

Factors That Have Influenced Australian Department of Defence Fuel Sustainability Since  
1999

by

Colonel Martin White, CSC, BA *UNSW*, M (DefStud) *UNSW*,  
GradDip (Econ) *UNE*, GradDip (DefStud) *UNSW*, *psc*

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School of Humanities and Social Sciences

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## **ABSTRACT**

There are reasons why Australian military fuel sustainability *might* have been a higher priority for Australian policymakers since leading the International Forces in East Timor mission in 1999. Defence declaratory policy statements consistently prioritised the ability to conduct independent operations in Australia's nearer region; the outcome of major conflicts such as World War Two were significantly influenced by access to oil; new military equipment of the type Australia is acquiring is increasing fuel demand; the logistics behind fuel supply for major military operations is vast and expensive; fuel governance requirements have presented major challenges; securing fuel supply lines has proven particularly onerous in United States military operations in the Middle East; and, strategic competitors could disrupt Australia's fuel supply during a conflict. However, military fuel sustainability has not been a priority for Australian policymakers for decades, and this lack of emphasis caused no significant strategic or tactical problems. The Department of Defence achieved its directed tasks without any major fuel concerns.

This thesis contends that the Australian policymaker approach to military fuel sustainability is consistent with an enduring disjunction between defence policy and operational practice, with policymakers anticipating the most likely operational contingencies to be the provision of expeditionary forces to United States-led missions rather than independent nearer region operations. Further, the exceptional military role means that the Department of Defence would be prioritised for national resources such as fuel should a military requirement emerge. This thesis will critique three common trends in the literature: the *isolation* of military fuel sustainability commentary from broader defence policy; the *conflation* of national energy concerns with military fuel sustainability; and, the absence of critical analysis relating to the *politicisation* of aspects of military fuel sustainability. These trends have the potential to skew understanding of military fuel sustainability.

**STATEMENT OF AUTHORSHIP**

Except where reference is made in the text of this thesis, this thesis contains no material published elsewhere or extracted in whole or in part from a thesis accepted for the award of any other degree or diploma. No other person's work has been used without due acknowledgement in the main text of the thesis. This thesis has not been submitted for the award of any degree or diploma in any other tertiary institution.

Martin White

10 May 2019

## **ACKNOWLEDGEMENTS**

After 25 years of military service, I can confidently say that I owe the Australian Defence Force far more than it owes me. This incredible organisation has presented me with more opportunities than I could have ever imagined. My simple aim for this doctoral research project, and for my ongoing service, is to help to advance Australia's military capability and the standing of the Australian Defence Force, to ensure that we are most prepared for the predicted and the unknown challenges of the future. Although too numerous to mention individually, I have had the great fortune to be inspired and mentored by many wonderful military commanders during my service. The Australian Defence Force and the Department of Defence are blessed with excellent leadership, and I continue to enjoy being a small part of this great team.

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## **CHAPTER ONE – INTRODUCTION**

### **Overview**

The outcome of World War Two was significantly influenced by access to crude oil.<sup>1</sup> Military fuel consumption continues to rise as sophisticated military technology is introduced;<sup>2</sup> the sheer quantity of fuel now required by military forces is a considerable logistics undertaking. Recent military operations demonstrated the immense physical risks<sup>3</sup> and high monetary costs<sup>4</sup> associated with the tactical supply of fuel to deployed military units. The threat of a military fuel supply disruption caused by a hostile nation withholding or blocking supply is a commonly declared concern of policymakers.<sup>5</sup>

There are many important reasons why Australian Department of Defence (herein titled 'Defence') military fuel sustainability *might* have been a high priority issue for policymakers since Australia led the International Force in East Timor (INTERFET) in 1999. However, military fuel sustainability has not elicited significant interest, because there have been more important issues for successive Australian Governments to manage and there has been no foreseeable direct or existential military threat to Australia.<sup>6</sup> When the most extreme existential security concerns passed as the memories of World War Two faded, and as the military reliance on the United States (US) became deeply embedded in defence policy, military fuel sustainability appeared to become an afterthought in Australian defence policy. The acquisition and maintenance of combat equipment was

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<sup>1</sup> Daniel Yergin, *The Prize: The Epic Quest for Oil, Money and Power* (Free Press, New York, 1991), 308-371.

<sup>2</sup> United States Department of Defense, *Energy for the Warfighter: Operational Energy Strategy* (Office of the Assistant Secretary of Defense for Operational Energy, Plans and Programs, Washington, D.C., 2012), Introduction.

<sup>3</sup> United States Department of Defense, *2016 Operational Energy Strategy* (Office of the Assistant Secretary of Defense for Energy, Installations and Environment, Washington, D.C., 2016), 9.

<sup>4</sup> United States Defense Science Board, *More Capable Warfighting Through Reduced Fuel Burden* (Office of the Under Secretary of Defense for Acquisition, Technology and Logistics, Washington, D.C., January 2001), 19.

<sup>5</sup> Geoff Dabelko, 'Admiral Mullen and the 'Strategic Imperative' of Energy Security', *New Security Beat*, [website], (13 October 2010), <<http://www.newsecuritybeat.org/2010/10/admiral-mullen-and-strategic-imperative.html>>, accessed 12 April 2019.

<sup>6</sup> Interview with Mr Dennis Richardson, Secretary of the Department of Defence (2012-2017) and Australian Ambassador to the United States (2005-2010), conducted on 15 April 2019.



pragmatically prioritised over the fuel and logistical capacity needed to support that combat equipment.<sup>7</sup>

More broadly, prioritisation challenges are prevalent in all aspects of Australian defence policy, as finite resources are allocated to military response options to meet a range of assessed security threats.<sup>8</sup> These prioritisation challenges have led to a number of commonly posed questions. Despite consistent declarations in policy that Australia should prioritise military force structure for independent nearer region operational contingencies and be able to lead military coalitions in the region,<sup>9</sup> do Australian policymakers retain a primary expectation of providing expeditionary forces to US-led military operations?<sup>10</sup> Is there a further expectation of being logistically supported,<sup>11</sup> but with no expectation of developing a more independent defence policy unless strategic circumstances change significantly? Is Australian defence policy being pulled in 'different directions'<sup>12</sup> by competing important priorities?<sup>13</sup>

Implicit in these questions is the concept of policy ambiguity, reflecting the frequent identification, by credible commentators such as White, Dibb, Cheeseman and Davies of a disjunction between declaratory defence policy and operational practice.<sup>14</sup> Whilst White Papers produced since 1976 situated nearer region contingencies as the highest priority,<sup>15</sup> consistency between defence policy and operational practice is not always evident.<sup>16</sup>

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<sup>7</sup> Mark Thomson, *The Cost of Defence* (Australian Strategic Policy Institute Defence Budget Brief 2013-2014, Canberra, 2013), viii.

<sup>8</sup> Department of Defence, *2016 Defence White Paper* (White Paper, Commonwealth of Australia, 2016), 18-22.

<sup>9</sup> Department of Defence, *Defence White Paper 2013* (Commonwealth of Australia, Canberra, 2013), 26.

<sup>10</sup> Michael Evans, *The Continental School of Strategy: The Past, Present and Future of Land Power* (Land Warfare Studies Centre, Study Paper No. 305, June 2004), 106, highlighted the recurrent trend of using tactical Australian military forces to achieve politico-strategic interests.

<sup>11</sup> Sea Power Centre Australia, *Semaphore* (12, Newsletter, November 2008), highlighted the long-standing US logistic support to Australian forces operating in the Persian Gulf.

<sup>12</sup> Rod Lyon, *Australia's Strategic Fundamentals* (Australian Strategic Policy Institute, June 2007), 2.

<sup>13</sup> Department of Defence, *2016 Defence White Paper*, 17, outlined three 'Strategic Defence Interests' of 'fundamental significance' to military force structure.

<sup>14</sup> For example, see: Hugh White, 'Waning US power must shape Australia's defence strategy', *The Strategist* [website], (8 October 2018), <<https://www.aspistrategist.org.au/waning-us-power-must-shape-australias-defence-strategy/>>, accessed 2 February 2019; Paul Dibb and Richard Brabin-Smith, 'Australian Defence: Challenges for the New Government', *Security Challenges*, 9/4 (2013), 52; Graeme Cheeseman, 'The Howard Government's Defence White Paper: Policy, Process and Politics', *The Drawing Board: An Australian Review of Public Affairs*, 2/1 (July 2001), 13; Andrew Davies, *Let's Test that Idea: The Contestability of Advice in the Department of Defence* (Australian Strategic Policy Institute No. 54, 22 January 2010), 2-3.

<sup>15</sup> For example, Department of Defence, *Australian Defence* (White Paper, Canberra, 1976), 6.

<sup>16</sup> Davies, *Let's Test that Idea: The Contestability of Advice in the Department of Defence*, 3.

Furthermore, regardless of the stated priority of nearer region contingencies, there are implications in relation to fuel sustainability, and these have not been prioritised.

### **Enhancing existing hypotheses – Australian defence policy and military exceptionalism**

The presence of a disjunction between declaratory Australian defence policy and operational practice is an existing and well developed hypothesis, as Chapter Two will identify. However, Australian defence policy has not been analysed through a military fuel sustainability lens, and this presents the opportunity for a unique and valuable perspective on the apparent policy-practice disjunction to be developed. Unlike the existing literature relating to defence policy and to military fuel sustainability, this thesis seeks to determine whether the issue of Australian military fuel sustainability is consistent with the existence of a policy-practice disjunction.

Further, this thesis will uniquely view the concept of military exceptionalism<sup>17</sup> – a complex and often imprecise notion, relating to the perceived importance of the task the military is expected to undertake – through a military fuel sustainability lens. The overarching question is: Is the approach by Australian policymakers to military fuel sustainability indicative of the military being treated as an exceptional or unique organisation? More specifically, is it envisioned that in the case of a significant threat to Australia, the current allocation of resources for fuel supply would be increased to sustain independent operations?<sup>18</sup>

In considering these two questions, this thesis will contribute to existing and well developed knowledge relating to the armed forces and society. This thesis will expand on the work of notable military commentators including Huntington, Janowitz and (in the Australian context) Bergin and Smith,<sup>19</sup> and to the knowledge created by prominent military logistics theorists such as van Creveld and Eccles.<sup>20</sup> An existing proposition

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<sup>17</sup> Also referred to as ‘romantic militarism’ – see Nancy Rosenblum, *Another Liberalism: Romanticism and the Reconstruction of Liberal Thought* (Harvard University Press, 1987), 9-12.

<sup>18</sup> Anthony Bergin and Hugh Smith, ‘The Public Perceptions of the Army’, in David Horner (ed.), *Reshaping the Australian Army: Challenges for the 1990s* (Canberra Papers on Strategy and Defence No. 77, Canberra, 1991), 201.

<sup>19</sup> See: Samuel Huntington, *The Soldier and the State* (Harvard University Press, 1957); Morris Janowitz, *The Professional Soldier* (Free Press, New York, 1971); Bergin and Smith, ‘The Public Perceptions of the Army’.

<sup>20</sup> Martin van Creveld, *Supplying War: Logistics from Wallenstein to Patton* (Cambridge University Press, United Kingdom, 1977), 1-2; Henry Eccles, *Logistics in the National Defense* (Naval War College Press Edition in the Logistics Leadership Series, Rhode Island, 1997), 18.

frequently presented in the literature is that logistics is treated as a lesser priority than tactics and strategy, because 'it does not appeal to the imagination' like the tactics and strategy associated with the defeat of an enemy.<sup>21</sup> This may be an unconscious bias for some.<sup>22</sup> Huntington argued that tasks supporting military operations, but without a responsibility to 'manage violence',<sup>23</sup> had closer links to the civilian community rather than to the military. Unlike previous literature on the armed forces and society and on military logistics, which did not focus on fuel as an aspect of military exceptionalism, this thesis will seek to determine if the contemporary approach to Australian military fuel sustainability is indicative of military exceptionalism and consistent with a broader perspective on the relative priority of military logistics.

The hypothesis evaluated in this thesis is that military fuel sustainability has not been of significant concern or priority for Australian policymakers since INTERFET, and a pragmatic approach to only provide the bare minimum of resources for military fuel sustainability still allowed Defence to achieve directed military tasks. This pragmatic and minimalist approach was adopted despite the regularly declared highest strategic priority being the need to lead military coalitions in Australia or in the nearer region, where fuel supply for military operations would be challenging. Furthermore, this declaratory policy priority was sustained despite the continued focus on maintaining a technologically sophisticated military capability, where fuel consumption continued to grow over time; and despite the declared importance of military fuel sustainability in high level policy.<sup>24</sup> Following from this, a key question to be addressed in this thesis is whether military fuel sustainability is indicative of a broader approach to Australian defence policy (that the most anticipated operational contingencies are of expeditionary forces supporting the US, where Defence fuel shortfalls are mitigated), and related to a belief in military exceptionalism and the enduring low priority given to military logistics.

On this basis, three research questions are posed. First, is military fuel sustainability an issue that is seriously considered in Australian defence policy? Second, is the Australian approach to military fuel sustainability indicative of an expectation of providing

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<sup>21</sup> van Creveld, *Supplying War: Logistics from Wallenstein to Patton*, 2.

<sup>22</sup> David Kilcullen, 'Australian Statecraft: The Challenge of Aligning Policy with Strategic Culture', *Security Challenges*, 3/4 (November 2007), 47.

<sup>23</sup> Huntington, *The Soldier and the State*, 11-12.

<sup>24</sup> For example, Department of Defence, *Defence White Paper 2013*, 51.

expeditionary forces to US-led military operations? Third, is the approach by Australian policymakers to military fuel sustainability indicative of the military being treated as an exceptional or unique organisation within the government and society?

### Thesis structure

The literature review in Chapter Two will identify that the answers to these research questions represent important gaps in knowledge. These questions were initially explored through published work, including consideration of the approach to fuel in Defence,<sup>25</sup> the link between national energy policy and military fuel sustainability issues,<sup>26</sup> and the gap between declaratory Australian defence policy and operational practice.<sup>27</sup> However, the researcher acknowledges that further data collection conducted since the publication of these works, through interviews for instance, has led to more diverse conclusions being drawn.

Chapter Two will identify three trends in Australian and US commentary that may in fact distort the understanding of military fuel sustainability. These trends can be characterised as the *isolation* of military fuel sustainability from broader Australian defence policy and from military logistics theory, the *conflation* of national energy matters with military fuel sustainability, and the failure to identify *politicisation* of some approaches to military fuel sustainability.

First, the common consideration of military fuel sustainability in isolation from factors such as broader defence policy and established military logistics theory is questioned. Examples such as Winston Churchill changing the British Royal Navy fleet from coal to oil power prior to World War One were regularly invoked in contemporary literature,<sup>28</sup> but were not contextualised in current strategic circumstances. Second, the frequent conflation of national energy requirements and military fuel sustainability, including the

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<sup>25</sup> Martin White, 'The compelling requirement to energy-proof the Australian Defence Force', *Australian Defence Force Journal*, 175 (Canberra, March/April 2008), 12-21.

<sup>26</sup> Martin White, 'Linking National and Military Energy Security in Australia: A Legitimate Nexus, or Political and Economic Expediency?', *Security Challenges*, 9/3 (2013), 43-62.

<sup>27</sup> Martin White, 'The Futility of Capability Arguments and the Army Approach to the 2014 Force Structure Review', in *Australian Army Journal*, X/4 (Summer 2013), 8-26.

<sup>28</sup> Robert Zubrin, *Energy Victory: Winning the War on Terror by Breaking Free of Oil* (Prometheus Books, New York, 2009), 224, and Daniel Yergin, 'Crisis and Adjustment: An Overview', in Daniel Yergin and Martin Hillenbrand (eds.), *Global Insecurity: A Strategy for Energy and Economic Renewal* (Houghton Mifflin Company, Boston, USA, 1982), 21.

extrapolation of concepts such as political and geological supply limitations to crude oil production into the military domain, will be considered.<sup>29</sup> Third, this thesis will consider why evidence of politicisation of military fuel sustainability was rarely identified in the literature.<sup>30</sup> Failure to identify politicisation of military fuel sustainability is particularly apparent in the US context (outlined in the Chapter Five case study); study of US military fuel sustainability is therefore important, because of the regular argument that Australia should do more to improve military fuel sustainability as it has been perceived that the US military is taking significant action.<sup>31</sup>

To answer these questions, the methodology for this thesis derived from the literature review will be outlined in Chapter Three. An entirely qualitative approach was adopted on the basis that there is no specific literature identified on the questions posed for this thesis; there was a high degree of subjectivity and many different views of the ‘problem’ in the literature; and, the researcher maintained a desire to understand the underlying motives and range of different perspectives that may apply to the contemporary approaches to Australian military fuel sustainability. Analysis of underlying structures and mechanisms relating to military fuel sustainability offers more useful knowledge at this point in time than specific quantitative analysis of certain aspects of military fuel sustainability. Further valuable quantitative, qualitative or mixed method research could be derived from this thesis.

Chapter Three will outline a qualitative methodology comprising a multiple method (multi-method) approach. The methods include primary document analysis, case studies, and semi-structured interviews, allowing methodological triangulation to be undertaken. The heavy reliance on primary policy documents sought to reduce the problem of interpretation and reinterpretation that is possible when analysing Australian defence

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<sup>29</sup> The Pew Project, *Reenergizing America's Defense: How the Armed Forces are Stepping Forward to Combat Climate Change and Improve the US Energy Posture* (The Pew Charitable Trusts, Washington and Philadelphia, 2010), 4. In the Australian context, see Cameron Leckie, ‘Peak Oil and the Australian Army’, *Australian Army Journal* (Summer 2007), 22.

<sup>30</sup> Chris Barrie, ‘Why the defence force must plan for climate change’, *ABC News*, [website], (12 September 2013), <<http://www.abc.net.au/news/2013-09-12/barrie---defence-force-and-climate-change/4953150>>, accessed 12 April 2019.

<sup>31</sup> Climate Council, *Be Prepared: Climate Change, Security and Australia's Defence Force* (Canberra, 2015), v.

policy, and supported a strategy of non-reactive research,<sup>32</sup> which partly aimed to ensure no perceived or real bias associated with the fact that the researcher is a senior military officer. Semi-structured interviews were undertaken with a range of actors, including senior military officers and public servants (in fuel-related appointments and in non-fuel specific command and leadership appointments), commentators, and an Australian Senator (a retired senior military officer).

Chapter Four will outline the specific Australian approach to military fuel sustainability, including the supply of fuel for contemporary operations, the significant number of contemporary reviews into fuel governance and safety for domestic military facilities, the role of institutional structures such as the Defence Fuel Management Committee, the approach to energy management in a domestic context for fixed military installations, and the approach to training, procurement and science and technology relating to fuel.

Chapter Five is a case study of US military fuel sustainability, compared and contrasted to Australian military fuel sustainability. Chapter Five will critically analyse actions taken by US policymakers to influence deployed fuel consumption and domestic energy expenditure and consumption.<sup>33</sup> With Australia often reliant on US technology and operational and logistical support,<sup>34</sup> and focused on interoperability with the US,<sup>35</sup> this chapter will examine factors such as fuel initiatives and influences on US military fuel sustainability to gain further understanding of the Australian context. The different geopolitical outlooks of the US and Australia, and the differences in the proven ability of these countries to sustain independent expeditionary military operations, offers a useful comparison. Similarities between the two nations such as the equipment interoperability,<sup>36</sup> the need to operate militarily across vast distances; the historical prioritisation of resources for military use during major conflict; and, the regular conflation of national energy and military fuel issues, allowed further comparison.

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<sup>32</sup> John Brewer and Albert Hunter, *Foundations of Multimethod Research: Synthesising Style* (Sage Publications, California, 2006), 2.

<sup>33</sup> For example, United States Congressional Research Service, *Energy Independence and Security Act of 2007: A Summary of Major Provisions* (Washington, D.C., 21 December 2007).

<sup>34</sup> Department of Defence, *Defence Procurement Policy Manual* (Defence Materiel Organisation, Canberra, 1 July 2010), Prelim-2, highlighted the need to maintain preferential access to US technology.

<sup>35</sup> Department of Defence, *Australia United States Capability Development Liaison Handbook* (Interim Edition, 2006-2007), 3.

<sup>36</sup> Ibid, acknowledged 'several hundred committees and working groups' supporting US-Australia military interoperability.

Chapter Six will examine military fuel sustainability in the context of a declared contingency scenario. A case study outlining military fuel supply for the forward deployment of a combat aircraft Squadron, a contingency presented consistently across decades of Australian defence policy, will be outlined. This case study seeks to identify how prepared Defence is to undertake missions declared as being central to Australian defence policy.

Chapter Seven will summarise the factors influencing Australian military fuel sustainability since INTERFET. It will generalise findings from this research to determine if military fuel sustainability displays consistencies with the observed policy-practice disjunction, and enhances understanding of Australian defence policy and military exceptionalism.

### **Divergent views of a problem**

While this thesis positions military fuel sustainability within the context of Australian defence policy and military exceptionalism, the researcher remained mindful of the different problems associated with military fuel sustainability, as these all had the potential to be influential factors. The difficulty often associated with identifying public policy problems is apparent when examining military fuel sustainability. There are multiple understandings of every problem or issue; the problems (or lack of any problems) with military fuel sustainability, and the relative priority associated with solving identified problems, were approached differently by different groups.

At various times, concerns have been raised about different aspects of military fuel sustainability, including: ongoing geological constraints that could impact on military fuel supply;<sup>37</sup> the significant military logistics burden associated with fuel;<sup>38</sup> fuel expenditure;<sup>39</sup> the impact of fuel use on the environment and related climate change issues;<sup>40</sup> lives placed at risk during fuel resupply;<sup>41</sup> politically hostile oil producers and their potential to

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<sup>37</sup> Chris Trengove and R.J. Clarke, 'Australian Energy Markets', in Chris Trengove (ed.), *Australian Energy Policies in the 1980s* (Allen and Unwin Australia, 1986), 3, discussed the 'fear of depletion'.

<sup>38</sup> Interview with Air Commodore Martin Smith, Director General Logistics-Air Force (2019), conducted on 1 April 2019.

<sup>39</sup> Department of Defence, *The Strategic Reform Program: Delivering Force 2030* (Commonwealth of Australia, 2009), 18.

<sup>40</sup> Department of Defence, *Australian Defence Force Environmental Statement* (Canberra, April 2006).

<sup>41</sup> Ben White, 'Sustainable Defence Capability: Australia's national security and the role of defence industry', *Australian Defence Force Journal*, 183 (2010), 89.

disrupt supply;<sup>42</sup> military reputational issues;<sup>43</sup> future military capability;<sup>44</sup> the free market;<sup>45</sup> military interoperability;<sup>46</sup> an unaffordable force structure;<sup>47</sup> and, science, technology and innovation.<sup>48</sup> Military fuel sustainability was concurrently defined as a technical problem, a tactical problem, and a political problem. Military fuel sustainability was argued to be a problem that was symptomatic of the lack of an Australian national security strategy.<sup>49</sup> Military fuel sustainability was periodically assessed to require either a long-term political shift, or a short-term response, or both. Although few commentators defined it as such, military fuel sustainability could also be defined as an issue of relativity – if tactical fuel supply could become a problem for Australia, what is the effect on future allies or enemies?<sup>50</sup>

An important aspect of this thesis is to document and analyse how policymakers reconcile these non-unified views of military fuel sustainability. Indeed, it is possible that no specific problems relating to fuel supply surfaced through the military hierarchy to the most senior policymakers. The Australian performance during Defence's largest contemporary operational deployment, INTERFET, was often praised, and 'enhanced Australia's military reputation'.<sup>51</sup> However, INTERFET demonstrated military fuel sustainability shortfalls that would be relevant to other more demanding declared contingencies. A pragmatic approach to military fuel sustainability, with only the bare minimum of resources being

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<sup>42</sup> Several presenters at the Defence Fuel Seminar, held at the Royal Military College on 24 August 2010, linked the Defence fuel 'problem' to international insecurity and instability.

<sup>43</sup> For example, Department of Defence, *Australian Defence Force Environmental Statement*, argued that Defence is an 'environmental leader'.

<sup>44</sup> Leckie, 'Peak Oil and the Australian Army', 30.

<sup>45</sup> White, 'Sustainable Defence Capability: Australia's national security and the role of defence industry', 92, argued that where the market will not provide 'sustainable' capabilities for Defence, the Australian Government must create the demand.

<sup>46</sup> Interview with Mr Dennis Richardson, Secretary of the Department of Defence (2012-2017) and Australian Ambassador to the United States (2005-2010), conducted on 15 April 2019.

<sup>47</sup> Thomson, *The Cost of Defence*, viii.

<sup>48</sup> Chapter Four will examine the Defence Science and Technology Group's approach to military fuel sustainability, through the initiation of studies such as Gregory Clark, *Conceptual Study on Replacing the Raven Back Pack Radio Batteries with a Solid Polymer Fuel Cell* (Defence Science and Technology Organisation, DSTO-TN-0014, Melbourne, 1995).

<sup>49</sup> Interview with Senator Jim Molan, Senator for New South Wales (2018-2019), conducted on 7 March 2019.

<sup>50</sup> Neil James, *Defence White Papers: An Alternative View* (Address to the Royal United Services Institute, 30 September 2008), 15, argued that oil supply vulnerabilities affected 'nearly everybody'.

<sup>51</sup> Bob Breen, *Struggling for Self Reliance: Four Case Studies of Australian Regional Force Projection in the Late 1980s and the 1990s* (Strategic and Defence Studies Centre, Canberra Papers on Strategy and Defence, No. 171, ANU E Press, Canberra, 2008), 163.



applied to meet current and expected tasks, might be considered a reasonable approach to military fuel sustainability, but may be evidence of a policy-practice disjunction.

Further, formal acknowledgement by a policymaker that any one of the concerns about military fuel sustainability constitutes an immediate or critical problem for Defence could lead to an expenditure obligation that may detract from other higher defence priorities.<sup>52</sup> Such expenditure is unnecessary if fuel capacity can be developed in conjunction with the emergence of an exceptional military task. If 'the first and abiding priority' of the Australian Government is Australia's security,<sup>53</sup> it could reasonably be expected that an Australian Government would resource any exceptional military task if or when required. It is also a reasonable proposition (and incorporated in Australian defence policy) that some parts of Defence could be held at a lower state of readiness to minimise expenditure on unlikely scenarios,<sup>54</sup> noting that the readiness of different combat equipment was not emphasised in the 2016 White Paper, with an unequivocal claim that 'Defence is prepared to respond if the Government decides the pursuit of Australia's interests requires the use of military force'.<sup>55</sup> A risk with a readiness-based approach is that supporting elements may be unfunded or underfunded due to competing political and budgetary pressures and a short-term view of policy.<sup>56</sup>

It is important to define what military fuel sustainability is not. Military fuel sustainability has not been a core strategic concern for any Australian government since World War Two, and this has contributed to its absence from any serious consideration by Australian defence commentators within the context of Australian defence policy. This is unlike other geostrategic factors such as the end of the Cold War or the rapid growth of China, which are extensively acknowledged. While there is the potential for issues such as tactical fuel unavailability and increased fuel prices to make core strategic problems more challenging to manage, such as when INTERFET operations were constrained by inadequate fuel provision,<sup>57</sup> these tactically significant fuel supply challenges have barely been

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<sup>52</sup> Interview with Mr Dennis Richardson, Secretary of the Department of Defence (2012-2017) and Australian Ambassador to the United States (2005-2010), conducted on 15 April 2019.

<sup>53</sup> Department of Defence, 2016 Defence White Paper, 9.

<sup>54</sup> For example, Department of Defence, *Australian Defence*, 12.

<sup>55</sup> Department of Defence, 2016 Defence White Paper, 17.

<sup>56</sup> Jim Molan, 'Why Our Defence Forces Face Terminal Decline', *Quadrant Online*, [website], (1 March 2013), <<https://quadrant.org.au/magazine/2013/03/why-our-defence-forces-face-terminal-decline/>>, accessed 7 January 2018.

<sup>57</sup> Paul Firth, 'Petroleum Support', *The Link Defence Logistics Magazine*, 3 (Canberra, 2008), 21.

acknowledged by policymakers. With no major strategic threat, many competing strategic and resource demands, an historical and highly effective reliance on the US for fuel supply during expeditionary operations,<sup>58</sup> and a level of benign neglect from senior levels,<sup>59</sup> military fuel sustainability has not been a prominent issue. However, declaratory policy statements do not de-prioritise the unlikely scenarios that would demand greater fuel sustainability.

### **A note on terminology**

Whilst often used interchangeably, or in combination with other terminology such as petroleum, this thesis will refer to 'fuel' (describing the end products supplied for tactical consumption) and 'crude oil' (the raw product required for fuel, petroleum and lubricant production). The term 'energy' is used throughout this thesis as an encompassing term to describe the full range of available energy sources and supplies, including petroleum.

This thesis focuses on 'fuel sustainability' because it is an essential requirement for achieving the defence mission as defined in numerous declaratory policy statements such as Defence White Papers. Sustainability does not necessarily equate with operational independence and is discussed relative to specific contingencies (such as independent operations in the nearer region or coalition operations further afield).

In addition to the focus on sustainability, this thesis will refer to fuel 'usage', 'consumption' and 'supply'. These are terms that imply less coordination and coherence than 'policy', 'management' or 'strategy'. Policy, management and strategy are terms that have been used in some policy documents and by some commentators when referring to fuel,<sup>60</sup> but this thesis has not uncovered sufficient evidence of coherence and priority to describe Australia's military fuel sustainability actions as part of a broader, deliberate strategy.

This thesis distinguishes between the energy requirements of Defence's domestic facilities and infrastructure, known within Defence as the 'Defence Estate' (the predominant

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<sup>58</sup> Breen, *Struggling for Self Reliance: Four Case Studies of Australian Regional Force Projection in the Late 1980s and the 1990s*, 168.

<sup>59</sup> Interview with Brigadier Andrew Freeman, Commander 17<sup>th</sup> Combat Service Support Brigade (2018-2019), conducted on 18 February 2019.

<sup>60</sup> For example, see Department of Defence, *Defending Australia in the Asia Pacific Century: Force 2030* (White Paper, Commonwealth of Australia, 2009), 124.

domestic military energy usage, mostly sourced from domestically-generated electricity), and the fuel required by tactical elements while operating in Australia, on independent operations in the nearer region, or coalition operations further afield (predominantly crude oil-based). By distinguishing between tactical and domestic energy requirements in different contingencies, an understanding of military exceptionalism can be discovered, particularly by understanding factors such as exemptions from restrictive government legislation and policy.

The terms 'declared policy', 'operational practice' and 'policy-practice disjunction', will be used throughout this thesis to highlight the divergence between what policymakers say and what they do. The policy-practice disjunction is described throughout this thesis as a hypothesis. A hypothesis can be defined as a 'proposed explanation',<sup>61</sup> and the policy-practice disjunction is a widely accepted descriptor. The significant body of evidence presented over time on a policy-practice disjunction is a strong basis, which this thesis will seek to either further substantiate (or observe consistency with) or contradict, through the lens of military fuel sustainability.

Whilst there has been considerable debate concerning the definition and the relative nature of policy, particularly in the discipline of security where policy cannot be absolute,<sup>62</sup> this thesis refers to 'policymakers' as the individuals who have the authority to plan for, develop and influence defence policy. In his description of Australian national security policymaking during the Timor Leste crisis, Connery described a 'formal policymaking system' enacted during the Howard Government, centred around the National Security Committee of Cabinet, which comprised political leaders (in 1999, this included the Prime Minister, the Deputy Prime Minister, the Foreign Minister, the Defence Minister, the Treasurer and the Attorney General) and officials (various Departmental Secretaries, Directors General and the Chief of Defence Force) as the 'dominant domestic actors'. Connery described the lower level Secretaries Committee on National Security (comprising only senior departmental bureaucrats and the Chief of Defence Force) as

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<sup>61</sup> Peter Eastwell, 'Understanding Hypotheses, Predictions, Laws, and Theories', *Science Education Review*, 13/1 (2014), 16.

<sup>62</sup> Deborah Stone, *Policy Paradox: The Art of Political Decision Making* (Norton and Company, United States, 2002), Chapter 4.

being responsible for 'policy development and implementation.'<sup>63</sup> This thesis will use the term policymakers when referring specifically to those who have the authority to enact or influence defence policy and aspects of military fuel sustainability, and this includes political leaders, senior military commanders and senior public servants. Where more specificity is required, this thesis will refer to the responsible actor or actors using the terms political leaders, military commanders or senior public servants.

The term 'politicisation' is used to identify one of the three key features of the military fuel sustainability literature. Fuel is already an intrinsically political subject. In the context of the existing literature, politicisation refers to the fact that military fuel sustainability is often discussed in a politically opportunistic way to further agendas which only bear a marginal relevance to military performance or strategy.

The term 'nearer region' refers to the South Pacific and Timor Leste, and this term was applied in the 2016 White Paper and in previous defence policy.<sup>64</sup>

The term 'Peak Oil' is used commonly in literature relating to military fuel sustainability, and can be defined as 'the point at which the world's oil supplies go into irreversible decline'.<sup>65</sup> Peak Oil is an important concept in this thesis only insofar as it forms the basis for conflation of domestic and operational fuel use and was also viewed at times as influencing the increasing costs of fuel, which in turn drove attempts to manage fuel usage.

Finally, the term 'existential threat' has commonly been used to describe 'a threat to existence'.<sup>66</sup> It is often used in security commentary to describe major wars involving great powers, given the extreme consequences of such wars.<sup>67</sup> In this thesis, an existential conflict also refers to a conflict with a nation that possesses the military capability to permanently and coercively change another group's values such as their system of

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<sup>63</sup> David Connery, *Crisis Policymaking: Australia and the East Timor Crisis of 1999* (ANU E Press, Canberra, 2010), 1-10, 140.

<sup>64</sup> Department of Defence, *2016 Defence White Paper*, 17.

<sup>65</sup> Financial Times, 'Lexicon', *FT*, [website], (2014), <<http://lexicon.ft.com/Term?term=peak-oil>>, accessed 20 April 2019.

<sup>66</sup> *The Spectator*, 'Existential threat: the birth of a cliché', [website], (24 January 2015), <<https://www.spectator.co.uk/2015/01/existential-threat-the-birth-of-a-cliche/>>, accessed 15 April 2019.

<sup>67</sup> For example, Mike Scrafton, 'Australia needs a real debate on a national security strategy', *The Strategist*, [website], (7 March 2019), <<https://www.aspistrategist.org.au/australia-needs-a-real-debate-on-a-national-security-strategy/>>, accessed 15 April 2019.

governance.<sup>68</sup> Existential threats are distinguished from other lesser threats insofar as they frame policy by defining the most significant contingency that Defence is tasked to counter, but also in that they place different demands on the provision of fuel. As such, they can be contrasted with contingencies such as independent operations in the nearer region or coalition operations further afield.

## Conclusion

There are many reasons why military fuel sustainability *might* have been a high priority for Australian policymakers. The fact that it is not a high priority, and that the literature and declared Australian defence policy lacks an appropriate explanation as to why, demands greater understanding.

When generalised, the unique lens of military fuel sustainability has the potential to bring greater understanding to wider aspects of Australian defence policy, including the hypothesis relating to the existence of a disjunction between declared policy and operational practice, and a view of military exceptionalism and the prioritisation of resources such as fuel for military purposes in times of need.

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<sup>68</sup> Phil Walter, 'What is an Existential Threat?', *Real Clear Defense*, [website], (9 February 2016), <[https://www.realcleardefense.com/articles/2016/02/10/what\\_is\\_an\\_existential\\_threat\\_109009.html](https://www.realcleardefense.com/articles/2016/02/10/what_is_an_existential_threat_109009.html)>, accessed 15 April 2019.

## **CHAPTER TWO – LITERATURE REVIEW**

### **Introduction**

This chapter will review the existing body of literature, and build the case for the specific research methodology outlined in Chapter Three, to enhance knowledge of the factors influencing Australian military fuel sustainability. A focus of this literature review is the period since 1999 when Australia led the International Forces in East Timor (INTERFET), unique in its standing as a mission comparable to more demanding independent nearer region scenarios outlined in Australian defence policy. However, this chapter also considers the literature relating to the prominence of fuel during historical conflicts, and this longitudinal observation will be represented within Chapter Three as a method to explore key contemporary issues given the absence of any major or existential conflicts facing Australia since World War Two.

Military fuel sustainability was represented in literature and in policy from World War One onwards, mostly through non-participant observation, as advances in fuel technology transformed warfare, and as warfare shaped further development in fuel technology.<sup>1</sup> The bulk of recent literature on military fuel sustainability originated in the United States (US), where the issue was prominent at various times during the twenty-first century.<sup>2</sup> Despite the Australian focus of this thesis, the US literature is also relevant. The regular procurement of US equipment; the commonality of standard operating procedures; the consistent Australian military deployments in support of US-led missions; the durability of the alliance; and, the similarly declared importance placed on military fuel sustainability for both nations means that there is relevance for understanding Australian military fuel sustainability by examining the US literature. The growing and significant body of Australian military fuel sustainability literature was also considered.<sup>3</sup>

There are three common and often related features that are distinct and consistent across contemporary literature on military fuel sustainability, but these have not been previously

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<sup>1</sup> David Mellor, *The Role of Science and Industry: Australia in the War of 1939-1945* (The Griffin Press, Adelaide, 1958), 212.

<sup>2</sup> The CNA Military Advisory Board, *Advanced Energy and US National Security* (Virginia, United States, 2017), 5.

<sup>3</sup> John Blackburn, *Australia's Liquid Fuel Security Part 2* (A Report for NRMA Motoring and Services, February 2014), 10.

charted in a clear way. They can be characterised as *isolation*, *conflation*, and *politicisation*.

First, the literature consistently examined military fuel sustainability, or related issues such as climate securitisation, in relative or complete isolation from broader defence policy,<sup>4</sup> and did not effectively distinguish between the likely missions that the Australian Department of Defence (herein titled 'Defence') would be tasked to undertake and more unlikely existential conflicts. As a result, the literature often treated military fuel sustainability as an area that individual policymakers could independently and significantly change, rather than being intimately entwined with defence policy.<sup>5</sup> There is research merit in examining these prevailing views to determine if the treatment of military fuel sustainability in isolation from defence policy allows an effective understanding of how decisions on military fuel sustainability are made.

Second, the literature commonly conflated national energy policy matters and military fuel sustainability. Concepts such as assured national fuel supply, and geological and political limitations to oil production were routinely argued to be military problems,<sup>6</sup> even though such linkages lack nuance and contextualisation of factors such as military exceptionalism and the likelihood of resource prioritisation for the military during major or existential conflicts.<sup>7</sup>

Third, there was an absence of critical reflection in the commentary on contemporary policymakers who frequently treated aspects of military fuel sustainability in an opportunistic way, often through making tenuous claims.<sup>8</sup> This lack of critique was a notable absence in the literature, and is also worthy of examination as the absence potentially skews the understanding of the factors influencing military fuel sustainability in Australia and in the US. Chapter Three will outline a qualitative research methodology

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<sup>4</sup> For example, Centre for Policy Development, *The Longest Conflict: Australia's Climate Security Challenge* (Report, 2015), 13.

<sup>5</sup> For example, Anthony Bergin and Zoe Glasson, *Implications of climate change for Australia's national security* (Submission 3 to Foreign Affairs, Defence and Trade Committee, 26 July 2017), 7.

<sup>6</sup> Cameron Leckie, 'Peak Oil and the Australian Army: An Update', *Australian Army Blog* [website], (6 February 2019), <<https://www.army.gov.au/our-future/blog/logistics/peak-oil-and-the-australian-army-an-update>>, accessed 6 February 2019.

<sup>7</sup> The CNA Corporation, *National Security and the Threat of Climate Change* (Virginia, USA, 2007), 7.

<sup>8</sup> For example, the literature review found no evidence of critical analysis of the claim in Department of Defence, *Defence Environment Strategic Plan 2010-2014* (Canberra, 2010), 5, that Defence would 'minimise its environmental footprint' while on overseas operations.

of case study analysis, primary documentation analysis and semi-structured interviews as a means to better understand these three features arising from this literature review.

Across all three of these identified trends, the literature lacked acknowledgement that the military may be treated as an exceptional entity that would be prioritised for fuel above other civilian uses in the event of major or existential conflict – even though a high level threat of this sort was not a scenario anticipated by Australian governments this century. The concept of military exceptionalism – a view that defence is the most important function of government, and resources for defence would be prioritised above other uses when required, through measures such as fuel rationing in Australian society – was a key omission in contemporary military fuel sustainability literature. Analysis of primary documentation was therefore an important method to understand the nature of military exceptionalism, and how military fuel sustainability was approached in policy and practice. Military exceptionalism is a theme that could reasonably have been anticipated in discussion on military fuel sustainability, but this was consistently absent from the literature.

Consideration of military fuel sustainability literature from a longitudinal or comparative historical perspective complemented the review of more contemporary literature and the time-bounded nature of the research. Contemporary Australian government threat scenarios do not envisage existential war and national mobilisation,<sup>9</sup> but major or existential conflict was considered possible in the period following World War Two. History is an important aspect of strategic culture, and some argued that strategic culture is more influential in the development of a nation's defence policy than deliberate decisions, for example in determining military force structure.<sup>10</sup> This historical context will assist in understanding the evolution of the approach to military fuel sustainability in Australia.

As this thesis uniquely seeks to identify some of the underlying motives of policymakers in their approach to military fuel sustainability, and the divergence between declaratory policy and operational practice (including the durability of Australian defence policy and

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<sup>9</sup> Department of Defence, *2016 Defence White Paper* (White Paper, Commonwealth of Australia, 2016), 32.

<sup>10</sup> Colin Gray, *Modern Strategy* (Oxford University Press, United States, 1999), 51.



alignment with the US), a review of existing commentary on Australian defence policy also forms part of this chapter. The basis of Australian defence policy was the subject of significant commentary; so to ensure this literature review remains sufficiently contained, it will focus on the distinction between declaratory policy and operational practice, which will be discussed from a methodological perspective in Chapter Three. The use of case studies will be identified in Chapter Three as a method to seek a better understanding of how military fuel sustainability was actually approached by policymakers. Consideration of this policy-practice disjunction in the context of military fuel sustainability offers a unique contribution to both the analysis of Australian defence policy, and to the study of military fuel sustainability.

### **Military logistics**

Pre-INTERFET literature, particularly from the period following World War Two, offered a comparative historical analysis in reference to contemporary approaches to military fuel sustainability. This pre-INTERFET literature demonstrated the approach to military fuel sustainability by policymakers during periods of warfare which many commentators and policymakers considered to be existential.<sup>11</sup> The literature also demonstrated how important military fuel sustainability could become for policymakers in certain circumstances,<sup>12</sup> even though such existential concerns do not currently exist in Australia and are not predicted to be likely in a reasonable planning timeframe.

In the absence of a wealth of literature focused on military fuel sustainability, classical military logistics literature also forms an important theoretical basis for further analysis of contemporary military fuel sustainability, given the clearly defined placement of fuel sustainability under military logistics in Australian and US military doctrine.<sup>13</sup> However, it is a notable comparison that much of the contemporary literature on military fuel sustainability treated fuel as a matter that is independent of, or of limited relationship to,

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<sup>11</sup> Australian War Memorial, *Second World War, 1939-45*, [website], <<https://www.awm.gov.au/articles/second-world-war>>, accessed 15 March 2018.

<sup>12</sup> Daniel Yergin, *The Prize: The Epic Quest for Oil, Money and Power* (Free Press, New York, 1991), 308-371.

<sup>13</sup> For example, Australian Army, *Land Warfare Doctrine 4-0: Logistics* (Canberra, 2018), 26, identified petrol, oils and lubricants as a 'Class 3' supply. This was consistent with North Atlantic Treaty Organisation doctrine.

military logistics, rather than integral to it.<sup>14</sup> Most contemporary military fuel sustainability literature was not explicitly linked to well-established logistics theory, and differed from approaches to other types of military logistics such as rations and equipment repair, which were often firmly situated in military logistics tradition.<sup>15</sup> The common absence of a link to established theory presented several possibilities that the literature review and Chapter Four will consider further: some contemporary commentators did not view the link to be important, or they believed the provision of oil for warfare was more important than other logistical commodities, or they viewed military fuel sustainability through a lens that prioritised environmental outcomes over military performance. It is also possible that a contemporary concern about fuel is a legacy from previous existential conflicts. Further, the orthodoxy of classical military logistics literature situated logistics in the context of major-power warfare, with independent military operations being conducted in existential conflict (as opposed to logistics in expeditionary military contributions). Existential conflict consideration was not relevant to the operations routinely undertaken by the Australian military since World War Two, and was not a priority in military planning. A major conflict scenario in the Australian context will be examined through the Chapter Six case study.

Nineteenth century Swiss military theorist Jomini designated logistics as one of the five branches of the art of war, and defined it as ‘the art of moving armies’ and ‘the means and arrangements which work out the plans of strategy and tactics’.<sup>16</sup> Whilst Jomini clearly placed logistics on an equal footing to the other components of the art of war (strategy, grand tactics, logistics, tactics of the different arms, and the art of the engineer), many of the great military logistics theorists subsequent to Jomini frequently observed that logistics was improperly treated as a component of military power and military operations that was less important than the other branches.<sup>17</sup> However, this did not

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<sup>14</sup> For example, Athol Yates and Neil Greet, *Energy Security for Australia: Crafting a comprehensive energy security policy* (Engineers Australia, 2014), commented on the assurance of fuel supply for military use, but without reference to the nature of the Australian military logistics system.

<sup>15</sup> For example, see Ann Barrett and Armand Cardello, *Military Food Engineering and Ration Technology* (DEStech Publications, Pennsylvania, 2012), 3-7; D. Vijaya Rao, *Armies, Wars and their Food* (Cambridge University Press, India, 2012).

<sup>16</sup> Antoine Henri de Jomini, *The Art of War* (Translated by G.H. Mendell and W.P. Craighill, Arc Manor, Rockville, 2007), 48-51.

<sup>17</sup> George Cyrus Thorpe, *Pure Logistics: The Science of War Preparation* (National Defense University Press Edition, Washington, D.C., 1986), 2.

necessarily undermine the importance of military fuel sustainability, but rather was an indication of military exceptionalism, and the fact that national resources were expected to be assigned to the exceptional military mission in situations of major or existential conflict.

Eccles highlighted the tension between logistics in the national economy, where it was 'dominated by civilian influence and civilian authority', and logistics in combat operations, where commanders sought to use logistics to sustain their forces. Eccles described this tension as 'the root of...differences of opinion as to national defense', where civilian efficiencies and combat demands overlapped.<sup>18</sup> Eccles served during World War Two and his views were articulated when great power conflict and existential threats were at the forefront of the minds of policymakers. Although some argued that specialisation and outsourcing of logistics chains created further unique problems for military operations,<sup>19</sup> the perceived lack of an existential threat may bring into question the validity of making theoretical generalisations based on this particular view of Eccles. The relevance of this will be explored further in Chapter Four, where fiscal pressure and energy provision will be examined in the Australian contemporary context. Further, the military-civilian tension identified by Eccles remains relevant<sup>20</sup> when considering the opportunistic approach taken by some policymakers towards contemporary military fuel sustainability, where the lack of an existential threat has meant that military outcomes are often of less concern than other factors such as creating a perception of environmental awareness within Defence. This issue will be considered further in this literature review and in Chapter Four.

Writing prior to the immense logistical demands resulting from the widespread use of the internal combustion engine in military operations, Thorpe lamented the fact that 'logistics has received so little academic attention', particularly given its importance to military campaigns.<sup>21</sup> This remains significant as an enduring observation, and remains a factor in the contemporary approach to logistics generally and to military fuel sustainability specifically. For example, the literature outlining logistics lessons from INTERFET

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<sup>18</sup> Henry Eccles, *Logistics in the National Defense* (Naval War College Press Edition in the Logistics Leadership Series, Rhode Island, 1997), 18.

<sup>19</sup> David Beaumont, 'Hoping and planning for the best: Understanding war without logistics', *Logistics in War: Military Logistics and its Impact on Modern Warfare*, [website], (12 February 2018), <<https://logisticsinwar.com/2018/02/11/hoping-and-planning-for-the-best-understanding-war-without-logistics/>>, accessed 20 January 2019.

<sup>20</sup> Christopher Paparone and George Topic Jr., 'The 'Clausewitz' of Logistics: Henry E. Eccles', *Army Sustainment* (January-February 2014), 9, argued that Eccles' contribution was enduring.

<sup>21</sup> Thorpe, *Pure Logistics*, 2.

consistently highlighted the underlying concern of van Creveld, Eccles, Ruppenthal and others about the low priority of logistics when compared to tactics and strategy.<sup>22</sup> Breen was one of many contemporaries who highlighted the lower priority of Australian military logistics across decades, illustrated by a lack of logistical capacity in Timor Leste.<sup>23</sup> In the US, Knepper argued that despite the criticality of fuel considerations for aircraft range and persistence, 'limited attention is given to this vital logistics matter, which threatens to undercut our strategy (for) decisive power projection'.<sup>24</sup> The same could be said for an Australian strategy that emphasises the ability to operate independently in the nearer region.

Ruppenthal, whose comprehensive history of US logistics during World War Two contained many observations of US military fuel sustainability during that conflict, also reflected that whilst 'World War II provided a convincing demonstration of the decisive role which materiel supremacy can have in modern warfare...little has been written' about it.<sup>25</sup> Examining all components of logistics during World War Two, Ruppenthal highlighted the many times that local shortfalls of all classes of supply occurred during tactical operations, and noted that transport limitations meant that each different class of supply had to effectively compete with the other classes of supply when demand was high.<sup>26</sup> This is a notable factor to be contemplated in the Chapter Six case study, which remains bounded in considering only fuel supply for a declared regional contingency, but notes that the demand for other types of supply would be immense and would need prioritisation.

Written after the Vietnam War, van Creveld's 'Supplying War' continued these observations when highlighting that little could be more important in war than the logistical support for a military force. Van Creveld sought to rebuff what he saw as earlier stories that 'armies frequently seem capable of moving in any direction at almost any

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<sup>22</sup> Roland G. Ruppenthal, *Logistical Support of the Armies: Volume 1, May 1941-September 1944* (Center of Military History, United States Army, Washington D.C., 1953), vii, 516.

<sup>23</sup> Bob Breen, *Struggling for Self Reliance: Four case studies of Australian Regional Force Projection in the late 1980s and the 1990s* (Strategic and Defence Studies Centre, Canberra Papers on Strategy and Defence, No. 171, ANU E Press, Canberra, 2008), 155.

<sup>24</sup> Gregory Knepper, *Access Assurance: Addressing Air Power Reach, Persistence and Fueling Limitations for Contested and Permissive Air Operations* (Policy Paper, Brookings Institute, United States, September 2014), 1.

<sup>25</sup> Ruppenthal, *Logistical Support of the Armies: Volume 1, May 1941-September 1944*, vii, 516.

<sup>26</sup> Ibid.

speed and to almost any distance once their commanders have made up their minds to do so’;<sup>27</sup> a view that logistics was commonly an afterthought. Van Creveld demonstrated the difference between pre-industrial armies, which had ‘almost unrestricted freedom from lines of communication’ due to the nature of their supply system, which was often to plunder or trade with local populations, and the evolving modern system where secure supply chains for specialised supplies such as fuel were critical.<sup>28</sup> Chapter Six will consider whether independent security of supply lines is a critical requirement in the contemporary operations undertaken by Australian military forces, and whether the contemporary Australian approach remains one of treating logistics as a lower priority.

Such classics of literature on military logistics established the relative (and enduring) high level of political and military interest in strategy and tactics, and the common lack of understanding and interest in logistics, despite its clear and historically-reinforced importance to the success of nations at war.<sup>29</sup> Van Creveld, Eccles, Thorpe and Ruppenthal each lamented the lack of logistical expertise and priority within military forces. Eccles summed this up, warning military commanders against deceiving themselves through ‘a delusion based upon a failure to understand the nature and magnitude of the logistics base on which the combat forces must rest before they can begin to fight’.<sup>30</sup> Perhaps then, it should be unsurprising to learn that logistics was offered scant attention in contemporary Australian literature, and the classical military logistics literature proved to be uninfluential in Australian defence policy.<sup>31</sup>

#### *Australian logistics during INTERFET*

INTERFET was a unique deployment for Australia, given the logistical challenges of independently deploying and then sustaining a large force of around 5700 personnel (at its peak);<sup>32</sup> a mission that was not the most challenging scenario presented in Australian defence policy, but it was the closest actual operation to other declared scenarios that

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<sup>27</sup> Martin van Creveld, *Supplying War: Logistics from Wallenstein to Patton* (Cambridge University Press, United Kingdom, 1977), 1-2.

<sup>28</sup> Ibid, 10.

<sup>29</sup> Yergin, *The Prize: The Epic Quest for Oil, Money and Power*, 308.

<sup>30</sup> Eccles, *Logistics in the National Defense*, 321.

<sup>31</sup> Beaumont, ‘Hoping and Planning for the Best: Understanding War Without Logistics’.

<sup>32</sup> David Horner, ‘Deploying and Sustaining INTERFET in East Timor in 1999’, in Peter Dennis and Jeffrey Grey (eds.), *The 2009 Chief of Army History Conference* (Australian Military History Publications, 2010), 205.

successive Australian Governments declared they were preparing for.<sup>33</sup> Prior to INTERFET, defence policy highlighted that any attempt to achieve greater military self-reliance was contingent on increasing the 'emphasis' on military logistical support capacity. INTERFET was a measure of the effectiveness of this long-standing minimalist approach.<sup>34</sup> Evans assessed that the consistent 'dissonance between strategic theory and operational practice', where expeditionary land operations were declared to be an 'occasional marginal activity' rather than the norm, was the basis for problems such as insufficient logistics sustainability.<sup>35</sup> The use of the case study method, and the specific case study to be presented in Chapter Six of a forward based air combat unit, will offer further insight into this perspective.

Australia's performance during INTERFET was widely praised as a military and diplomatic success, although with obvious fragility in areas such as logistics acknowledged.<sup>36</sup> With a dearth of Australian logistics commentary from other conflicts, and with the theme of 'self-reliance within alliance' prevalent in defence policy,<sup>37</sup> the unique logistical requirements from INTERFET elicited some important commentary relating to Australian military logistics.

Horner examined logistical aspects of the INTERFET deployment in relation to declared Australian defence policy. He observed that the previous decade of commercialisation of some logistical functions had not been tested, and difficulties related to this were apparent during INTERFET. He assessed that the command structure for logistics elements was not suitable for overseas deployments. As the premise from the previous two decades was that Australian forces would operate from Australia where there was a national support base, this proved to be a limitation during INTERFET. Horner noted that all of the Army's petroleum operators were sent to East Timor to support the single mission. He concluded that the 'deployment of East Timor came just in time to arrest the further withering of (logistics) capabilities.'<sup>38</sup> Other commentators, including Ryan and Kelly,

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<sup>33</sup> Department of Defence, *2016 Defence White Paper*, 74-75.

<sup>34</sup> Department of Defence, *Australian Defence* (White Paper, Canberra, 1976), 10.

<sup>35</sup> Michael Evans, *The Tyranny of Dissonance: Australia's Strategic Culture and Way of War: 1901-2005* (Study Paper No. 306, Land Warfare Studies Centre, Canberra, February 2005), 72.

<sup>36</sup> Breen, *Struggling for Self Reliance: Four Case Studies of Australian Regional Force Projection in the Late 1980s and the 1990s*, 163.

<sup>37</sup> Stewart Firth, *Australia in International Politics: An Introduction to Australian Foreign Policy* (Allen and Unwin, Australia, 1999), 168.

<sup>38</sup> Horner, 'Deploying and Sustaining INTERFET in East Timor in 1999', 223, 225.

similarly highlighted Defence's lack of preparedness for this type of mission, and the problems with relying on the US for logistical support.<sup>39</sup>

Breen was another prominent commentator on INTERFET operations, completing a detailed study of Australian military force projection. Breen was highly critical of Australia's military logistical capacity in East Timor. Citing a 'century of conditioned dependence on allies for (enabling) functions', he highlighted that the reduction in the size of military trades led to a confused INTERFET supply chain that relied on contractors but could not cope with multiple demands. He described the Army as a 'dependent Service bereft of the means for deployment and resupply'. He further observed that despite recurring acceptance of the need to significantly improve logistical capacity, based on experience in conflicts such as Somalia and Bougainville, there was never a genuine attempt to make a significant improvement.<sup>40</sup>

A definition of military logistics is 'acquiring, positioning, sustaining and redeploying the resources required for military operations'.<sup>41</sup> Commentators highlighted many problems relating to 'positioning' and 'sustaining' during INTERFET, but consistently referred to the lack of longer-term investment and focus on logistics. For example, Smith, a military logistics practitioner, argued that INTERFET shortfalls were symptomatic of military commanders often considering the 'logistics tail' as an overhead to be reduced, rather than as a prerequisite for operational independence. Smith highlighted that General Cosgrove had to geographically position INTERFET partners in different areas of operation, based on their logistical capacity.<sup>42</sup> Smith's argument was based upon a belief that senior military commanders were complicit in the poor resourcing of logistical capacity, whereas most other commentators held successive Australian governments to a higher level of account.

There was further commentary on the challenges associated with supporting a coalition force. A senior New Zealand Defence Force planner during INTERFET identified the

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<sup>39</sup> Alan Ryan, *Australian Policymaking and the East Timor Crisis* (Australian National University, 2000), xii-xiii; Paul Kelly, *The March of Patriots* (Melbourne University Press, 2009), 483.

<sup>40</sup> Breen, *Struggling for Self Reliance: Four Case Studies of Australian Regional Force Projection in the Late 1980s and the 1990s*, 146-7, 156, 160, 162.

<sup>41</sup> Paraphrased from Gary Waters and John Blackburn, *Australian Defence Logistics: The Need to Enable and Equip Logistics Transformation* (Kokoda Paper No. 19, June 2014), 13.

<sup>42</sup> Susan Smith, *A Handmaiden's Tale: An Alternative View of Logistic Lessons Learned from INTERFET* (Australian Defence Studies Centre, Working Paper No. 65, April 2001), 7.

Australian Defence Force's logistical shortfalls as the most important 'strategic lesson learnt' for New Zealand, although this point was not extrapolated to suggest that New Zealand should develop a greater level of logistical self-sustainment,<sup>43</sup> indicating the challenges for smaller military forces to invest in sufficient logistical capacity to allow the force projection of a large or technologically sophisticated military force outside a national support base.

Waters and Blackburn highlighted two key observations about Australian military logistics. First, they argued that Defence often placed different parts of the logistics system under different commands, meaning the entire supply chain was not considered holistically. Second, they argued that logistics was a low priority area within Defence.<sup>44</sup> The use of primary document analysis and semi-structured interviews, in the context of military fuel sustainability in Australia, will allow further exploration of these perspectives in Chapter Four.

Analysis of military logistics performance during INTERFET was undertaken from a range of different perspectives. Breen considered INTERFET from a historical perspective; Smith adopted an operational perspective; Gibbons considered an allied perspective; and Horner, Ryan and Kelly focused on preparedness and the US alliance. Each of these analyses offered a negative view of Australia's military logistics capacity, even in benign military circumstances.

Outside some minor attention after INTERFET, Beaumont accurately reflected that strategic logistics matters which significantly shaped warfare 'are just not written about'. He observed 'virtually no strategic discussion concerning the revolution of military logistics' and the military transition from a supply-based system to one of 'integrated logistics'.<sup>45</sup> It is therefore unsurprising that the body of literature relating to military fuel sustainability (since World War Two, and during the period since INTERFET) was limited, despite the assessments of historians (discussed below) that access to fuel played a significant role in determining the outcome of World War Two.

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<sup>43</sup> Phil Gibbons, *The Urban Area During Stability Missions – Case Study: East Timor* (Joint Headquarters New Zealand, Presentation, 22 March 2000), 157.

<sup>44</sup> Waters and Blackburn, *Australian Defence Logistics: The Need to Enable and Equip Logistics Transformation*, 13.

<sup>45</sup> Beaumont, 'Hoping and Planning for the Best: Understanding War Without Logistics'.



## **Military fuel sustainability in the twentieth century**

The strategic importance of fuel was already apparent early in the twentieth century. From the advent and rapid introduction of motorised and armoured land vehicles into the Army, the conversion of maritime vessels to oil, and the rise of air power, technology associated with fuel sustainability and reliable logistical support assumed immense importance during periods of war and national mobilisation. During the World Wars – periods that were closer to existential conflict than any situation facing Western nations in the twenty-first century, fuel sustainability was directly related to military capability and national strategy.<sup>46</sup> Political leaders in nations such as the US saw immense ‘implications for strategic stability and security’ derived from the supply of fuel.<sup>47</sup> Constrained fuel availability often negatively affected military performance, and reliable access to fuel provided significant strategic advantage in conflict.<sup>48</sup>

Most literature relating to military fuel sustainability during the World Wars comprised texts that outlined historical events and military actions, with fuel as one part of a broader story, effectively researched using non-participant observation, historical analysis and expert interviews.<sup>49</sup> These texts commonly portrayed military fuel sustainability as a critical factor in an existential conflict, where the whole of society was mobilised to ensure that military forces were supplied with sufficient fuel and other resources for their exceptional tasks – often, to undertake decisive military battles and the massing of military forces. Mobilisation and different levels of military readiness were concepts that remained deeply rooted in the defence policies of most nations throughout the twentieth century.<sup>50</sup> Froude and other historians highlighted the nexus between society, and the provision of fuel and other logistical commodities to the military.<sup>51</sup>

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<sup>46</sup> Shawn Keller, *Turning Point: A History of German Petroleum in World War II and its Lessons for the Role of Oil in Modern Air Warfare* (Air Command and Staff College, Air University, 2011), 1.

<sup>47</sup> Brian Black, ‘How World War I ushered in the century of oil’, *The Conversation*, [website], (4 April 2017), <<http://theconversation.com/how-world-war-i-ushered-in-the-century-of-oil-74585>>, accessed 18 January 2019.

<sup>48</sup> Yergin, *The Prize: The Epic Quest for Oil, Money and Power*, 308-371, demonstrated that both German and Japanese military capability suffered significantly due to a lack of crude oil during World War Two.

<sup>49</sup> Ibid.

<sup>50</sup> Michael Evans, ‘The Closing of the Australian Military Mind: The ADF and Operational Art’, *Security Challenges*, 4/2 (Winter 2008), 107.

<sup>51</sup> Lorna Froude, ‘Petrol Rationing in Australia during the Second World War’, *Journal of the Australian War Memorial* (No. 36, May 2002).

The twentieth century military fuel sustainability literature was often divided into the maritime, land and air domains, often based on the specific expertise or interest of the commentator.

Maritime power was the first of the military domains to undergo dramatic change due to fuel technology. This led countries, including the US, to take political actions to assure oil supply for their navies in the event of war, and the maritime domain consequently received substantial attention in the literature.<sup>52</sup> Oil-powered ships were already important during World War One, while this conversion for land and development of air forces was important during World War One but only fully realised during World War Two. Influenced by its geography and history as a maritime power, Britain led the maritime conversion to oil in the early twentieth century. Winston Churchill's bold and transformational conversion of the Royal Navy from coal to oil in 1911 gained significant attention from historians such as Yergin and Zubrin.<sup>53</sup> Churchill's decision proved successful. Commentators including Rahn made comparison to the German dreadnoughts, which were manufactured to a better standard than the British ships, but coal power did not allow them to operate outside the North Sea.<sup>54</sup> Dahl represented a slightly nuanced view of the British Navy transition from coal to oil (compared to other literature), describing it as 'a significant innovation but not a strategy', improving maritime capability but not changing the way that wars were fought.<sup>55</sup> Notably, Churchill's decision remained of interest to contemporary commentators,<sup>56</sup> many of whom used Churchill as

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<sup>52</sup> American Oil and Gas Historical Society, 'Petroleum and Sea Power', *American Oil and Gas Historical Society*, [website], (2018), <<https://aoghs.org/petroleum-in-war/petroleum-and-sea-power/>>, accessed 18 January 2019.

<sup>53</sup> Robert Zubrin, *Energy Victory: Winning the War on Terror by Breaking Free of Oil* (Prometheus Books, New York, 2009), 224. Daniel Yergin, 'Crisis and Adjustment: An Overview', in Daniel Yergin and Martin Hillenbrand, (eds.), *Global Insecurity: A Strategy for Energy and Economic Renewal* (Houghton Mifflin Company, Boston, USA, 1982), 21.

<sup>54</sup> Werner Rahn, 'German Naval Power in First and Second World Wars', in Nicholas Rodger (ed.), *Naval Power in the Twentieth Century* (MacMillan, Great Britain, 1996), 88, stated that Germany's focus, with potential enemies to the east and west, was traditionally Army-centric. It was not until Britain arose as a serious competitor that Germany developed a maritime strategy greater than forward coastal defence. Even with high seas operations culminating in the 1916 Battle of Jutland, German maritime strategy remained focused on coastal protection. Zubrin, *Energy Victory: Winning the War on Terror by Breaking Free of Oil*, 225.

<sup>55</sup> Erik Dahl, 'Naval Innovation: From Coal to Oil', *Joint Force Quarterly* (Winter 2000-2001), 56.

<sup>56</sup> For example, Thomas D. Crowley, Tanya D. Corrie, David B. Diamond, Stuart D. Funk, Wilhelm A. Hansen, Andrea D. Stenhoff and Daniel C. Swift, *Transforming the way DoD looks at energy: An approach to establishing an energy strategy* (Report FT602T1, LMI Consulting, April 2007), 2-1; Liam Fox, 'Energy Security and Military Structures', *Chatham House* (Speech, Chatham House, 22 May 2006), 14.

an illustration of the transformational change that could be made to military fuel sustainability when new fuel technology emerges, but with limited acknowledgement of the unique historical context and significant risk as an early technology adopter.<sup>57</sup> For example, Buchanan argued that contemporary forces ‘can learn from the Royal Navy’s pre-World War I energy transformation’, but without acknowledging the broader strategic context and existential threat.<sup>58</sup>

World War One foreshadowed the future for land forces, as warfare transitioned from a foot- and horse-mounted venture into one of rapid manoeuvre enabled by coal and then by petroleum-powered vehicles. Military strategies for land operations were often modified through battle experience and fuel technology.<sup>59</sup> German policymakers had a significant strategic advantage at the outset of World War One, before the realisation of the military potential of the automobile, with a well-developed domestic and international rail network. Some argued that Germany was best prepared for World War One due to preliminary planning, construction and stockpiling of rail resources in peacetime,<sup>60</sup> ensuring unrivalled continental mobility, having applied the logistics and manoeuvre lessons (particularly concerning the use of rail) from nineteenth century conflicts such as the Franco-Prussian War from 1870 to 1871.<sup>61</sup>

British policymakers countered this effective German means of military force projection through new technology. In 1914, the British military comprised 850 motor vehicles, many of which were not for combat. By the end of the war, the British vehicle fleet had expanded to 56,000 trucks, 23,000 motorcars and 34,000 motorcycles,<sup>62</sup> with the British Army continuing to use rail for functions such as troop transport. This mitigated and exceeded the German strategic advantage afforded by rail. Fuel technology

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<sup>57</sup> Britain had not guaranteed a crude oil supply when the decision was made (Yergin, *The Prize: The Epic Quest for Oil, Money and Power*, 156).

<sup>58</sup> Scott Buchanan, ‘Energy and Force Transformation’, *Joint Force Quarterly*, 42 (3<sup>rd</sup> Quarter, 2006), 51.

<sup>59</sup> Black, ‘How World War I ushered in the century of oil’.

<sup>60</sup> Outlined in War Department Light Railways, *The Forgotten Heroes*, [website], <<http://www.wdlr.org.uk>>, accessed 21 December 2018.

<sup>61</sup> Edwin Pratt, *The Rise of Rail Power in War and Conquest* (P.S. King and Son, London, 1915), 1-21, identified that German policymakers had planned the use of rail for conflict since the 1840s, in the event of war against Russia or France.

<sup>62</sup> Yergin, *The Prize: The Epic Quest for Oil, Money and Power*, 171.

advancements, in particular the internal combustion engine, and bold changes in operating procedures, provided great impetus to British war efforts.<sup>63</sup>

British military commanders were also central to the invention and employment of the tank in 1916, to break the impasse of trench warfare. First used in the Battle of the Somme, the literature highlighted that the tank did not prove decisive during World War One,<sup>64</sup> but its potential was realised during World War Two, particularly by German military commanders.<sup>65</sup> The Sentinel, the only tank to be produced in quantity in Australia in response to the feared Japanese invasion during World War Two, was not deployed because Australia's Armoured Divisions were equipped with British and US tanks, an early Australian example of reliance on, and interoperability with, allies. Tanks and other vehicles rapidly and substantially increased fuel consumption in land combat. In his history of logistics during World War Two, Ruppenthal highlighted the constant challenges and shortfalls associated with supplying fuel to rapidly advancing land forces in the European theatre. Ultimately, US forces had superior fuel supply relative to the Germans,<sup>66</sup> providing a significant advantage.

The rapid armoured and combined manoeuvre conducted by Field Marshal Rommel (sometimes referred to as Blitzkrieg) only became possible because of the widespread operation of an improved internal combustion engine, and the reliable supply of fuel; when supply was sufficient, Blitzkrieg was successful, revolutionising armoured warfare, even with tanks that were inferior to Allied tanks.<sup>67</sup> Higgins considered another German military commander, General Heinz Guderian, to have had a masterful ability to understand logistics and fuel supply risks, using 'quick tank thrusts into operational

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<sup>63</sup> Ibid.

<sup>64</sup> Brian Pedersen, *What Kept the Tank from Being the Decisive Weapon of World War One?* (United States Army Command and General Staff College, Kansas, 2007), 1-8, described why the tank did not transform conflict in World War One, citing reasons of culture, performance, technology and economics.

<sup>65</sup> Ferdinand Maria Von Senger Und Etterlin, *German Tanks of World War II: The Complete Illustrated History of German Armoured Fighting Vehicles 1926-1945* (Arms and Armour Press, London, 1969), 13, argued that the Germans operated with inferior tank technology, but with more effective operating procedures. Eliot Cohen, 'A Revolution in Warfare', *Foreign Affairs* (75:2, 1996), 43, identified that the improved technology also required other components, such as a culture of junior leadership and effective combined arms doctrine.

<sup>66</sup> Ruppenthal, *Logistical Support of the Armies: Volume 1, May 1941-September 1944*, vii, 516.

<sup>67</sup> Etterlin, *German Tanks of World War II: The Complete Illustrated History of German Armoured Fighting Vehicles 1926-1945*, 13, highlighted that Rommel's Afrika Korps was also considerably smaller (in men and materiel) than the British, impressing the importance of superior operating procedures.

depths' before fuel became a problem.<sup>68</sup> However by 1942, Rommel's Afrika Korps was isolated from secure supply lines and suffered fuel shortages, rendering Blitzkrieg less effective.<sup>69</sup> The Allies (aware of this critical vulnerability) deliberately targeted German fuel supplies. Targeting included maritime vessels supplying Rommel fuel through the Mediterranean Sea, and fuel production and distribution facilities in Romania, Germany and Russia. This targeting severely disrupted German mobility in 1944.

The Ardennes Campaign (commonly known as the Battle of the Bulge) was the final bold operation undertaken by the German Army, seeking a decisive victory to set favourable conditions for negotiation with the US. Delaforce argued that a key reason for the German loss was an inability to ensure consistent fuel supply to forward troops.<sup>70</sup> The Allies, conversely, had few fuel supply problems during the Battle of the Bulge. Dupuy highlighted that a cross-channel pipeline, and its extension across France, allowed fuel stockpiling throughout the Ardennes, enabling the desired use of vehicles.<sup>71</sup> Ultimately, Germany did not lose World War Two due to fuel shortages and poor strategic access to crude oil, but this access was an important contributing factor to the final outcome.

In military air operations, fuel technology was the slowest to gain military relevance. However, once their potential was established, aircraft transitioned from the status of military 'fad',<sup>72</sup> to become strategically invaluable. The rapid inversion of the relative fuel consumption between land forces and maritime and air forces, with the Royal Australian Air Force now using more than ten times the amount of fuel used by the Australian Army for existing capabilities, will be discussed in Chapter Six.

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<sup>68</sup> George Higgins, *The Operational Tenets of General Heinz Guderian and George S. Patton, Jr* (US Army School of Advanced Military Studies, Kansas, 1985), 83.

<sup>69</sup> Zubrin, *Energy Victory: Winning the War on Terror by Breaking Free of Oil*, 231.

<sup>70</sup> Patrick Delaforce, *The Battle of the Bulge: Hitler's Final Gamble* (Pearson Education Limited, Great Britain, 2004), 319-321, demonstrated that military commanders from the US and Germany attributed much of the German loss to fuel shortages. Germans periodically destroyed their tanks due to fuel shortages, and tactical decisions became entirely dependent on fuel availability. Hitler never had the necessary fuel to capture Antwerp. Trevor Dupuy, *Hitler's Last Gamble: The Battle of the Bulge December 1944 – January 1945* (Harper Collins Publishers, New York, 1994), 498, believed that the Germans consistently outfought Allied soldiers, but other factors (such as fuel) caused the major loss.

<sup>71</sup> Dupuy, *Hitler's Last Gamble: The Battle of the Bulge December 1944 – January 1945*, 395.

<sup>72</sup> Robin Higham, 'Air Power in World War One, 1914-1918', in Alan Stephens (ed.), *The War in the Air 1914-1994* (Air Power Studies Centre, Canberra, 1994), 24, described the air capability (of all combatant nations) at the start of World War One as 'virtually impotent'.

Higham highlighted the French use of balloons for battlefield reconnaissance during the Franco-Prussian War in the preceding century, and it was a logical extension to use aircraft for the same purpose. Specific combat aircraft were introduced in 1915.<sup>73</sup> Before World War One, Britain had an air force of approximately 2,000 personnel, and Germany had no air force. After World War One, the Royal Air Force had grown to 290,000 personnel, and the German Luftwaffe to 80,000 personnel, demonstrating the growing emphasis on air power. Historians such as Higham and Mason demonstrated how air forces became an indispensable military arm,<sup>74</sup> enabled by advances in fuel technology and access to fuel for military purposes, and encouraging further fuel technology advancements.

In the war in the Pacific, Australia had complete dependence on imported supplies of oil, and the eminent historian Mellor highlighted that political leaders considered this to be a serious military weakness.<sup>75</sup> Gillison highlighted that General MacArthur had to charter ships to supply Australian and US air units stationed at airfields including Rabaul, Port Moresby and Darwin with aviation fuel, and had to arrange for further fuel to be delivered from the US mainland.<sup>76</sup> The same text also noted that when the US established air bases in Australia, fuel and logistical supply from Australia was extremely challenging due to factors such as the breaks of gauge in the rail transport system and Australia's own growing defence needs – an ongoing challenge into the twenty-first century. The sinking of fuel vessels transiting from the US to Australia exacerbated this shortfall.<sup>77</sup> The reliance on the US for fuel supply, even for operations in defence of Australia, was quickly entrenched, and an unbalanced force unable to operate independent of allies – with procurement and manufacture of combat elements prioritised over the fuel and logistics capacity necessary to support those combat elements – became apparent. Subsequent chapters of this thesis will consider whether the ongoing reliance on the US remains one of the key factors influencing Australian military fuel sustainability and broader defence policy.

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<sup>73</sup> Ibid, 34, highlighted that standard aircraft were used in the initial stages of fighting, but 1915 saw the introduction of aircraft specifically designed to carry armament.

<sup>74</sup> Ibid, 38-39; Tony Mason, *Air Power: A Centennial Appraisal* (Brassey's, London, 1995), 236.

<sup>75</sup> Mellor, *The Role of Science and Industry*, 212.

<sup>76</sup> Douglas Gillison, *Royal Australian Air Force 1939-1942* (The Griffin Press, Adelaide, 1962), 183.

<sup>77</sup> Ibid, 297.

The importance of fuel for Australia during World War Two was highlighted by the need for US and Australian Air Forces to form an allied fuel coordinating committee, and significant oil storage capacity was established in 'safe areas' inland in Australia.<sup>78</sup> Concerned about supply and civilian consumption, and facing significant political and social opposition, political leaders introduced national petrol rationing in 1940.<sup>79</sup> Other significant actions, such as parliamentary inquiries into the development of oil from gas technology,<sup>80</sup> further highlighted the significance of oil supply to the Australian military effort during World War Two, and the prioritisation of oil for military use over other non-military purposes (particularly in the face of existential threats).

Twentieth century literature emphasised crude oil as a critical military resource.<sup>81</sup> Keller went further, representing the pursuit of oil as central to many key German strategic decisions in World War Two.<sup>82</sup> Germany in both World Wars, and Japan in World War Two, had poor access to this strategic resource, and this poor access was attributed as an important factor in the outcome of the war. Gillison argued, 'Japan was (deprived) of the oil supplies on which her whole war machine depended.'<sup>83</sup> Both countries' political leaders exerted significant influence on military fuel sustainability by consistently prioritising military access to this resource and attempting drastic actions to resolve their shortfalls. Germany manufactured synthetic oil, and conducted desperate military operations in the Caucasus during World War Two attempting to secure crude oil resources. Piccinotti highlighted that Germany relied on its smaller Italian ally to supply fuel for operations in North Africa,<sup>84</sup> a clearly desperate situation in contrast to the contemporary Australian military reliance on its larger US ally. Italian policymakers optimistically sought a high level of crude oil self-reliance during World War Two, but fuel shortages eventually constrained tactical manoeuvre and led to their inability to use

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<sup>78</sup> Ibid, 484.

<sup>79</sup> Mellor, *The Role of Science and Industry*, 212.

<sup>80</sup> Ibid, 214.

<sup>81</sup> French Prime Minister Clemenceau stated in 1917, 'gasoline is as vital as blood in the coming battles' (Daniel Yergin, 'America in the Strait of Stringency', in Daniel Yergin and Martin Hillenbrand (eds.), *Global Insecurity: A Strategy for Energy and Economic Renewal* (Houghton Mifflin Company, Boston, USA, 1982), 161-162.

<sup>82</sup> Keller, *Turning Point: A History of German Petroleum in World War II and its Lessons for the Role of Oil in Modern Air Warfare*, 14.

<sup>83</sup> Gillison, *Royal Australian Air Force 1939-1942*, 169, stated 'Japan was (deprived) of the oil supplies on which her whole war machine depended'.

<sup>84</sup> Andrea Piccinotti, 'The Oil Fuel Issue', *Regia Marina Italiana*, [website], (20 November 2010) <[http://www.regiamarina.net/detail\\_text.asp?nid=125&lid=1](http://www.regiamarina.net/detail_text.asp?nid=125&lid=1)>, accessed 15 April 2019.

modern destroyers.<sup>85</sup> Japanese political leaders unsuccessfully sought to secure permanent oil resources in the Dutch East Indies, splitting their naval fleet. Pelvin argued that the Japanese did not place sufficient priority on securing sea routes to outlying resources,<sup>86</sup> although they clearly understood the resource problem, as early as 1904 realising that they were tactically strong close to home, but could not effectively operate further afield.<sup>87</sup>

In the intervening period between World War Two and the twenty-first century, the US military focus shifted to the Cold War and its associated arms race, and to major conflicts including in Korea and Vietnam. While the US did not necessarily seek to expend more fuel to improve military performance, the rapid incorporation of technologically sophisticated combat equipment had this unintended effect. For example, during the Korean War, Smith highlighted 'the (US) requirements for engine oil and grease doubled and sometimes tripled the rates experienced during World War Two'. There was never any doubt that the US would seek to sustain these growing rates of fuel consumption in order to maintain combat effectiveness.<sup>88</sup>

Targeting enemy fuel supplies became a common tactic. Mason highlighted that the targeting of fuel supplies and strategic resources was initially advocated in Britain by the Marshal of the Royal Air Force Hugh Trenchard, who believed that striking at enemy industry undermined national morale and military capability, and created the conditions for surrender,<sup>89</sup> and this type of targeting became more common over the course of the twentieth century. Correll highlighted that fuel facility strikes by the US during Operation Rolling Thunder in North Vietnam were a major component of that air campaign. However, with no refineries, North Vietnamese leaders were able to widely disperse imported fuel, allowing supply along many different lines into the South. Despite the lack of strategic success, the US concluded that the airstrikes on fuel stores were authorised too late and would have been more successful if they had achieved strategic surprise.

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<sup>85</sup> Ibid.

<sup>86</sup> Richard Pelvin, *Japanese Air Power 1919-1945: A Case Study in Military Dysfunction* (Paper No. 31, The Air Power Studies Centre, Canberra, April 1995), 19-20.

<sup>87</sup> Nicholas Lambert, 'The Opportunities of Technology: British and French Naval Strategies in the Pacific, 1905-1909', in Nicholas Rodger (ed.), *Naval Power in the Twentieth Century* (MacMillan, Great Britain, 1996), 49.

<sup>88</sup> Merwin Smith, 'Petroleum Supply in Korea', *QMC Quartermaster Review* (November-December 1951).

<sup>89</sup> Mason, *Air Power: A Centennial Appraisal* 27-36.



Further, air-to-air refuelling developed as a critical capability for US air strikes during the Vietnam War,<sup>90</sup> and air-to-air refuelling in Australia and the US will be examined further in Chapters Five and Six.

Similarly, from a strategic perspective, Rosenberg identified that US Cold War contingency planning focused on Soviet industry and fuel as critical national and military infrastructure to be attacked.<sup>91</sup> There was clear recognition of the ability to disrupt a technologically sophisticated enemy through targeting of fuel supplies, and this recognition represented a continuation of the approach to fuel during World War Two taken by major geostrategic actors such as the US.

In summary, commentary on military fuel sustainability clearly identified the importance of fuel during twentieth century conflicts. Profound decisions relating directly to fuel were made by leaders such as Churchill, and fuel consumption increased over time as nations developed more sophisticated technology. Fuel became an essential resource to enable operations, and enemy fuel supplies were targeted to prevent military operations and limit the use of sophisticated equipment. When it was mentioned, fuel was portrayed as a critical national capability due to the exceptional nature of the military role and the importance of fuel to twentieth century military technology. However, since World War Two and within the broader context of military logistics theory, commentators such as van Creveld, Eccles and Thorpe were correct in arguing that logistics was a low priority for policymakers.

The review of twentieth century literature on military fuel sustainability demonstrates similarities with more contemporary literature, despite the different context and the contrast between the perceived existential nature of World Wars One and Two, and present threat perceptions and credible contingencies. The ongoing description of fuel as a critical national capability, and more than just a military logistics commodity, will now

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<sup>90</sup> John Correll, 'Rolling Thunder', *Air Force Magazine*, [website], (October 2017), <<http://www.airforcemag.com/MagazineArchive/Pages/2017/October%202017/Rolling-Thunder.aspx>>, accessed 18 January 2019.

<sup>91</sup> David Rosenberg, 'American Naval Strategy in the Era of the Third World War: An Inquiry into the Structure and Process of General War at Sea, 1945-90', in Nicholas Rodger (ed.), *Naval Power in the Twentieth Century*, (MacMillan, Great Britain, 1996), 246.

be considered in twenty first century Australian and US literature, and will be considered further in subsequent chapters through case studies and comparative historical analysis.

### **Contemporary commentary: Isolation, Conflation, Politicisation**

After a lull in the 1990s and early 2000s, at least in part reflecting Thorpe's concerns about the limited nature of the literature on military logistics matters,<sup>92</sup> publication of commentary on military fuel sustainability became more frequent from the mid-2000s, when the US was in the midst of significant military challenges in the Middle East, and during a corresponding significant rise in the price of oil. Although not just referring to the military, Wesley identified that 'concern about energy security has tended to occur in sudden bursts...largely following the price of oil'.<sup>93</sup> Most of the contemporary military fuel sustainability literature was generated in the US, although some literature was also published in Australia; a recent example being Patel's article from 2018.<sup>94</sup> Both the US and the Australian literature will be discussed in this chapter.

Based predominantly on experiences in the Middle East, a significant focus in the US literature was on the security and distribution of fuel in 'the last tactical mile',<sup>95</sup> which refers in most part to the tactical threats experienced to fuel convoys distributing fuel to combat units. The 'last tactical mile' commentary was mostly related to land operations, given the high number of casualties the US suffered in conducting fuel distribution tasks.<sup>96</sup> However, similar focus was prevalent in the maritime domain, and this was outlined by commentators such as Callaway in the context of the October 2000 terrorist attack on the United States Ship Cole in Yemen.<sup>97</sup> The air domain commentary on fuel distribution was also focused on tactical delivery. For example, in the context of improved technology to detect and target US aircraft in future conflicts, Knepper argued that refuelling tanker

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<sup>92</sup> Thorpe, *Pure Logistics*, 2.

<sup>93</sup> Michael Wesley, *Power Plays: Energy and Australia's Security* (Australian Strategic Policy Institute, Canberra, 2007), 10.

<sup>94</sup> Keyurkumar Patel, 'Australia's petroleum supply and its implications for the ADF', *Australian Defence Force Journal*, 204 (2018), 70.

<sup>95</sup> United States Department of Defense, *2016 Operational Energy Strategy* (Washington D.C., 2016), 9.

<sup>96</sup> Richard Kendig, Ashley Seaton and Robert Rodgers, *Evolution of the Operational Energy Strategy and its Consideration in the Defense Acquisition Process* (Naval Postgraduate School, Monterey, California, September 2016), 11.

<sup>97</sup> John Callaway, 'Learning the Hard Way: Force Protection 1983-2000', *Naval War College Review*, 62/1 (Winter 2009), 107-108.

aircraft should be made more survivable, and ideally, future aircraft have sufficient range so as not to require refuelling in a high threat area.<sup>98</sup> Others made similar arguments.<sup>99</sup>

The focus of the commentary on the 'last tactical mile' is relevant to understanding contemporary commentary, because the predominance of military fuel sustainability commentary referred to the tactical use of fuel, rather than the broader military use of energy for functions such as powering domestic facilities. Chapters Five and Six will argue that a similar tactical fuel delivery focus is prevalent in military doctrine. However, Chapter Four will contend that the tactical domain was not where the bulk of policymaker effort (relating to military fuel sustainability) in Australia was focused.

Three key trends in the Australian and US military fuel sustainability literature were apparent, particularly since the increase in commentary from the mid-2000s, and critique of these trends is made throughout this thesis. These trends are characterised as *isolation*, *conflation* and *politicisation*.

First, military fuel sustainability was consistently treated as a discrete issue that could or should be independently adjusted or addressed, rather than as an integrated component of defence policy or even as a field within military logistics. Second, issues of relevance to national energy policies were conflated with the issues facing the military, when more nuance was required, particularly in relation to exceptionalism during major conflicts or when facing an existential threat. Third, the absence of criticism or analysis of the politicisation of military fuel sustainability by policymakers in Australia and the US is a notable omission in the literature, particularly given the many misleading or overstated assertions. These three trends in the literature will now be reviewed.

### Isolation

Eccles warned against treating logistics as a discrete matter separate from strategy or tactics, stating 'once a commander thinks of the strategic, logistical, and tactical elements

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<sup>98</sup> Knepper, *Access Assurance: Addressing Air Power Reach, Persistence and Fueling Limitations for Contested and Permissive Air Operations*, vi.

<sup>99</sup> Valerie Insinna, 'US Air Force eyes self-protection systems for aging tankers, airlifters', *Defense News*, [website], (21 February 2018), <<https://www.defensenews.com/digital-show-dailies/air-warfare-symposium/2018/02/21/air-force-mulls-over-survivability-enhancements-for-its-aging-tankers-and-airlift-planes/>>, accessed 20 February 2019.

as individual or isolated matters he has lost his perspective'.<sup>100</sup> Analysis of primary documents indicated that military fuel sustainability was treated as a subordinate issue to both military logistics and to broader defence policy. This will be discussed in Chapter Four. However, while some commentators such as Knepper did contextualise fuel in broader military strategy,<sup>101</sup> most of the literature did not. For example, the regular reference to Churchill's actions to convert the Royal Navy to oil prior to World War One, discussed earlier in this chapter, demonstrates an underlying assumption in the literature that contemporary policymakers have the authority to effect significant discrete changes to military fuel sustainability.<sup>102</sup> The case study approach used in this thesis seeks to provide greater contextualisation of military fuel sustainability in Australian defence policy, challenging the discrete view that was consistently articulated in the literature.

The lack of contextualisation of military fuel sustainability in the broader defence policy context was particularly apparent in Australia. For example, the acceptance of a lower level of logistics capacity that could be developed should a military need arise, highlighted consistently in Australian defence policy,<sup>103</sup> was of clear relevance to military fuel sustainability but was absent from the literature. The fundamental reliance on the US as Australia's most important ally, a concept central to Australian defence policy, was not raised in the context of fuel supply assurance for future military operations. The long-standing attempts to allocate scarce military resources to many different military functions (highlighted in the debate between proponents of 'forward defence' and 'defence of Australia')<sup>104</sup> was also absent from the military fuel sustainability literature.

There were many specific examples of the lack of contextualisation of military fuel sustainability in an Australian defence policy context. Bergin argued that the Defence response to climate change should have included ambitious alternative fuel targets, identifying eucalyptus oil conversion into jet fuel as an area that Defence should invest in without establishing the logic behind such a venture or how it might be logistically

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<sup>100</sup> Eccles, *Logistics in the National Defense*, 21.

<sup>101</sup> Knepper, *Access Assurance: Addressing Air Power Reach, Persistence and Fueling Limitations for Contested and Permissive Air Operations*, vi.

<sup>102</sup> Jeffrey Eggers, 'The Fuel Gauge of National Security', *Armed Forces Journal*, [website], (May 2008), <<http://armedforcesjournal.com/the-fuel-gauge-of-national-security/>>, accessed 15 April 2019.

<sup>103</sup> Department of Defence, *2016 Defence White Paper*, 100.

<sup>104</sup> Stephan Frühling, *A History of Australian Strategic Policy Since 1945* (Defence Publishing Service, Commonwealth of Australia, Canberra, 2009), 12-13.

supported.<sup>105</sup> Waters and Blackburn argued that 'Australian Defence capabilities are completely reliant on 'best endeavour' contracts with foreign owned oil and fuel companies' and identified that the military faced significant risk as a result, but did not highlight measures available to political leaders such as national prioritisation for military purposes, nor that the US consistently supplied fuel to smaller Australian military deployments (creating a disincentive for Australian military planners to establish a more independent approach).<sup>106</sup> Dibb and Brabin Smith made a similar argument.<sup>107</sup> Leckie argued that the 'complexity' and vulnerability of Australian military fuel supply necessitated more use of natural gas, also without identifying the consistent reliance on US fuel supply for Australian military operations or the potential interoperability challenges.<sup>108</sup> Wong argued that oil price fluctuation was a major capability issue for the Australian military (and for other military forces), yet price fluctuation had only prompted Defence to 'review a number of energy savings initiatives', and Wong did not outline any specific negative operational effect,<sup>109</sup> because the US supplied fuel to the Australian military during contemporary military operations.

The Centre for Policy Development directly linked climate change to reduced energy availability for Australian military forces, but did not identify any potentially mitigating factors such as the exceptional nature of the military task leading to fuel prioritisation where necessary.<sup>110</sup> Thomas concluded that the requirement for Defence to take significant action to prepare for climate change (including in military fuel sustainability) was clear, but that Defence had not done so because of concern about different climate change priorities under different Liberal and Labour governments, with little acknowledgement of other compelling reasons why such an approach may have been

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<sup>105</sup> Anthony Bergin, 'Defence must regard climate change as a serious security issue', *Australian Strategic Policy Institute*, [website], (2 December 2016), <<https://www.aspi.org.au/opinion/defence-must-regard-climate-change-serious-security-issue>>, accessed 28 December 2017.

<sup>106</sup> Waters and Blackburn, *Australian Defence Logistics: The Need to Enable and Equip Logistics Transformation*, 37.

<sup>107</sup> Paul Dibb and Richard Brabin Smith, *Australia's management of strategic risk in the new era* (Australian Strategic Policy Institute, Strategic Insights, November 2017), 9.

<sup>108</sup> Cameron Leckie, 'Lasers or Longbows? The paradox of military technology', *Australian Defence Force Journal*, 182 (Canberra, 2010), 51-53.

<sup>109</sup> Ka Weng Kelvin Wong, *Future War Fighting Capability: An Energy Perspective* (The Australian National University, Canberra, November 2008), 13.

<sup>110</sup> Centre for Policy Development, *The Longest Conflict: Australia's Climate Security Challenge*, 13.

taken.<sup>111</sup> With no explanation, the Climate Council (with a former Chief of Defence Force as a contributing author) included the military use of bio-fuel as one of their measures to assess how effectively the Australian Defence Force was prepared for climate change impacts.<sup>112</sup> The Centre for Policy Development, Climate Council, Barrie, Bergin and Glasson, and others, all argued that Defence should set ambitious targets to reduce greenhouse gas emissions across Defence, including for deployed forces.<sup>113</sup> With Defence's greenhouse gas emissions representing only 0.35 per cent of national emissions in 2003,<sup>114</sup> and a recent report estimating a consistent emissions outlook for Defence until 2030,<sup>115</sup> the consistency of this recommendation indicated that there were strongly held views about climate change. These commentators intersected their primary views on climate change with military fuel sustainability, to make recommendations that risked a negative impact on military performance, and this will be further considered in Chapter Four.

Almost entirely, the twenty-first century Australian literature on military fuel sustainability did not acknowledge the history of Australian defence policy and the reliance on US logistics and fuel supply during conflict as a key factor influencing Australian military fuel sustainability. Earlier literature from the twentieth century clearly presented this reliance, but mostly did not frame this reliance as a strategic or tactical risk. Further, there was only passing reference to the ability for an Australian government to prioritise fuel supply for military use should the need arise, despite this prioritisation being codified in Australian legislation<sup>116</sup> and having been undertaken during World War Two. Where one commentator made a point about military exceptionalism and resource prioritisation, it was caveated.<sup>117</sup>

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<sup>111</sup> Michael Thomas, *Climate Securitization in the Australian Military* (Second Oceanic Conference on International Studies, Melbourne, 9-11 July 2014), 11-15.

<sup>112</sup> Climate Council, *Be Prepared: Climate Change, Security and Australia's Defence Force* (Canberra, 2015), 78.

<sup>113</sup> The Senate Foreign Affairs, Defence and Trade References Committee, *Implications of climate change for Australia's national security* (Commonwealth of Australia, May 2018), 60-62.

<sup>114</sup> Department of Defence, *Defence Public Environment Report* (Commonwealth of Australia, 2003), 28.

<sup>115</sup> Department of the Environment and Energy, *Australia's emissions projections 2018* (Commonwealth of Australia, 2018), 19.

<sup>116</sup> Cameron Leckie, 'Peak Oil and the Australian Army', *Australian Army Journal*, iv/3 (Summer 2007), 30.

<sup>117</sup> Blackburn, *Australia's Liquid Fuel Security Part 2: A report for NRMA Motoring and Services*, 12, 21.

In general, the literature treated military fuel sustainability as a discrete issue, separate to key features of Australian defence policy over many decades. One exception was Davies, who provided a brief but more balanced view of some of the risks associated with military fuel sustainability in Australia, highlighting that the greatest vulnerability, particularly for specialist aviation fuel types, was likely to be if the Royal Australian Air Force was required to operate from 'bare bases' (three unoccupied Royal Australian Air Force air bases in Australia's north capable of being activated for aircraft tasks) for extended periods<sup>118</sup> – an unlikely scenario but one that is declared to be a defence policy priority. This scenario will be examined further in the Chapter Six case study.

Many commentators took the treatment of military fuel sustainability as a discrete issue further to argue that the military should lead energy technology development for the good of society and ahead of other aspects of the economy, particularly to achieve energy efficiency and carbon reduction measures. This argument was widespread in the US literature but also present in Australian commentary. While the argument may be legitimate, the many associated risks were not identified. Hornitschek argued that the US could lead energy technology development for society in a way similar to the development of the global positioning system.<sup>119</sup> Eggers argued that military improvements to fuel technology could be seen in the same light as other technologies now in common use across society such as radar, microwaves and the internet.<sup>120</sup> Trabish asked, 'Will Trump disrupt the US military's clean energy mission?', as if this issue was a primary consideration for President Trump's national security policy.<sup>121</sup> Elhefnawy viewed military development programs as 'a logical starting point' for energy technology research that could benefit society.<sup>122</sup> Buchanan highlighted the Department of Defense's historical

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<sup>118</sup> Andrew Davies, *ADF Capability Snapshot 2015: Part 1-RAAF* (Australian Strategic Policy Institute, Strategic Insights, Canberra, 2015), 3.

<sup>119</sup> Michael Hornitschek, *War Without Oil: A Catalyst for True Transformation* (Occasional Paper No. 56, Centre for Strategy and Technology, Air University, Maxwell Air Force Base, Alabama, 17 February 2006), 38.

<sup>120</sup> Eggers, 'The Fuel Gauge of National Security'.

<sup>121</sup> Herman K. Trabish, 'Will Trump disrupt the US military's clean energy mission?' *Utility Dive* [website], (3 February 2017), <<http://www.utilitydive.com/news/will-trump-disrupt-the-us-militarys-clean-energy-mission/434465/>>, accessed 20 July 2017.

<sup>122</sup> Nader Elhefnawy, 'Toward a Long-Range Energy Security Policy', *Parameters*, 36 (Spring 2006), 109.

investments in ‘transformational technology’ that benefited society.<sup>123</sup> Williams made similar arguments.<sup>124</sup> The US Defense Science Board argued,

By addressing its own fuel demand, (the US Department of Defense) can serve as a stimulus for new energy efficiency technologies, and help limit national dependence on foreign oil.<sup>125</sup>

In the Australian literature, Bergin and Glasson argued that the Australian Defence Force bases ‘offer an ideal test-bed to develop and deploy the next generation of energy technologies to power built infrastructure’.<sup>126</sup> The Centre for Policy Development proposed that ‘Defence can be a strategic leader that spearheads the (connection of) national security to the climate change challenge.’<sup>127</sup> Leckie proposed that the ‘(Australian) Army can provide the broader Australian community with leadership through its actions in preparing for Peak Oil’.<sup>128</sup>

Whilst a view that the military should lead societal development through military fuel sustainability is not unreasonable, the literature rarely contextualised the competing issues, the risks or the opportunity costs that would arise from the various propositions. In particular, the Australian literature did not address the issue of military exceptionalism, and focused on aspects of Defence such as military basing, rather than identifying the relevant factors for military fuel sustainability during combat operations (as the most critical military function). Such competing issues, including the cost of transforming a highly sophisticated military force to rely on alternative fuels, or the risks associated with reducing military carbon emissions, are not trivial, and could be anticipated to be present in a holistic review. Indeed, despite being introduced with extensive publicity and arguably as an environmental statement, a number of artefacts emerged that questioned the benefits of establishing the US ‘Great Green Fleet’ carrier battle group. For example, a marine fuels website reported that the biofuel used by this fleet was highly expensive, was more damaging for the environment than conventional fuels, and the US Navy had

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<sup>123</sup> Buchanan, ‘Energy and Force Transformation’, 52.

<sup>124</sup> Huw Williams, ‘Military planners explore options for reducing reliance on oil-based energy’, *Jane’s International Defence Review*, 42 (January 2009), 58.

<sup>125</sup> United States Defence Science Board, *More Fight Less Fuel* (Washington, D.C., February 2008), 13.

<sup>126</sup> Bergin and Glasson, *Implications of climate change for Australia’s national security*, 7.

<sup>127</sup> Centre for Policy Development, *The Longest Conflict: Australia’s Climate Security Challenge*, 11.

<sup>128</sup> Leckie, ‘Peak Oil and the Australian Army’, 33.



significantly overstated the use of the biofuel,<sup>129</sup> indicating some of the challenges that were absent from other commentary.

More than most other military capability arguments, military fuel sustainability was consistently situated in a national environmental and economic context, and conflation of national energy and military fuel sustainability issues will now be considered.

### *Conflation*

A second key criticism of the military fuel sustainability literature uncovered by this review was the consistent conflation of national or international energy issues, and military fuel sustainability. There was warning against conflation of national and military logistics issues in some of the classical military logistics literature, but such warnings were not reiterated in twenty-first century literature. For example, Eccles highlighted that logistics ‘has its roots in the national economy’, but acknowledged that ‘circumstances may arise under which the civilian criterion and the military criterion are (at times) opposed’.<sup>130</sup> Eccles’ acknowledgement of the exceptional nature of military operations, particularly during existential conflict, was not reiterated in twenty-first century military fuel sustainability literature. The conflation in the literature was also at odds with government declaratory policy documents, to be examined in Chapter Four, which minimised such conflation. For example, Defence doctrine on preparedness and mobilisation separated national mobilisation issues from military mobilisation requirements, in the event of a crisis.<sup>131</sup> Primary document analysis is an appropriate methodology to consider this difference.

Quantitative data offered in some of the literature referred to national figures, particularly in relation to global oil consumption, which were not directly relevant to the military. For example, in Malthusian style, Leckie assessed that threats to global supply of fuel and other resources were ‘likely to present themselves as a series of ‘strategic shocks’ that will precipitate the transition from abundance to scarcity’, and this required Defence to

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<sup>129</sup> Ship and Bunker, ‘Latest US Navy Biofuel Bunkers Are Bad For the Environment, Expensive, Barely Biofuel At All, Says Critic’, *Ship and Bunker* [website], (6 July 2016), <<https://shipandbunker.com/news/world/143015-latest-us-navy-biofuel-bunkers-are-bad-for-the-environment-expensive-barely-biofuel-at-all-says-critic>>, accessed 28 December 2017.

<sup>130</sup> Eccles, *Logistics in the National Defense*, 18.

<sup>131</sup> Department of Defence, *ADDP 00.2 Preparedness and Mobilisation (Provisional)* (Executive Series, Commonwealth of Australia, 2004), Chapter 3, Paragraph 3.5.

procure equipment that was more fuel efficient and less technologically sophisticated.<sup>132</sup> Blackburn foreshadowed a major reduction in access to specialist aviation fuels for Defence, identifying a risk that Defence may 'not be able to operate helicopters from Naval ships...without the tacit approval of foreign refineries'.<sup>133</sup> Without mention of factors such as prioritisation of fuel for major or existential military operations and US fuel supply, such a statement is misleading and emotive, because an Australian government would have a number of different options to solve an aviation fuel supply problem, such as by requesting supply from allies or developing indigenous fuel solutions, if the military situation necessitated such an approach. An Assistant Federal Opposition spokesman for Defence asked, 'what is the point in investing billions in our armed forces if they would run out of fuel within weeks in the event of war?'<sup>134</sup>, also failing to contextualise fuel sustainability in Australian military operations, and presenting an unrealistic short-term scenario.

Palazzo foreshadowed that a 'petroleum scarce world' would see military 'mobility (becoming) unaffordable', and that military actions already undertaken to mitigate such risks fell short of the fundamental change that would be required;<sup>135</sup> this argument again missed the exceptional nature of military operations and government prioritisation, over-emphasised the price sensitivity associated with operational deployments (to be examined further in Chapters Four and Five), and it was not conceivable that such a scenario would emerge with little notice. Wong argued for an 'energy transformation for military forces' to alternative energy options, foreshadowing that 'the continued reliance on fossil fuel would cease to be...tenable' due to global supply factors.<sup>136</sup> Molan argued that Defence would be ineffective without a 'government-mandated strategic reserve of fuel', with no sense of the military scenario that he was concerned about<sup>137</sup> (presumably,

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<sup>132</sup> Cameron Leckie, 'Lasers or Longbows? The paradox of military technology', 52-53.

<sup>133</sup> Blackburn, *Australia's Liquid Fuel Security Part 2*, 10.

<sup>134</sup> David Feeney, Assistant Federal Opposition spokesman for Defence, 'Weak links in fuel supply chain threaten defence capabilities', *Australian*, [website], (8 April 2016), <<http://www.theaustralian.com.au/opinion/weak-links-in-fuel-supply-chain-threaten-defence-capabilities/news-story/3b2daec35d196951bbbd21f860fa896c>>, (accessed 1 June 2017), 10.

<sup>135</sup> Albert Palazzo, 'The Military Revolution of Limits and the Changing Character of War', *Small Wars Journal*, [website], (21 October 2013), <<http://smallwarsjournal.com/jrnl/art/the-military-revolution-of-limits-and-the-changing-character-of-war>>, (accessed 28 December 2017).

<sup>136</sup> Wong, *Future War Fighting Capability: An Energy Perspective*, 1.

<sup>137</sup> Henry Belot and Dan Conifer, 'Jim Molan, former military chief turned Liberal senator, issues stark warning over defence capabilities', *ABC News*, [website], (4 January 2018),

Molan was referring to an existential threat, of the like Australia had not prioritised since World War Two). Gray concluded that a potential decline in global petroleum supply would place pressure on the Defence budget due to the effect on the national economy; would require Defence to conduct more stability operations; and, force Defence to adjust its own capability;<sup>138</sup> but, with little specific evidence as to how these broad scenarios would develop.

While there were some similarities, military forces faced different issues to those of broader society. These differences could reasonably have been expected to be presented in a balanced assessment of risks to military fuel sustainability. Factors such as the national prioritisation and increased production of fuel for military use during periods of conflict; the expectation of logistical support from a larger ally when required; the likelihood of some strategic warning before a major conflict; the relative impact of fuel shortages across opposing military forces; and, the low percentage of national fuel consumption by military forces were some compelling reasons why national and military fuel sustainability issues were not always identical. This will be dealt with in depth in Chapter Four. Further, the military role in any conflict considered to be existential would clearly lead to prioritisation of fuel for that purpose, rendering arguments based on cost less compelling. White also highlighted the military innovation that history demonstrated often arose from necessity.<sup>139</sup> Leaver and Ungerer stated, 'competing civil and military demand can become intense because of the absolute scarcity of a commodity';<sup>140</sup> while this is true, a key factor in the Australian context is the likely military operational context, and there was no expectation by any Australian government in the twenty-first century that Australia would be facing an existential threat that would see civil-military competition over commodities.<sup>141</sup> With the advantage of gaining multiple perspectives on the different issues facing national energy policy and military fuel sustainability, a

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<<http://www.abc.net.au/news/2018-01-04/jim-molan-issues-stark-warning-over-adf-capabilities/9303810>>, (accessed 6 January 2018).

<sup>138</sup> Matthew Gray, 'Peak Oil Theory: Implications for Australia's Strategic Outlook and the ADF', *Australian Defence Force Journal*, 180 (Canberra, 2009), 33-34.

<sup>139</sup> Ben White, 'Sustainable Defence Capability: Australia's national security and the role of defence industry', *Australian Defence Force Journal*, 183 (2010), 91, identified industry opportunities arising from changing distribution of energy resources.

<sup>140</sup> Richard Leaver and Carl Ungerer, *A Natural Power: Challenges for Australia's resources diplomacy in Asia* (Australian Strategic Policy Institute, Canberra, May 2010), 10.

<sup>141</sup> Department of Defence, *2016 Defence White Paper*, 32.

methodology incorporating case studies, primary document analysis and semi-structured interviews therefore was an appropriate style for this thesis, and will be outlined in Chapter Three.

In the course of conflating national and military fuel sustainability issues, an inflated sense of concern about fuel supply was often present in the literature, once again missing the context of military exceptionalism. These supply concerns were expressed in terms of geological risk (that global oil supply would peak, leaving military fuel supply vulnerable) and geopolitical risk (that a hostile nation would withhold supply).<sup>142</sup> The Centre for Policy Development argued that climate change would result in both geological and geostrategic risk for the Australian Defence Force.<sup>143</sup> Copulos argued that a reduction in oil supply from the Arabian Gulf should be of considerable concern to the US military because it could ‘paralyze the ability of the armed forces to operate’.<sup>144</sup> In contrast, and perhaps more credibly, Bartis argued, ‘with over 11 million barrels per day of secure petroleum supplies (into the US), we find it inconceivable that the US military would not be able to access the fuels it requires to maintain readiness and perform its missions.’<sup>145</sup> In September 2017, the media reported a national fuel distribution problem in New Zealand caused by damage to an oil pipeline, with a military exercise cancelled as a result;<sup>146</sup> this was reported as a significant national incident, but was a minor issue for the military due to the security context and absence of threat.

This literature review identified a number of commentators who directly linked potential national risks from climate change to military fuel sustainability<sup>147</sup> when such a link was often not clear. Further, many commentators linked climate change to the military use of fossil fuel, despite only a fraction of carbon emissions emanating from military forces – in

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<sup>142</sup> Centre for Policy Development, *The Longest Conflict: Australia’s Climate Security Challenge* (Report, 2015), 23.

<sup>143</sup> Ibid.

<sup>144</sup> Milton Copulos, *America’s Achilles Heel: The Hidden Costs of Imported Oil – A Strategy for Energy Independence* (The National Defense Council Foundation, Washington, D.C., 2003), 13.

<sup>145</sup> James Bartis, *Promoting International Energy Security: Volume 1, Understanding Potential Air Force Roles* (RAND, Project Air Force, California, 2012), 13.

<sup>146</sup> Ana Nicolaci da Costa, ‘UPDATE 1-New Zealand’s fuel shortage hits more flights and petrol stations’, *Reuters*, [website], (19 September 2017), <<https://www.reuters.com/article/newzealand-fuel-shortage/update-1-new-zealands-fuel-shortage-hits-more-flights-and-petrol-stations-idUSL4N1M0276>>, (accessed 1 January 2018).

<sup>147</sup> Waters and Blackburn, *Australian Defence Logistics: The Need to Enable and Equip Logistics Transformation*, 13.

Australia, estimated to be less than half of one per cent of total national emissions.<sup>148</sup> The Centre for Policy Development highlighted the need for Australia ‘to deal with our climate vulnerabilities at home and abroad’, with subsequent recommendations such as the need for ‘decarbonisation of energy usage in military assets’ as a primary response to these climate vulnerabilities.<sup>149</sup> The Climate Council made a similar point.<sup>150</sup> These arguments failed to identify the risks that proposed force structure changes would entail, or the national or military benefits that were likely to be achieved. The also did not contextualise the likelihood of Defence undertaking independent high-intensity military operations, which successive White Papers acknowledged as low.<sup>151</sup>

Tenuous climate change linkages were also made in the US. Slattery argued that a ‘common solution’ to global climate change and to the need to respond to national disasters was for the US military to seek ‘diversified and renewable (energy) sources’.<sup>152</sup> Elhefnawy highlighted concerns about ‘resource wars’ as global energy demands rose, conflating this concern with his desire to see ‘renewable energy sources or conservation technologies’ as a military development priority.<sup>153</sup> In 2007, the Center for Naval Analyses Corporation (now known as ‘CNA’) highlighted the many negatives associated with reliance on foreign oil, such as placing ‘our troops in dangerous global regions’, but extrapolated this into recommended priorities including that the US military ‘design and deploy systems to reduce the burden that inefficient energy use places on our troops as they engage overseas’, and ensure the military knows its carbon footprint<sup>154</sup> (although a subsequent CNA report appeared to soften that position).<sup>155</sup> Retired senior US military officers linked their reasonable contention that the US military needs reliable and affordable energy and fuel to factors such as having to dedicate an ‘enormous military

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<sup>148</sup> Anthony Bergin and Jacob Townsend, ‘A change in climate for the Australian Defence Force’ *Australian Strategic Policy Institute* (Special Report, 7, Canberra, July 2007), 5.

<sup>149</sup> Centre for Policy Development, *The Longest Conflict: Australia’s Climate Security Challenge*, 23.

<sup>150</sup> *Climate Council, Be Prepared: Climate Change, Security and Australia’s Defence Force*, 53.

<sup>151</sup> Department of Defence, *2016 Defence White Paper*, 32.

<sup>152</sup> Meg Slattery, *Energy Security in the United States Department of Defense: How and why the US Army and Navy are reducing their reliance on fossil fuels and the electrical grid, and what it could mean for the rest of us* (Senior Capstone Projects, Paper 408, Vassar College, 2015), 4.

<sup>153</sup> Elhefnawy, ‘Toward a Long-Range Energy Security Policy’, 110-11.

<sup>154</sup> The CNA Corporation, *National Security and the Threat of Climate Change*, i, ix.

<sup>155</sup> The CNA Military Advisory Board, *Advanced Energy and US National Security*, 5.

presence to the Middle East since the 1980s',<sup>156</sup> an issue of marginal relevance to reliable military fuel supply due to the mitigating factors outlined earlier.

The third key criticism of the literature – that policymakers politicised aspects of military fuel sustainability but such politicisation was not identified by commentators – will now be considered.

### *Politicisation*

You're not the Secretary of Energy. You're the Secretary of Navy.<sup>157</sup>

This literature review revealed many references to statements or actions that policymakers declared they were taking to assure military fuel supplies, to improve the military's environmental standing, to reduce military fuel consumption, or gain greater access to alternative fuels.<sup>158</sup> There was little analysis of these actions to determine their efficacy (a gap that Chapter Five will seek to fill when considering US military fuel sustainability actions),<sup>159</sup> and the literature review did not uncover any commentary on politicisation of military fuel sustainability, despite evidence of exaggeration and opportunism. This thesis seeks to identify whether political opportunism is a factor influencing military fuel sustainability; in particular, although defence policy has many objectives, this thesis considers whether actions were taken that did not seek operational improvement as an important goal, despite operational improvement being the primary justification for those actions.

This literature review found evidence that political opportunism was a feature of the policy or the public statements of policymakers in Australia and the US, when referring to

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<sup>156</sup> The CNA Corporation, *National Security and the Threat of Climate Change*, 7.

<sup>157</sup> Sandra Erwin, 'Amid Political Backlash, Pentagon Pushes Forward With Green Energy', *National Defense Magazine* (April 2012), <<http://www.nationaldefensemagazine.org/articles/2012/4/1/2012april-amid-political-backlash-pentagon-pushes-forward-with-green-energy>>, accessed 15 April 2019, highlighted this quote from Representative Randy Forbes to the US Secretary of Navy Mabus, during the House Armed Services Committee.

<sup>158</sup> For example, J.J. Bailey, 'Is it Practical for Defence to Reduce its Carbon Emissions Without Affecting its Effectiveness?', *Defence Studies*, 9/1 (March 2009), 48-60, argued that reduction in military carbon emissions was an unambiguous 'win-win' for the military and the environment.

<sup>159</sup> Darren Samuelsohn, 'Gabrielle Giffords' 'Green' Question Riled Right', *Politico*, [website], (9 June 2011), <<http://www.politico.com/news/stories/0111/47341.html>>, accessed 5 March 2012, was a short example from a news article highlighting political concerns associated with a line of questioning over renewable energy, directed to General David Petraeus during his appointment as the Commander of US forces in Afghanistan.

military fuel sustainability. For example, Defence's statement that it would seek to 'minimise its environmental footprint' (including in relation to greenhouse gas emissions through fuel consumption) in the conduct of overseas operations<sup>160</sup> requires further investigation to establish how such an ambition might be possible of fulfilment; particularly given the possibility that minimising the environmental footprint may present the risk of not fielding the most capable military force. However, this statement was not investigated or challenged.

US political leaders regularly promoted discourse about military fuel sustainability that sought political advantage. For example, some members of US Congress, such as Congressman Saxton<sup>161</sup> and Congresswoman Giffords,<sup>162</sup> sought legislative changes relating to energy to improve their broader environmental credentials, with questionable achievement of security or environmental outcomes. The proposed Giffords-Udall legislation was specifically focused on reducing domestic base energy consumption, but was said to be necessary because of the risk to logistics convoys in the Middle East.<sup>163</sup> Such contradictions elicited no serious critique in the literature.

The use of primary document analysis sought to determine whether these actors blurred the important distinction between the energy challenges faced nationally, and military fuel sustainability, or over-emphasised actions that were being taken; such over-emphasis may have been done intentionally, carelessly or unknowingly. For example, the 'Great Green Fleet' carrier battle group was an emotive application of the word 'Green', misleadingly implying an environmental benefit that did not exist as these warships still consumed a large quantity of fuel and other resources, and were of no benefit to the natural environment. The 'Great Green Fleet' concept was widely covered in the literature as an exemplar of US military energy transformation.<sup>164</sup> Secretary of Navy Mabus reinforced this perception of environmental action through the title of a 2013 article,

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<sup>160</sup> Department of Defence, *Defence Environmental Strategic Plan 2010-2014* (Canberra, 2010), 5.

<sup>161</sup> Roger Drinnon, 'C-17 uses synthetic fuel blend on transcontinental flight', *United States Air Force News*, [website], (18 December 2007), <<https://www.amc.af.mil/News/Article-Display/Article/147789/c-17-uses-synthetic-fuel-blend-on-transcontinental-flight/>>, accessed 20 January 2019.

<sup>162</sup> Office of Congresswoman Gabrielle Giffords, *The Giffords-Udall Department of Defense Energy Security Act* (Executive Summary, United States, 2010), 1.

<sup>163</sup> Ibid.

<sup>164</sup> *Alternative Energy*, [website], (2010), <<http://www.alternative-energy-news.info/us-navy-green-fleet/>>, accessed 20 February 2019.

‘Green Water: Can the US Navy win the eco-arms race?’.<sup>165</sup> Clearly, whilst fuel diversification may have been a necessary goal, efforts to increase the percentage of biofuel in use by the US Navy were not in this instance going to be of benefit to the environment. Indeed, as diversification of fuel was Mabus’ main argument, the title of the article was misleading and emotive, and sought to create a perception of environmental consciousness. Some commentary eventually emerged, such as a critique questioning whether a five per cent blend of biofuel mixed into petroleum ‘should even be called biofuel; it is petroleum fuel with an expensive additive’, and further questioning the ‘green’ credentials of using a ‘first-generation’ biofuel feedstock in palm oil.<sup>166</sup> The above-quoted assertion by Representative Forbes to Secretary Mabus questioned the extent to which Mabus had sought to influence military fuel sustainability, but this type of critique was infrequently replicated in the literature despite a significant volume of commentary on the ‘Great Green Fleet’.

Political leaders and commentators alike widely praised the US military for actions taken to improve energy efficiency. This praise included recognition from US Presidents. For example, in 2012 at a US Air Force base that had established solar power, Miles was one of several commentators to quote President Obama as saying, ‘the world’s largest consumer of energy, the Department of Defense, is making one of the largest commitments to clean energy in history’, and, ‘The less we depend on foreign oil, the more secure we become as a nation’.<sup>167</sup>

There were some contradictory observations in President Obama’s comments that were not identified in the literature, despite this event being widely reported. First, the transition of some domestic bases to solar power reduced pressure on local or regional electricity supplies, but President Obama made the link to foreign crude oil reliance.<sup>168</sup> The transition of some US military bases to solar power did not result in less dependence on foreign oil. Some commentators such as Pearce argued that more solar power capacity

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<sup>165</sup> Ray Mabus, ‘Green Water: Can the US Navy win the eco-arms race?’, *Foreign Policy*, [website], (6 August 2013), <<http://foreignpolicy.com/2013/08/06/green-water/>>, accessed 24 December 2014.

<sup>166</sup> *Ship and Bunker*, ‘Latest US Navy Biofuel Bunkers Are Bad For The Environment, Expensive, Barely Biofuel At All, Says Critic’.

<sup>167</sup> Donna Miles, ‘Obama praises DoD’s energy leadership, stewardship’, *Air Force News*, [website], (27 January 2012), <<https://www.af.mil/News/Article-Display/Article/111794/obama-praises-dods-energy-leadership-stewardship/>>, accessed 30 March 2019.

<sup>168</sup> *Ibid.*



available to the US military in domestic bases enabled remote operations such as ‘drones...flying over Yemen or Iraq or Syria’ to be more reliable.<sup>169</sup> This was a particularly oblique linkage to tactical operations, and this literature review found no declared problems of drones losing control because the domestic base in the US where the drone was controlled lost power. Second, by discussing foreign crude oil reliance, President Obama causally linked national energy challenges to military fuel sustainability. This link had far greater nuance, but this was not evaluated in the literature. Indeed, commentary was very positive; one commentator argued that President Obama’s quote indicated:

...the administration is driving (Defense) investment in energy efficiency and alternative fuels from the top down, with senior (Defense) civilian and military leadership proceeding full speed ahead to accomplish the President’s energy vision.<sup>170</sup>

It is possible that President Obama was poorly briefed on the consequences of the actions that had occurred to introduce solar power in some domestic bases. However, it is probable that he sought association with military energy efficiency, targeting a domestic audience to reinforce his own environmental credentials, and targeting a foreign audience to highlight that the US was becoming less vulnerable to crude oil price fluctuations and supply disruption. He similarly argued in 2015 that a scheme to train military veterans in solar panel installation would ‘help make the planet more secure’,<sup>171</sup> again linking solar energy and security. His 2014 State of the Union address affirmed that the US had to reduce its fuel dependence,<sup>172</sup> and while he declared the military fuel sustainability actions to be important, there was a clear incentive for President Obama to establish his involvement in military energy efficiency. The case study and primary document analysis methodology to be outlined in Chapter Three will describe the approach to determine whether significant actions were taken to reduce tactical fuel consumption (given that

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<sup>169</sup> Joshua Pearce, ‘How solar power can protect the US military from threats to the electricity grid’, *The Conversation*, [website], (14 September 2017), <<http://theconversation.com/how-solar-power-can-protect-the-us-military-from-threats-to-the-electric-grid-83698>>, accessed 22 September 2017.

<sup>170</sup> James Corlett, ‘It’s Not So Easy Being Green’, *Proceedings Magazine*, 140/11/1 (November 2014), 341.

<sup>171</sup> Dave Boyer, ‘Obama pitches clean energy industry as jobs program for military veterans’, *Washington Times*, [website], (3 April 2015), <<http://www.washingtontimes.com/news/2015/apr/3/obama-pitches-clean-energy-industry-jobs-program-m/>>, accessed 31 December 2015.

<sup>172</sup> Brad Plumer, ‘Obama’s 2014 State of the Union address’, *Washington Post*, [website], (28 January 2014), <<http://www.washingtonpost.com/blogs/wonkblog/wp/2014/01/28/read-obamas-2014-state-of-the-union-address/>>, accessed 10 December 2018.

more than 75 per cent of total US military energy consumption is petroleum),<sup>173</sup> and the examples highlighted above did nothing to reduce tactical fuel consumption.

The actions taken by the US to improve military fuel sustainability will be further considered in Chapter Five. Chapter Five will consider whether Australian commentators misrepresented or misunderstood the level of action that was taken in the US to reduce tactical fuel consumption, to argue that Australian policymakers should follow the US example to seek significant reductions. For example, one publication argued, 'The United Kingdom and United States militaries are rapidly preparing for climate change while Australia lags behind'.<sup>174</sup> Others argued along similar lines.<sup>175</sup> A clear understanding of the US actions to improve military fuel sustainability is important to fully understand the Australian context.

The failure to identify political opportunism relating to military fuel sustainability was also evident in Australia.<sup>176</sup> For example, a number of Australian media organisations reported that Queensland Premier Palaszczuk was on 'the verge of a breakthrough' in developing a biofuels industry to support requirements such as the US 'Great Green Fleet' vessels transiting through the region. Wardill described the 'significant coup' in Premier Palaszczuk's meeting with US Secretary of Navy Mabus, with the Premier stating that the 'Great Green Fleet initiative will help attract new investment and new jobs to regional Queensland'.<sup>177</sup> Other commentators reported Premier Palaszczuk describing a signing of a non-binding 'statement of cooperation' with the US Navy as 'a pivotal moment in our history'.<sup>178</sup> There was little critical analysis of this initiative, with one commentator arguing that Australia had 'jumped on board' with a US effort to 'take climate change and energy security seriously', further stating 'a pilot biodiesel plant in Queensland...could lead to the

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<sup>173</sup> The Pew Project, *Reenergizing America's Defense: How the Armed Forces are Stepping Forward to Combat Climate Change and Improve the US Energy Posture* (The Pew Charitable Trusts, Washington and Philadelphia, 2010), 9.

<sup>174</sup> Climate Council, *Be Prepared: Climate Change, Security and Australia's Defence Force*, v.

<sup>175</sup> Centre for Policy Development, *The Longest Conflict: Australia's Climate Security Challenge*, 24.

<sup>176</sup> For example, Department of Defence, *Defending Australia in the Asia Pacific Century: Force 2030* (White Paper, Commonwealth of Australia, 2009), 122, overstated Defence's environmental performance.

<sup>177</sup> Steven Wardill, 'Opinion: Government determined to ensure biofuels a new industry for Queensland', *Courier Mail*, [website], (26 November 2016), <<http://www.couriermail.com.au/news/opinion/opinion-government-determined-to-ensure-biofuels-a-new-industry-for-queensland/news-story/2b1cb96e623f638bfb8c54ceea84214d>>, accessed 29 December 2017.

<sup>178</sup> Geoff Egan, 'US Navy to meet with biofuel sector this year', *Queensland Times*, [website], (23 August 2016), <<https://www.qt.com.au/news/US-Navy-to-meet-with-biofuel-sector-this-year/3080431/>>, accessed 29 December 2017.

production of enough fuel by 2020 to power the entire army, navy and air force'.<sup>179</sup> This commentary was another example of the emphasis placed upon the importance of environmental and economic actions, above the importance of military performance, and this trend was an important feature in understanding the factors influencing attitudes towards military fuel sustainability.

Such opportunism or presumption was regularly evident, but rarely identified by commentators, and this represented a shortfall in the literature and in the understanding of military fuel sustainability. Indeed, the extensive and overwhelmingly positive commentary on the US approach to military fuel sustainability was conspicuous. The declared focus of policymakers on fuel efficiency and alternative energy was strongly supported by a vast range of commentators, including many who did not question that the US military was taking extensive action to set an example for an important global issue.<sup>180</sup> For example, in the context of a perceived risk to assured military fuel supply, Hornitschek argued that the US military had demonstrated the 'positive effects of a coherent strategy and leadership' through its renewable energy program, although without describing any tactical aspects.<sup>181</sup> In effect, strongly supported by commentators and the media, the US military sought to promote its environmental credentials, and policymakers demonstrated commitment to reduce energy consumption in domestic bases, but changes to tactical fuel sustainability (where the most energy consumption occurred) were limited, and the lack of action was not questioned. This was similar to observations made about the Australian context earlier in this chapter.<sup>182</sup>

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<sup>179</sup> Giles Parkinson, 'Australia's defence force could run on sugar cane and tyres under biofuel plan', *Guardian*, [website], (16 April 2016), <<https://www.theguardian.com/sustainable-business/2016/apr/06/australias-defence-force-could-run-on-sugar-cane-and-tyres-under-biofuel-plan>>, accessed 29 December 2017.

<sup>180</sup> Crowley, et al, 2007, 2-10. Donald Fournier and Eileen Westervelt, *Energy Trends and their Implications for US Army Installations* (Energy Research and Development Center, USA, September 2005), iii-iv, argued that disproportionate consumption could cause a loss of goodwill, and therefore Army installations should be more environmentally friendly. Gregory Lengyel, *Department of Defense Energy Strategy: Teaching an Old Dog New Tricks* (Walker Paper No. 10, Air University Press, Maxwell Air Force Base, Alabama, January 2008), 5, argued that the US military should use more 'environmentally friendly forms of energy.' Williams, 'Military planners explore options for reducing reliance on oil-based energy', 58, argued that the need to develop viable alternative fuels was 'more pressing than ever.'

<sup>181</sup> Hornitschek, *War Without Oil: A Catalyst for True Transformation*, 49.

<sup>182</sup> For example, Department of Defence, *Environmental Strategy 2016-2036* (Commonwealth of Australia, June 2016), 3, highlighted Defence's long-standing but non-quantified aim of being 'a leader in sustainable environmental management'.

Underpinning the three key trends of *isolation*, *conflation* and *politicisation* is an almost complete absence of recognition in the literature that the military mission would be prioritised for resources in the unlikely event of an existential conflict. This will now be considered.

### **Australian defence policy and military exceptionalism**

As identified earlier in this chapter, a key weakness in the literature was that military fuel sustainability was regularly considered by commentators as a discrete issue, rather than as an integral component of Australian defence policy. For example, Molan's assessment that Australia's national security and military efficacy was impacted by the lack of a strategic fuel reserve<sup>183</sup> begs the question, 'in what anticipated military scenario?' This thesis seeks to provide greater context and linkage between defence policy and military fuel sustainability.

There was an extensive quantity of literature written on Australian defence policy. This thesis is particularly concerned with where declared policy differs from operational practice, focused on the topic of military fuel sustainability. Aspects of military readiness are also relevant to Australian military fuel sustainability, particularly in the Chapter Six case study, with Betts a leading commentator on military readiness and the national choices that this entails.<sup>184</sup> The following section will focus on the literature that considered the long-standing choice of prioritisation between missions either in support of the US (where logistical support was consistently provided to Australian forces), or, more independent missions in the nearer region, which in recent history were almost entirely focused on stability, humanitarian support and military-to-military engagement and did not entail the same degree of risk or operational tempo as missions in the Middle East. For example, INTERFET did not require strategic lines of communication for fuel supply to be secured from disruption by an enemy maritime or air force. In relation to the 2016 White Paper, Ayson argued that a 'secure, resilient Australia with secure northern approaches' will always be a strategic defence interest, the question will be over the

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<sup>183</sup> Belot and Conifer, 'Jim Molan, former military chief turned Liberal senator, issues stark warning over defence capabilities'.

<sup>184</sup> Richard Betts, *Military Readiness: Concepts, Choices, Consequences* (Brookings Institute, Washington, D.C., 1995).

relative prioritisation and resourcing of that interest compared to Australian military actions further afield.<sup>185</sup>

Many pre-eminent commentators on Australian defence policy agreed that there was a long-standing disjunction between declared policy and operational practice.<sup>186</sup> Indeed, outside government policy documents, this literature review found only one commentator (Professor Paul Dibb) who argued in 2004 that there was no such inconsistency, when he stated, 'There is a naïve and simplistic view around that there is a disconnect between strategy and roles'.<sup>187</sup> However, his position seemed to be clarified by his later statement that 'the Defence organisation has been preoccupied with supporting military operations in the Middle East for the last 15 years', which indicated his awareness that there had been a policy-practice disjunction.<sup>188</sup>

Accepting that the vast majority of Australian defence commentators recognised a disjunction, this inconsistency has never been linked with military fuel sustainability. This thesis seeks to test if military fuel sustainability was an area that was consistent with a policy-practice disjunction.

Cheeseman wrote extensively about the policy-practice disjunction in the 1980s and 1990s, arguing that Australian political leaders tended to focus on 'means' rather than 'ends', consistently seeking alignment with the US rather than pursuing the more independent defence policy that was described in consecutive White Papers.<sup>189</sup> Dupont stated, 'Declaratory policy bears little resemblance to what the Australian Defence Force actually does'.<sup>190</sup> Dibb and Brabin-Smith outlined their concern about operations outside

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<sup>185</sup> Robert Ayson, 'Discovering Australia's Defence Strategy', *Security Challenges*, 12/1 (2016), 43.

<sup>186</sup> Christopher Cowan, Andrew Davies, Malcolm Davis, Rod Lyon, James Mugg and Mark Thomson, 'Defence Policy', in Malcolm Davis (ed.), *Agenda for change 2016: Strategic choices for the next government* (Australian Strategic Policy Institute, June 2016), 19-20.

<sup>187</sup> Joint Standing Committee on Foreign Affairs, Defence and Trade, *Australia's Maritime Strategy* (The Parliament of the Commonwealth of Australia, June 2004), 65.

<sup>188</sup> Paul Dibb, 'New policy regime forgets geography', *Australian National University Newsroom*, [website], (31 May 2016), <<http://www.anu.edu.au/news/all-news/new-policy-regime-forgets-geography>>, accessed 20 February 2019.

<sup>189</sup> Graeme Cheeseman, *Australia's Defence White Paper in the Red* (Peace Research Centre, Working Paper No. 80, Australian National University, May 1990), 1; Graeme Cheeseman, *Over-reach in Australia's Regional Military Policy* (Peace Research Centre, Working Paper No. 71, Australian National University, August 1989), 18.

<sup>190</sup> Alan Dupont, 'Full Spectrum Defence: Re-Thinking the Fundamentals of Australian Defence Strategy', *Lowy Institute*, [website], (13 March 2015), <<https://www.lowyinstitute.org/publications/full-spectrum-defence-re-thinking-fundamentals-australian-defence-strategy>>, accessed 1 March 2019.

the nearer region detracting from declared and more important nearer region priorities.<sup>191</sup> White regularly discussed the 'higher priority (afforded to) operations beyond the defence of Australia', noting that Australian defence policy evolved towards 'the 'forward defence' policy of the pre-Vietnam era'.<sup>192</sup> In the context of major hardware procurement, Davies noted, 'something other than strategic logic is driving our decision making',<sup>193</sup> and Thomson argued that Australian military procurement focused on combat capabilities at the expense of supporting capabilities that would be needed for independent operations (such as logistics).<sup>194</sup>

The 'equally weighted high level Strategic Defence Objectives' outlined in the 2016 White Paper<sup>195</sup> was described by Dibb as further evidence of Defence being 'preoccupied with supporting military operations in the Middle East' with no understanding of strategic warning time and the expansion base.<sup>196</sup> Evans highlighted the 'frequent irrelevance of strategic theory to military practice' in Australia, noting the regular heavy demand for land forces despite the policy emphasis on air and maritime forces.<sup>197</sup> Burke argued that the exaggerated Australian fear of perceived military threats entrenched a military force structure that was most applicable to provide expeditionary support to US-led operations.<sup>198</sup>

The concepts of military preparedness and strategic warning time, relating to Australian defence policy, were regularly discussed in the literature. For example, Brabin-Smith argued that Australian political leaders were 'able to take a relaxed approach to warning time' over several decades, due to the limited threat posed to Australia.<sup>199</sup> This 'relaxed

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<sup>191</sup> Dibb and Brabin Smith, *Australia's management of strategic risk in the new era*, 2.

<sup>192</sup> Hugh White, 'Strategic risk in the new era: a response to Paul Dibb and Richard Brabin-Smith', *The Strategist* [website], (20 November 2017), <<https://www.aspistrategist.org.au/strategic-risk-in-the-new-era-a-response-to-paul-dibb-and-richard-brabin-smith/>>, accessed 3 January 2018.

<sup>193</sup> Andrew Davies, *Let's test that idea – contestability of advice in the Department of Defence* (Australian Strategic Policy Institute, 22 January 2010), 3.

<sup>194</sup> Mark Thomson, *War and Profit: Doing business on the battlefield* (Australian Strategic Policy Institute, Canberra, March 2005), 28.

<sup>195</sup> Department of Defence, *2016 Defence White Paper*, 71.

<sup>196</sup> Dibb, 'New policy regime forgets geography'.

<sup>197</sup> Evans, *The Tyranny of Dissonance: Australia's Strategic Culture and Way of War 1901-2005*, 42.

<sup>198</sup> Anthony Burke, *Fear of Security: Australia's Invasion Anxiety* (Cambridge University Press, Melbourne, 2008), 1-23.

<sup>199</sup> Richard Brabin-Smith, 'Warning time', *The Strategist*, [website], (16 November 2017), <<https://www.aspistrategist.org.au/warning-time/>>, accessed 20 December 2018.

approach' associated with preparedness will be considered in Chapter Six, which will case study a credible contingency scenario.

The literature indicated that alignment with the US was deeply ingrained in Australian strategic culture, and highlighted the durability of Australian defence policy across the decades since World War Two. Australian military history comprised an almost exclusive emphasis on expeditionary conflict in a conventional threat environment in support of allies. Despite not being major geostrategic actors or leading military technology development, Australian military forces participated in all major twentieth century conflicts involving Western powers. By acting in support of the US, Australian military forces were consistently insulated from the many challenges of fuel supply faced by the US, discussed earlier in this chapter. Further, the US alliance allowed Australian military forces to gain new military technology, irrespective of the higher fuel consumption often associated with this technology. Defence consequently became increasingly reliant on fuel being readily available (and on others to support this technology). Commentators such as Cheeseman questioned whether this technological focus was affordable and necessary,<sup>200</sup> but a technologically sophisticated approach remained dominant in Australian defence policy.<sup>201</sup> Sayer argued from a critical realist perspective that:

social phenomena rarely have the durability of many of the objects studied by natural science...Where they are relatively enduring, as many institutions are, then this is usually an intentional achievement, a product of making continual changes in order to stay the same.<sup>202</sup>

Although not specifically relating to Australian defence policy, this quote offers a fitting summation of the Australian literature identifying a policy-practice disjunction.

The military advantages conferred by the US alliance were well established in the literature, and spoke to the durability of the Australian policy of prioritising the US alliance. Medcalf and Brown stated,

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<sup>200</sup> For example, Graeme Cheeseman, *Alternative Defence Strategies and Australia's Defence* (Peace Research Centre, Working Paper No. 51, Australian National University, September 1988), 10.

<sup>201</sup> Department of Defence, *Defence White Paper 2013* (White Paper, Commonwealth of Australia, Canberra, 2013), 109.

<sup>202</sup> Andrew Sayer, *Realism and Social Science* (Sage Publications, London 2000), 13.

Australia cannot achieve (important) goals without international partnerships – the most important of which by far remains the alliance with the United States. These partnerships in turn are reasons for Australia to uphold its reputation as a secure, capable, reliable, and active participant in the international system.<sup>203</sup>

Molan argued that the US should be Australia's closest ally because it 'shares our values, our geography, our history and many of our interests'.<sup>204</sup> Jennings argued that Australian governments must 'invest heavily in sustaining the relationship' because 'we could double our defence spending and still have a significantly inferior Australian Defence Force' without US support.<sup>205</sup> Dean highlighted the importance of the US in developing amphibious expertise and in opening up engagement opportunities with regional partners.<sup>206</sup> Such advantages were long-standing – prominent Australian commentator Bell highlighted in the 1980s, 'the (US alliance has) paid off handsomely, provided the conventional wisdom about the Australian national interest...is accepted'.<sup>207</sup>

Similarly, the disadvantages of a close US alliance were well documented.<sup>208</sup> White made extensive recent commentary on the meaning for Australia of China's emergence as a global power, concluding that Australia 'would be very unwise to expect that America will sustain its leadership in Asia'.<sup>209</sup> Dibb and Brabin-Smith were critical of the US alliance distracting Australian political leaders from what they considered to be the highest priority nearer region and domestic military requirements.<sup>210</sup> The durability of Australian support for global powers in twentieth century conflicts, and the contemporary

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<sup>203</sup> Rory Medcalf and James Brown, *Defence challenges 2035: Securing Australia's Lifelines* (Lowy Institute, Sydney, 10 November 2014), 2.

<sup>204</sup> Jim Molan, 'Why Our Defence Forces Face Terminal Decline', *Quadrant Online*, [website], (1 March 2013), <<http://quadrant.org.au/magazine/2013/03/why-our-defence-forces-face-terminal-decline/>>, accessed 7 January 2018.

<sup>205</sup> Peter Jennings, 'The Strategic Agenda', in Malcolm Davis (ed.), *Agenda for change 2016: Strategic choices for the next government* (Australian Strategic Policy Institute, June 2016), 13-14.

<sup>206</sup> Peter Dean, 'Australia, Maritime Strategy and Regional Military Diplomacy', in Justin Jones (ed.), *A Maritime School of Strategic Thought for Australia: Perspectives* (Sea Power Centre – Australia, Commonwealth of Australia, 2013), 95.

<sup>207</sup> Coral Bell, *Dependant Ally: A Study in Australian Foreign Policy* (Oxford University Press, Melbourne, 1988), 195.

<sup>208</sup> Dibb, 'New policy regime forgets geography'.

<sup>209</sup> Hugh White, 'Worlds apart: John McCain and Angela Merkel', *The Strategist*, [website], (1 June 2017), <<https://www.aspistrategist.org.au/worlds-apart-john-mccain-angela-merkel/>>, accessed 10 January 2018.

<sup>210</sup> Paul Dibb and Richard Brabin-Smith, 'Australian Defence: Challenges for the New Government', *Security Challenges*, 9/4 (2013), 52.



operational scenarios that envisaged further support, led some commentators such as Kelly to argue that the Australian military relied on others for fuel supply in many operational circumstances, and therefore faced significant capability shortfalls if required to operate independently, as Australia's leadership role in the militarily benign INTERFET mission demonstrated (discussed previously in this chapter).<sup>211</sup>

Regardless of whether the US alliance was a net positive or negative for the Australian military, there is benefit in considering military fuel sustainability to determine if this is consistent with the hypothesis of a known and long-standing disjunction between declared policy and operational practice. Case studies, primary document analysis, and semi-structured interviews are part of a multi-method qualitative approach to identify the presence or otherwise of a disjunction. If there is indeed a disjunction, and support to US-led operations is the priority for Australian political leaders (and with the option to prioritise national fuel resources for independent operations if militarily required), the risk for Australia associated with relying on US military fuel supply in these circumstances is very low. This finding would be inconsistent with the majority of the twenty-first century Australian literature on military fuel sustainability, which did not consider likely military contingencies. The specific case study in Chapter Six will develop this point further, by testing military fuel sustainability against a long-standing scenario.

The literature on another aspect of strategic culture from twentieth century conflict, the emergence of military exceptionalism in Australia, will now be considered.

### *Fuel sustainability and military exceptionalism*

Australian defence policy does not envisage the onset of existential conflict in the foreseeable future.<sup>212</sup> This thesis will examine whether Australian policymakers adopted a pragmatic approach to military fuel sustainability, providing sufficient fuel resources to only achieve current and likely tasks, with an expectation that the exceptional military role would lead to a prioritisation of additional fuel resources for future tasks should such prioritisation be required.

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<sup>211</sup> Kelly, *The March of Patriots*, 483.

<sup>212</sup> Department of Defence, *2016 Defence White Paper*, 32.

The historical mobilisation of military forces for major or existential conflict using national resources is an example of military exceptionalism. There is a meaningful body of literature on the mobilisation of entire nations for war efforts throughout what some considered to be existential conflicts during the twentieth century, with prioritisation of fuel for military use an important part of mobilisation efforts. The pre-eminent logistics theorists from the twentieth century wrote extensively about mobilisation, including Ruppenthal<sup>213</sup> and others.<sup>214</sup> Contemporary commentators such as Brands also situated military exceptionalism within a concept of grand strategy, noting that ‘the need for grand strategy is most painfully evident in war’ as national resources must be stretched and prioritised.<sup>215</sup> In the contemporary Australian context, Waters and Blackburn highlighted that Defence would not keep all of its capabilities at the highest readiness for the full range of operational responses, and the concept of mobilisation was clearly important for the Australian military.<sup>216</sup>

Military exceptionalism is the foundation for an Australian Defence Doctrine Publication (ADDP) which outlined the process of military mobilisation and requisition of equipment from the wider community. This doctrine noted that assets and resources such as ‘vehicles, equipment, fuel and facilities’ could be requisitioned from the wider community during a defence emergency (as defined under the Defence Act 1903).<sup>217</sup>

As resources are prioritised for military use, military mobilisation requires support from civilian agencies, and there was important previous examination of military-civilian relations in Australia and in the US. A prominent debate on military-civilian relations between Huntington and Janowitz from the 1950s onwards remained relevant,<sup>218</sup> with important contributions by Smith in the Australian context.<sup>219</sup> Huntington’s use of the

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<sup>213</sup> Ruppenthal, *Logistical Support of the Armies: Volume 1, May 1941-September 1944*, 60.

<sup>214</sup> Eccles, *Logistics in the National Defense*, 41, 49.

<sup>215</sup> Hal Brands, *The Promise and Pitfalls of Grand Strategy* (United States Army War College, Strategic Studies Institute, August 2012), 6-8.

<sup>216</sup> Waters and Blackburn, *Australian Defence Logistics: The Need to Enable and Equip Logistics Transformation*, 15.

<sup>217</sup> Commonwealth of Australia, *Australian Defence Doctrine Publication 00.2: Preparedness and Mobilisation*, Chapter 5, paragraph 5.20.

<sup>218</sup> Samuel Huntington, *The Soldier and the State* (Harvard University Press, 1957), 11-12; Morris Janowitz, *The Professional Soldier* (Free Press, New York, 1971), 423-425.

<sup>219</sup> Hugh Smith, ‘The Decline of the Military Profession in Australia?’, *Defence Force Journal*, 74 (January/February 1989), 7.

term ‘auxiliary vocation’ to describe functions outside the ‘management of violence’<sup>220</sup> was indicative of his expectation that national and military logistics would be made available to support the high priority military combat units when required, and of a lower prioritisation of military fuel sustainability than combat functions. Janowitz argued that technology made the gap between civilian and military employment much narrower,<sup>221</sup> with the implications for employment of personnel in military fuel sustainability roles to be discussed in Chapter Four.

This literature review identified two competing ideas on military exceptionalism, which will be tested through primary document analysis in Chapter Four. The literature specifically addressing military exceptionalism in Australia, and the belief that military forces should be prioritised for resources such as fuel during periods of conflict as part of a nation’s grand strategy, mostly argued that military exceptionalism was deeply embedded in Australian culture.<sup>222</sup> Conversely, contemporary literature specifically concerning Australian military fuel sustainability (outlined earlier in this chapter) made little reference to military exceptionalism and national prioritisation of resources for military use, despite the regular linkage of national energy policy matters to military fuel sustainability.<sup>223</sup> This chapter previously argued that the contemporary literature *isolated* military fuel sustainability as a discrete issue, rather than as a deeply entwined field in Australia’s defence policy. This thesis will engage with the identified isolation and test whether the concept of military exceptionalism and an expectation of fuel prioritisation is a factor influencing the contemporary Australian approach to military fuel sustainability.

Some of the literature on military exceptionalism noted that the Australian military was not always perceived to be ‘exceptional’, and perception varied over time and location, both within Australia and when compared to Australia, and the ‘acceptance’ of the military being exceptional was inherently political.<sup>224</sup> In the context of contemporary military operations in the Middle East, Rothkopf criticised the ‘reflexive deference’ given

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<sup>220</sup> Huntington, *The Soldier and the State*, 11-12.

<sup>221</sup> Janowitz, *The Professional Soldier*, 423-425.

<sup>222</sup> Australian War Memorial, *Second World War, 1939-45*, [website].

<sup>223</sup> For example, Blackburn, *Australia’s Liquid Fuel Security Part 2*, 10.

<sup>224</sup> Adrienne Francis, ‘All commemoration is political: Historians lead charge against Gallipoli ‘myth’’, *ABC News*, [website], (11 November 2013), <<http://www.abc.net.au/news/2013-11-11/war-and-memory-australians-experiencing-commemoration-fatigue/5081544>>, accessed 11 November 2013.

to military commanders, not allowing critical assessment of military decisions.<sup>225</sup> This is relevant insofar as it identifies that the support for the mobilisation of a military force in Australia may not be undisputed. However, Brown argued that the level of respect associated with aspects of military service was at a high point,<sup>226</sup> and policy documents such as the 1976 White Paper described defence as the 'first responsibility of government'.<sup>227</sup>

World War Two saw the military raised in relative priority above other areas of the government and the nation, when committed to a major or existential conflict, allowing policymakers to make significant decisions when required.<sup>228</sup> Rationing of strategic resources including fuel was one way that military exceptionalism was portrayed in the literature, and this will now be examined.

### *Rationing*

Although not stated in most of the literature relating to contemporary military fuel sustainability, there were numerous ways that Australian military forces could be (and have been) provided with additional fuel supply if a major or existential conflict emerged. For example, certain market behaviours may allow the prioritisation of fuel for military purposes, reducing civilian and commercial consumption through higher fuel prices caused by an increase in military demand. However, rationing of fuel across commercial and private functions, and placing limitations on non-military fuel consumption, provided Australian military forces with additional capacity during World War Two, with a body of literature outlining the various actions taken. Military requisition during a defence emergency remains an option available to the current Australian government.<sup>229</sup> Butlin and Schedvin highlighted the challenging range of political decisions for the Curtin Government associated with rationing, such as the choice between rationing essential

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<sup>225</sup> David Rothkopf, 'The Case for Challenging Our Generals', *Foreign Policy*, [website], (22 June 2011), <<https://foreignpolicy.com/2011/06/22/the-case-for-challenging-our-generals/>>, accessed 10 March 2019.

<sup>226</sup> James Brown, *ANZAC's Long Shadow: The Cost of our National Obsession* (Redback, Victoria, 2014), Introduction.

<sup>227</sup> Department of Defence, *Australian Defence*, Introduction.

<sup>228</sup> Queensland Government, 'Rationing', *Queensland WWII Historic Places*, [website], (30 June 2014), <<https://www.ww2places.qld.gov.au/homefront/rationing/>>, accessed 30 January 2019.

<sup>229</sup> Commonwealth of Australia, *Australian Defence Doctrine Publication 00.2: Preparedness and Mobilisation*, Chapter 5, paragraph 5.20.

items versus rationing luxury items, and whether rationing could provide more productive use of resources including labour.<sup>230</sup> Furthermore, prioritised fuel allocation was included in federal legislation as a result of experience from World War Two.

Rationing of fuel for military purposes in Australia during World War Two faced opposition, and the Australian government did not enact rationing measures as severe as those enacted in the United Kingdom.<sup>231</sup> Ruppenthal highlighted the more extensive rationing arrangements that were established in the United Kingdom across the entire population, indicative of a population that perceived an existential threat.<sup>232</sup> Kynaston also highlighted the often desperate situation in the United Kingdom during and immediately after World War Two.<sup>233</sup> According to one account, the Australian Government in 1939 did everything within its power to avoid having to enact rationing. The Government was eventually forced to conduct rationing, but with opposition from many groups including motoring organisations, the federal opposition, newspapers and commercial firms. Despite a growing military threat to Australia, there was widespread anger at the introduction of price controls and of (eventual) rationing.<sup>234</sup> Rationing was partly undermined by actions taken by parts of society, such as mass hoarding of fuel.<sup>235</sup> A history of the role of science and industry during World War Two highlighted that in the coal industry, Australia's main source of energy and critical to the war effort, there was no 'restraining influence on the frequency of industrial disputes'.<sup>236</sup> Furthermore, Butlin and Schedvin highlighted that attempts to enact fuel rationing, at the height of Australia's military requirements for fuel, were only moderately successful because normal domestic consumption remained high. Limited measures such as 'appeals to the public', education campaigns and study of the use of fuel substitutes,<sup>237</sup> proved that enacting rationing for military use, even in the most serious circumstances, has been resisted. Rationing also elicited opportunistic responses from senior parliamentarians.<sup>238</sup> Such opportunistic

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<sup>230</sup> Sydney James Butlin and Carl Boris Schedvin, *War Economy 1942-1945* (Australia in the war of 1939-45, Vol. 4, Australian War Memorial, Canberra, 1955), 286-7.

<sup>231</sup> Queensland Government, 'Rationing'.

<sup>232</sup> Ruppenthal, *Logistical Support of the Armies: Volume 1, May 1941-September 1944*, 61.

<sup>233</sup> David Kynaston, *Austerity Britain 1945-51* (Walker and Company, New York, 2008), 19.

<sup>234</sup> Lorna Froude, 'Petrol Rationing in Australia during the Second World War'.

<sup>235</sup> Ibid.

<sup>236</sup> Mellor, *The Role of Science and Industry*, 202.

<sup>237</sup> Butlin and Schedvin, *War Economy 1939-1942*, 282-283.

<sup>238</sup> *The Mercury*, 'Rationing of Petrol: Government would consider alternative plan' (Hobart, 8 August 1940), 1.

responses were a feature of contemporary military fuel sustainability outlined earlier in this chapter.

Presenting a more idealised view, a government-endorsed ANZAC Day Commemoration Committee website described rationing of strategic resources during World War Two, and stated,

The Australian people went through war with considerable unity...while the urgency of the war and the severity of the shortages started to be reduced after 1943, there was still an 'all-in' emphasis.<sup>239</sup>

While Butlin and Schedvin presented some evidence that the limitations placed on commercial and civilian fuel (and other food and resource) consumption were often minimal,<sup>240</sup> the Curtin Government compelled strategic rationing during World War Two because it was considered necessary to defeat a major or existential threat. This brings into question the contemporary military fuel sustainability literature that did not identify military exceptionalism and resource prioritisation as a likely government response in the unlikely event of major or existential conflict. The rationing of fuel during World War Two was subsequently romanticised by Australian governments and others, with Brown noting the extreme lengths taken by successive governments to commemorate past Australian sacrifices.<sup>241</sup>

Adding further weight to the concept of military exceptionalism was the emergence and maintenance of the federal Liquid Fuel Emergency Act 1984, a contemporary policy option available to political leaders in the unlikely event that a military requirement should arise if fuel supply was temporarily constrained.<sup>242</sup> Chapter Four will identify that senior

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<sup>239</sup> ANZAC Day Commemoration Committee, *The Home Front – World War 2*, [website], <<https://anzacday.org.au/ww2-overview>>, accessed 17 March 2019.

<sup>240</sup> Butlin and Schedvin, *War Economy 1942-1945*, 282-3.

<sup>241</sup> Brown, *ANZAC's Long Shadow: The Cost of our National Obsession*, 8.

<sup>242</sup> Interview with Mr Andrew Gillespie, Defence Directorate of Strategic Fuel (2010), conducted on 24 November 2010. Mr Gillespie argued that Defence could be expected to receive priority allocation under the Liquid Fuel Emergency Act, and there was Defence representation on the National Oil Supplies Emergency Committee.

Defence officers responsible for military fuel sustainability believed that the Liquid Fuel Emergency Act was sufficient for Defence's purposes.<sup>243</sup>

Based on the challenges identified by Butlin and Schedvin in enacting rationing through legislation, a decision to undertake fuel prioritisation for military purposes through the Liquid Fuel Emergency Act would require significantly different strategic circumstances than currently exist (or were considered credible within a certain timeframe). Furthermore, an Australian National Audit Office report established that the practicalities of enacting the Liquid Fuel Emergency Act were not tested,<sup>244</sup> and the existence of this legislation was not mentioned in any Defence White Paper, despite fuel rationing during World War Two being necessary and also attracting vehement opposition from across the Australian community. However, the sense of urgency presented by some commentators to be prepared for constrained supply of fuel, both in operational conflicts in support of the US and in the unlikely event of existential conflict, was excessive.<sup>245</sup> Such commentary misunderstood or misrepresented defence policy priorities. The concept of military exceptionalism, highlighted through actions such as strategic rationing of fuel for military use, was reinforced throughout twentieth century conflicts. The Chapter Six case study will consider contemporary operational contingencies and the risks associated with military fuel sustainability.

## Conclusion

Three features of the contemporary military fuel sustainability literature became apparent through this literature review, and these formed the basis for analysis throughout this thesis. These can be summarised as *isolation*, *conflation* and *politicisation*.

First, most of the literature sought to examine military fuel sustainability in isolation from broader Australian defence policy. In particular, there was little reference to the concept of military exceptionalism, and the prioritisation of resources for the military in the unlikely event of major or existential conflict. Some commentators approached the issue from an environmental improvement perspective, with military performance as a

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<sup>243</sup> Interview with Major General David Mulhall, Commander Joint Logistics (2017-2019), conducted on 26 February 2019.

<sup>244</sup> Australian National Audit Office, *Australian Defence Force Fuel Management* (Audit Report No. 44, Commonwealth of Australia, 2002), 94.

<sup>245</sup> Leckie, 'Lasers or Longbows? A Paradox of Military Technology', 52.

secondary issue. These piecemeal arguments did not allow a complete understanding of all the factors that influenced military fuel sustainability. Second, the literature review identified a regular conflation of national energy issues and military fuel sustainability; this conflation failed to identify that the issues facing the nation and the military had some overlap, but they were not the same. Third, the literature review highlighted a lack of analysis of the motivations and actions of policymakers who made questionable or opportunistic claims about their effectiveness in improving military fuel sustainability. There was a difference between the claims made and the actual outcomes achieved, and the fact that this was not well established in the literature is a gap in the understanding of the factors affecting military fuel sustainability, necessitating further examination.

Based on these features of the literature review, Chapter Three will outline a multi-method qualitative approach consisting of case studies, semi-structured interviews and primary documentation analysis, to gain further understanding of the factors influencing Australia's military fuel sustainability.

The review of some of the historically notable military logistics theorists reinforced the idea of military exceptionalism. Focused during periods of major or existential conflict, these theorists highlighted an expectation (held by policymakers) that the necessary resources would be assigned to the military to achieve its exceptional task. Partly, they argued that this was necessitated by a lack of priority assigned to understanding logistics compared to other branches of the art of war, and this will be examined in the contemporary Australian context in Chapter Four.

The importance of fuel supply to the military outcome of World War Two was consistently highlighted through non-participant observation, with the emergence of air power a key factor in the rapid increase in fuel consumption by military forces, and military demand for fuel continued to rise into the twenty-first century. Chapter Five will consider US predictions for further increases in consumption as new technology emerges. The desire of policymakers has consistently been for improvements to combat equipment, regardless of the fuel demands. The history of Australian military contributions to US-led operations resulted in a reliance on US fuel supply that will be examined further in subsequent chapters.



Prominent Australian defence commentators consistently observed a disjunction between declared Australian defence policy, and operational practice. Through the qualitative methodology outlined in Chapter Three, this thesis seeks to identify whether the approach to military fuel sustainability was consistent with a policy-practice disjunction.

### **CHAPTER THREE – RESEARCH METHODOLOGY**

#### **Introduction**

Chapter Two reviewed the literature relating to military fuel sustainability. While the focus of this research is on contemporary Australian military fuel sustainability since the International Force in East Timor (INTERFET) mission in 1999, historical literature relating to the major or existential conflicts of the twentieth century was also considered. Chapter Two observed three key features of the literature, all subjective in nature that led to the selection of an entirely qualitative research approach using multiple methods (multi-method). First, the contemporary military fuel sustainability commentators consistently considered the topic in isolation from broader defence policy. Second, national energy policy matters were frequently conflated with military fuel sustainability, when there are important nuances that could reasonably be expected to have been addressed. Third, despite evidence of politicisation of military fuel sustainability in Australia and the United States (US), this was not identified in the literature. Underpinning each of these features was the paucity of references to military exceptionalism – specifically, the prioritisation of the military for resources such as fuel, should Australia face a major or existential conflict.

This chapter will outline the research methodology applied throughout this thesis to address the research questions identified in Chapters One and Two, which are as follows. First, is military fuel sustainability an issue that is seriously considered in Australian defence policy? Second, is the Australian approach to military fuel sustainability indicative of an expectation of providing expeditionary forces to US-led military operations? Third, is the approach by Australian policymakers to military fuel sustainability indicative of the military being treated as an exceptional or unique organisation?

The selection of the research methodology influenced the results obtained from this fundamental research, and a qualitative methodology was chosen to best understand and develop the thesis and the different meanings that different people ascribed to military fuel sustainability.<sup>1</sup> The research questions are exploratory in nature, and Chapter Two identified no specific literature relating to those questions. This chapter will discuss the

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<sup>1</sup> Norman Denzin and Yvonna Lincoln, 'Introduction: The Discipline and Practice of Qualitative Research', in Norman Denzin and Yvonna Lincoln (eds.), *The Sage Handbook of Qualitative Research Third Edition* (Sage Publications, California, 2005), 3.

research methodology and philosophical paradigm used for this thesis, identifying the reasons that multiple methods were used in an entirely qualitative approach. This chapter will also consider whether this research on military fuel sustainability could be generalised to broader Australian defence policy.

The literature review, and in particular the subjective nature of the issues presented, led to the decision to use a multi-method qualitative approach for this thesis. Denzin and Lincoln argued that different methods in qualitative research lead to the world being viewed in different ways, and understanding data through more than one interpretive practice is a common technique to produce results that are more trustworthy<sup>2</sup> and reduce the risk of methodological error. The use of multiple qualitative methods also sought to offset the weaknesses of any single qualitative method by using the strengths of a different method, and offer different views of the influences on military fuel sustainability. The methods used to collect data included case studies, primary documentation analysis (within a longitudinal framework to allow historical analysis), and semi-structured interviews – effectively, a qualitative strategy of non-reactive research<sup>3</sup> to allow an unobtrusive understanding of the thesis, and to limit any perceived bias that may be associated with the researcher being a senior Australian military officer. This chapter will outline the strengths and weaknesses associated with each of these methods, and discuss the use of triangulation, the assurance of quality and validity, aspects of bias, and the boundaries of the thesis.

### **Research approach**

This thesis is qualitative in nature, a paradigm that emerged from the discoveries of the literature review, and from the desire of the researcher to understand the underlying motives and range of different perspectives associated with the contemporary approaches to Australian military fuel sustainability, but grounded within the historical context of Australian defence policy. The exploratory nature of the research questions and the paucity of literature on the specific research questions significantly influenced the choice of approach. At this point in time, in the context of a largely uncharted field, the

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<sup>2</sup> Ibid, 4.

<sup>3</sup> John Brewer and Albert Hunter, *Foundations of Multimethod Research: Synthesising Style* (Sage Publications, California, 2006), 2.

analysis of underlying structures and mechanisms<sup>4</sup> of military fuel sustainability is likely to be more valuable than specific quantitative analysis.

Although there was a historical link between qualitative research and a constructivist paradigm, this thesis is established from a critical realism ontological position, where a 'god's eye' reality is assumed to exist, but has to be subjected to 'the widest possible critical examination to facilitate apprehending reality as closely as possible', and it could never be perfectly understood.<sup>5</sup> The level of subjectivism, identified in the approaches to military fuel sustainability in the literature review, influenced the selected ontological position. Context and meaning are particularly important, as different views of military fuel sustainability held by diverse actors will be outlined. For example, while the literature review in Chapter Two found that the factors affecting the Australian approach to military fuel sustainability could not be considered without understanding the divergence between declared Australian defence policy and operational practice, there are those who argued that seeking to reduce military use of fossil fuel, for example, is an important objective in itself.<sup>6</sup> The literature review observed that the isolated treatment of military fuel sustainability, separate from consideration of Australian defence policy, was remarkably consistent. However, even if such separation of defence policy and military fuel sustainability was an emotional, moral or belief-based response, such a view could still be considered a legitimate view from a particular perspective. The fact that so many commentators did not link military fuel sustainability with defence policy may have meant that there were strongly held views about topics such as climate change and energy security, and these commentators intersected their primary views (on climate change or other topics) with the discussion of military fuel sustainability. Primarily using document analysis and semi-structured interviews, Chapter Four will determine how policymakers approached military fuel sustainability, and whether these approaches were consistent with the commentary.

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<sup>4</sup> Mats Alvesson and Kaj Skoldberg, *Reflexive Methodology: New Vistas for Qualitative Research* (Sage Publications, London, 2009), 39.

<sup>5</sup> Egon G. Guba and Yvonna S. Lincoln, 'Competing paradigms in qualitative research' in Norman Denzin and Yvonna Lincoln (eds.), *Handbook of qualitative research* (Thousand Oaks California, Sage, 1994), 110.

<sup>6</sup> For example, Centre for Policy Development, *The Longest Conflict: Australia's Climate Security Challenge* (Report, 2015), 13.

*Value of qualitative study for military fuel sustainability*

A good qualitative study can bring understanding to a situation that is otherwise ‘enigmatic or confusing’.<sup>7</sup> In the case of military fuel sustainability, this is particularly germane, as the literature review demonstrated the lack of linkage made between military fuel sustainability, and broader Australian defence policy and operational practice, when one may have reasonably predicted the linkage to be much closer. Military fuel sustainability was consistently considered independently, and often in the narrow context of developing military equipment that was not fossil fuel dependent. If military fuel sustainability was as important as was highlighted by many commentators and in policy, there must have been reasons that so few actions were taken to make it a central consideration (as Chapter Four will identify) when implementing defence policy and force structure. This thesis used qualitative research to explore this concept, and to seek to fill the research gap that connects Australian defence policy and military fuel sustainability. From a critical realist perspective, this thesis also acknowledges that social systems have ‘the capacity to learn and change their behaviour’, and found value in making explanations rather than seeking consistent regularities across time.<sup>8</sup>

Creswell argued that qualitative research is valuable to address a research problem where the variables are less clear. The views of participants were considered particularly important to this qualitative research,<sup>9</sup> and in the case of this thesis, declaratory Australian defence policy and the actual military operational practice directed by Australian policymakers are particularly important to determine the factors that influenced military fuel sustainability since INTERFET. While there are many legitimate quantitative and qualitative approaches to analysing policy, a more open-ended consideration of Australian defence policy allows for further qualitative and quantitative analysis in the future, and also permits a more thematic understanding of military fuel sustainability. Further, it allows the findings of this thesis to be revised by new evidence if such evidence arises, an important aspect of qualitative research.<sup>10</sup> A critical realist

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<sup>7</sup> Elliot W. Eisner, *The Enlightened Eye: Qualitative Inquiry and the Enhancement of Educational Practice* (Teachers College Press, New York, 2017), 58.

<sup>8</sup> Andrew Sayer, *Realism and Social Science* (Sage, London, 2000), 5.

<sup>9</sup> John W. Creswell, *Educational Research: Planning, Conducting and Evaluating Quantitative and Qualitative Research* (Fourth Edition, Pearson Education Incorporated, Boston, 2012), 15-17.

<sup>10</sup> Clive Seale, *The Quality of Qualitative Research* (Sage Publications, London, 1999), 52.

ontology also recognises that social structures like bureaucracies (including military bureaucracies) have structures and causal powers, and susceptibilities to certain kinds of change;<sup>11</sup> institutional power (both exercised and not exercised) is an important aspect of this thesis.

### **A multi-method qualitative study**

A multi-method qualitative approach was chosen for this research. Most qualitative researchers accept that 'individual methods might be flawed', but the flaws in each of these individual methods are not identical.<sup>12</sup> Principally, this choice sought to allow triangulation of data, as the corroboration of data sought to add trustworthiness to the research findings, presuming appropriate methods were used.

Brewer and Hunter described triangulation as 'the multi-method strategy's most familiar application'.<sup>13</sup> Triangulation of methods mitigated the risk of bias from using a single method. In this thesis, triangulation was achieved through primary documentation analysis, case studies, and semi-structured interviews. Within the analysis of primary documents, the longitudinal nature of the research allowed a further 'time triangulation' aspect<sup>14</sup> – this was important given that the twenty-first century did not see Australia or the US involved in major or existential conflict and the approach to military fuel sustainability differed in the past. Further, this thesis used two distinct case studies, and the case study distinction ensured that data was not selectively chosen. It is acknowledged that methodological triangulation is but one way to achieve triangulation – other options included triangulation through multiple researchers or commencing with multiple theses to see which the data best fit.<sup>15</sup> These alternative triangulation options are valid for general research into military fuel sustainability, although they were not considered relevant for this thesis.

The point of triangulation for this thesis was not necessarily to produce the same results through each methodology. Patton (1980) highlighted that a researcher should not expect

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<sup>11</sup> Sayer, *Realism and Social Science*, 11-12.

<sup>12</sup> Brewer and Hunter, *Foundations of Multimethod Research: Synthesising Style*, 4.

<sup>13</sup> Ibid, xi.

<sup>14</sup> Louis Cohen, Lawrence Manion and Keith Morrison, *Research Methods in Education* (6<sup>th</sup> Edition, Routledge, London, 2007), 142.

<sup>15</sup> Norman Denzin, *The Research Act: A theoretical introduction to sociological methods* (McGraw-Hill, New York, 1978), 297.

different methods to produce the same or integrated findings. The point of triangulation is to study and understand when and why there are differences. Indeed, in this thesis, there is a distinct difference between results achieved through primary policy analysis (Chapter Four will observe a long-standing Australian Government declared emphasis on the importance and priority of effective military fuel sustainability in Australian defence policy) and the results obtained through case study and interview methods and through analysis of secondary material. In this thesis, the different methods were undertaken simultaneously rather than sequentially.

Triangulation of methods also sought to mitigate any risk associated with the fact that the author of this thesis is a senior military officer. Denzin highlighted that 'human-personalistic' factors are evident throughout the research process, and that triangulation could raise researchers above 'personalistic biases'.<sup>16</sup> This ensures that research is credible in a wider community. Triangulation was used in this thesis to ensure that unconscious bias was significantly reduced.<sup>17</sup>

The multi-method approach comprised three methods of data collection – document analysis (including policy over a longitudinal timeline), case studies, and semi-structured interviews.

### *Document analysis*

Creswell identified documents as 'a valuable source of information in qualitative research' that have 'the advantage of being in the language and words of the participants, who have usually given thoughtful attention to them'.<sup>18</sup> Content analysis of Australian defence and US defense policy documents was the primary method used. Analysis of both the content of declared policy, and of the method of policy articulation, was conducted, and this focus on primary policy documents sought to reduce the problem of interpretation and reinterpretation that is commonly faced in analysis of Australian defence policy. Strategic Basis Papers (classified statements by the Defence Committee initiated after World War Two) and White Papers and Defence Updates (unclassified statements initiated in 1976)

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<sup>16</sup> Ibid, 294.

<sup>17</sup> Guba and Lincoln, 'Competing paradigms in qualitative research', 111.

<sup>18</sup> Creswell, *Educational Research: Planning, Conducting and Evaluating Quantitative and Qualitative Research*, 223.

were examined.<sup>19</sup> Defence granted access to other primary data, such as Defence Fuel Management Committee (DFMC) minutes, and some doctrine. Other documents, such as press releases, were also relevant and used during the data collection process.

An advantage of this method is that the documents analysed were not influenced by the research; comparable documents were viewed over time to determine organisational changes (useful to determine the approach to military fuel sustainability over time, a factor raised in the literature review); the documents allowed thematic understanding to uncover themes that could be extrapolated; and, document analysis helped to contextualise the semi-structured interviews.<sup>20</sup>

Analysis of primary source data sought to establish the deliberate actions taken to influence military fuel sustainability, and the incidental effects that broader policy and force structure decisions had on military fuel sustainability. This data allowed examination of military fuel sustainability in the context of the disjunction between defence policy and operational practice, a trend that many commentators observed over a long period of time.<sup>21</sup>

The risks associated with document analysis in this thesis included a potential lack of necessary detail (the documents were not written for the purpose of this research), and the manifestation of bias through incomplete document selection. These risks were mitigated by the use of different methods to seek different data on the same phenomenon – for example, the semi-structured interviews allowed the participants to provide any relevant information on military fuel sustainability or Australian defence policy that they felt necessary.

Another risk associated with using document analysis as a primary methodology is the substantial quantity of classified material associated with defence policy and military

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<sup>19</sup> Strategic Basis Papers were publicly released in 2008, and Stephan Fruhling, *A History of Australian Strategic Policy Since 1945* (Commonwealth of Australia, 2009), provided summaries and analysis, with apparently few omissions due to classification of information.

<sup>20</sup> Glenn Bowen, 'Document Analysis as a Qualitative Research Method', *Qualitative Research Journal*, 9/2 (2009), 31.

<sup>21</sup> For example, Andrew Davies, Rod Lyons and Mark Thomson, *Australian Defence Policy Assessment 2010* (Australian Strategic Policy Institute Special Report, 30, April 2010), 3; Ross Babbage, 'Australia's new defence direction', *The Pacific Review*, 1/1 (1988), 92-96.



operations. This factor may be faced by any researcher attempting to undertake research on many military topics at the 'unclassified' level of classification.

Even at the 'unclassified' level, the researcher must consider whether the aggregation of data could cause some level of risk to the organisation from a strategic or military competitor, potentially through the public identification of key military weaknesses.

In the case of military fuel sustainability, the risk is reduced. This is in large part due to the fact that military fuel sustainability is considered within the Department of Defence (herein titled 'Defence') as a logistics issue, and logistics tends to be an area where fewer classification caveats are applied. Therefore, the researcher is confident that he gained a full understanding of the key issues, and triangulation strengthened this understanding. Where classified information was encountered, the researcher reverted to information in the public domain to ensure no deliberate or inadvertent compromise of this information. For example, after one interview, the participant requested that details of a US interoperability matter that he raised not be included in this thesis due to the sensitivity and classification, and the researcher complied with this request. Further, the analysis of primary data sought to overcome problems when researching a military organisation identified by Vuga and Juvan, for example by mitigating the concern that 'servicemen and servicewomen have proven to be a suspicious and mistrusting population and are very careful about their statements, especially with regard to...possible criticism aimed at their superiors.'<sup>22</sup>

The focus on primary policy data and the case study methodology meant that interaction between the investigator and the respondents was minimal, and therefore differed from a more constructivist epistemology. Furthermore, this thesis was consistent with Lincoln and Guba's description of knowledge accumulation within a post-positivist paradigm, with the study supporting an accretion of knowledge.<sup>23</sup> Specifically, this thesis considered the evidence that Australian defence policy was primarily structured to offer support to US-

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<sup>22</sup> Janja Vuga and Jelena Juvan, 'Inside the Military Organization: Experience of Researching the Slovenian Armed Forces', in Helena Carreiras and Celso Castro (eds.), *Qualitative Methods in Military Studies: Research Experiences and Challenges* (Routledge, London, 2013), 125.

<sup>23</sup> Guba and Lincoln, 'Competing paradigms in qualitative research', 112.

led contingencies rather than allow more independent operations in the nearer region, considered through the lens of military fuel sustainability.

Analysis of secondary material, particularly perspectives on defence policy, national energy requirements and broader public policy, complemented primary data collection. The work of notable Australian defence policy commentators such as Cheeseman, White and Dibb, was examined. None of the notable defence policy commentators directly analysed military fuel sustainability. Further, no commentators who specifically wrote about military fuel sustainability placed the topic within a broader defence policy or military logistics context. The detailed existing knowledge on Australian defence policy was critiqued and extrapolated, to support arguments in this thesis of the approach to military fuel sustainability being indicative of a broader approach to defence policy.

### *Case studies*

A case study methodology, using two case studies, was applied. Yin argued that a case study methodology is most appropriate when asking 'how?' or 'why?', and can be used to complement existing studies.<sup>24</sup> It is often used to examine contemporary events where behaviours and variables cannot be manipulated and relies on data from observation, artefacts and interviews.<sup>25</sup> Further, a multiple case study model was chosen. Multiple case studies could be more compelling and make the research more robust, although the choice of case studies should either predict similar results, or produce contrasting results for predictable reasons.<sup>26</sup>

There has been significant analysis of Australian defence policy, with many arguing that Australian defence policy was primarily driven by alignment with and support to the US. As a subordinate aspect of defence policy, military fuel sustainability could be considered through a case study method to highlight whether this aspect of defence policy was consistent with a broader hypothesis of Australian defence policy being primarily aligned to contribute expeditionary forces to US-led military operations (generalisation of research results will be discussed later in this chapter). Further, aspects such as

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<sup>24</sup> Robert K. Yin, *Case Study Research: Design and Methods* (Second Edition, Sage, Thousand Oaks California, 2003), 1-5.

<sup>25</sup> Ibid, 8-9.

<sup>26</sup> Ibid, 45-6.

politicisation, and the lower priority of logistics and fuel compared to strategy and tactics, both identified in the literature review, were predicted to be applicable to both Australia and the US. The case studies chosen may be described as 'instrumental',<sup>27</sup> as they provide insights or help to develop an existing hypothesis.

A number of prominent case study theorists argued that constructivism was the primary epistemology used for case study research, since each case study could be considered using multiple perspectives, with reality constructed accordingly.<sup>28</sup> The emergence of critical realism in qualitative research, including in the conduct of case studies, is most relevant to this thesis, with aspects of both positivist and interpretivist paradigms remaining important and valid. Wynn and Williams outlined key aspects of case study research using critical realism as a philosophical paradigm that is relevant to this thesis – specifically, the use of research questions that asked 'what caused a certain phenomenon?', and the focus on generalisability not from a statistical sense but for an ability to explain causal mechanisms in different settings.<sup>29</sup> This is not to dismiss alternative perspectives of case studies, and there is also alignment with Merriam's more extensive view of what could constitute a case study.<sup>30</sup> Indeed, the two case studies presented in this thesis are highly distinct – one will examine the specifics of Australian combat aircraft employment in declaratory operational contingencies, and the other will consider the broader topic of US military fuel sustainability to offer opportunities for triangulation of data between the chosen case studies. While there are significant geopolitical differences between Australia and the US, and significant differences in the proven ability of Australia and the US to sustain independent expeditionary military operations, there are also important points of nexus that were identified in the literature review in Chapter Two. These included the regular adoption of US military technology, the prioritisation of interoperability, the close alignment of Australian defence policy and

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<sup>27</sup> Robert Stake, *The art of case study research* (Sage, Thousand Oaks California, 1995), 3.

<sup>28</sup> Ibid, 108; Sharan B. Merriam, *Qualitative Research and Case Study Applications in Education* (Jossey-Bass Publishers, California, 1998), 22.

<sup>29</sup> Donald Wynn, Jr. and Clay K. Williams, 'Principles for Conducting Critical Realist Case Study Research in Information Systems', *MIS Quarterly*, 36/3 (September 2012), 804-805.

<sup>30</sup> Bedrettin Yazan, 'Three Approaches to Case Study Methods in Education: Yin, Merriam, and Stake', *The Qualitative Report*, [website], (23 February 2015) <<http://nsuworks.nova.edu/tqr/vol20/iss2/12>>, accessed 15 April 2017, 137-139.

contingency scenarios with the US, and the vast number of military-to-military links.<sup>31</sup> By similarly limiting Australia and the US military fuel sustainability actions in the context of time and in the specific actions taken to influence military fuel sustainability, the approach to include two distinct case studies was feasible.

The use of distinct case studies sought to mitigate other risks. For example, Glaser and Strauss highlighted the risk of ‘exemplifying’, where examples could be selectively chosen to confirm a theory, rather than theory being developed or elicited from the example.<sup>32</sup> The case study on a combat aircraft unit being forward deployed for a mission has been a central component of declared Australian defence policy for decades, either to ‘bare bases’ within Australia<sup>33</sup> or offshore,<sup>34</sup> and could not reasonably be described as a niche example that was chosen to confirm a specific outcome. The same argument can be made for the US case study, given the centrality of the US to Australian defence policy.

Yin argued that the development of the theoretical framework was key, to allow the generalisation of results to new cases.<sup>35</sup> The three research questions – concerning the priority of military fuel sustainability within Australian defence policy, the expectation held by Australian policymakers of providing expeditionary forces to US-led military operations, and the belief in military exceptionalism – framed the case studies, and their comparison to the other data collection methods then sought to allow generalisations to be made.

The primary data collection for both case studies was done through government, Defence (in Australia) and Department of Defense (in the US) publications and policy. Other sources including interviews and analysis of secondary documents complemented the primary data collection.

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<sup>31</sup> Department of Defence, *Australia United States Capability Development Liaison Handbook* (Interim Edition, 2006-2007), 3, acknowledged ‘several hundred committees and working groups’ supporting US-Australia military interoperability.

<sup>32</sup> Barney G. Glaser and Anselm L. Strauss, *The Discovery of Grounded Theory: Strategies for Qualitative Research* (Aldine Transaction, New Brunswick and London, 1967, Reprinted 2006), 5, 18.

<sup>33</sup> Department of Defence, *Australian Defence* (White Paper, Canberra, 1976), 17.

<sup>34</sup> Department of Defence, *Defending Australia in the Asia Pacific Century: Force 2030* (Defence White Paper, Commonwealth of Australia, 2009), 61.

<sup>35</sup> Yin, *Case Study Research: Design and Methods*, 48-49.

Stake highlighted that ‘not everything is a case’, and ‘specificity’ and ‘boundedness’ were important aspects of a case study method.<sup>36</sup> It is acknowledged that the two case studies presented in this thesis are broad, particularly the US case study. However, the case studies are limited by the fact that they are focused on military fuel sustainability; they are situated in a discrete period of time; and, they are focused on the decisions of policymakers. Further, the premise of this thesis is that military fuel sustainability is mostly influenced by defence policy and operational practice, and therefore broad case study analysis is appropriate. Of note, there remains a lack of firm consensus on what a ‘case’ is, but the literature review led to the conclusion that treating US military fuel sustainability as a case study was appropriate, and was an integral part of understanding the factors affecting Australian military fuel sustainability since INTERFET. In this context, the chosen case studies are considered suitable, and complexity in the case studies is reasonable given the focus on keeping them bounded throughout the course of the research.

### *Semi-structured interviews*

Semi-structured interviews are considered to be an applicable method within a critical paradigm.<sup>37</sup> Data was collected using semi-structured interviews, either conducted in person, via telephone or via email. Where possible, interviews were undertaken in person to allow for non-verbal cues to be considered, although the interviews conducted by email almost entirely provided well considered responses to the questions posed, and the written responses provided a level of assurance relating to ‘descriptive validity’<sup>38</sup> and limiting interpretation errors. Interviews in person tended to be semi-structured with some conversational outcomes, with the data gathered from each participant comparable in specific questions (for example, is Australian military fuel sustainability sufficient to undertake independent operations in the nearer region?).<sup>39</sup> Specific topics were explored with subject matter expert interviews (for example, is the Australian military’s training

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<sup>36</sup> Stake, *The art of case study research*, 444.

<sup>37</sup> James Scotland, ‘Exploring the Philosophical Underpinnings of Research: Relating Ontology and Epistemology to the Methodology and Methods of the Scientific, Interpretive, and Critical Research Paradigms’, *English Language Teaching Journal*, 5/9 (2012), 14.

<sup>38</sup> R. Burke Johnson, ‘Examining the validity structure of qualitative research’, *Education*, 118/2 (Winter 1997), 284.

<sup>39</sup> Michael Patton, *Qualitative Research and Evaluation Methods* (Sage Publications, Thousand Oaks California, 2002), 14.

system for tactical petroleum operators effective?). The researcher relied upon note-taking throughout the course of each interview – electronic recordings could not be used due to the potential for discussions to branch into classified topics.

Interviews were conducted with senior military officers, military logistics practitioners and personnel managers, and commentators, to gain practical knowledge of the topic, and the insights of experts in defence policy and fuel sustainability. These interviews included a range of currently serving one, two and three star military officers, such as the Commander Joint Operations and the Commander Joint Logistics, and a recently retired Secretary of the Department of Defence and Vice Chief of the Defence Force, to ensure that the organisational position relating to military fuel sustainability was well contextualised. A list of interview participants is included with the references for this thesis. The researcher contacted participants directly based on his knowledge of their role or expertise, and this known expertise sought to ensure credibility in the data collected. Interview content varied depending on the participant. Some interviews focused on the specific issue of military fuel sustainability. Other interviews were focused to understand broader military logistic topics, with fuel sustainability addressed as a sub-set of military logistics. The diverse range of participants led to the adoption of a semi-structured interview approach, to allow the discussions to proceed in directions that were influenced by the participant (within the topic of military fuel sustainability) and would provide the most insight into the research.

Interviews with personnel directly involved in military fuel sustainability were used to determine whether the work being done by individuals and small groups with fuel sustainability responsibilities was organisationally supported. Furthermore, excellent access was granted to many senior military commanders through the Australian Defence College and through other engagements, and this provided valuable insight into the contemporary Australian approach to warfare and military strategy. Some of these senior commanders requested anonymity, and in these cases, attributions throughout this thesis ensured that they were not identified. Whilst this lack of attribution potentially reduces transparency and does not allow other researchers to fully examine a certain perspective in the future, some individuals were not identified to avoid the potential for damage to their careers or to other aspects of their work. Further, anonymised data and insights were verified and justified from other sources and methods.

Risks with the interview research method include the reliance on the amount of effort that the participant put into the interview, and the recollection capacity of the participant. Further, relative power relations between the researcher and the participant were identified as a risk in the interview method.<sup>40</sup> The interview process for this thesis sought to mitigate this risk, despite the regular rank differential between the researcher and some of the participants. The establishment of interviews in informal settings, the use of open ended questions, and the clear distinction made by the researcher at the commencement of the interview that this was not related to his primary work within the military, sought to ensure that participants were prepared to fully engage on the topic.

Aside from the risks inherent in each of the methods associated with the overall thesis methodology, multi-method qualitative research could also present risks. Meetoo and Temple argued that although multi-method research is useful for establishing various perspectives in a research project, there is a risk that the researcher will look only for evidence that supports the findings from one of the methods used. Multi-method research is not an 'unproblematic way to validate around a common reference point'.<sup>41</sup> Ahmed and Sil argued that if different methods were predicated on distinct ontologies, the findings were difficult to compare, and this could be no better than a single method being used.<sup>42</sup> While these risks are acknowledged, techniques such as 'disinterested peer' review<sup>43</sup> at various points in the research process, the selection of a range of different interview participants, distinct case studies, a longitudinal approach to primary document analysis, and a clear understanding of the reflexivity associated with the researcher as a military officer,<sup>44</sup> all sought to ensure that the multi-method approach maintained validity and led to trustworthy findings.

### *Quantitative methodology considerations*

Creswell highlighted the circumstances when quantitative research might be most appropriate to perform research. These reasons centred on factors such as the need to

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<sup>40</sup> Rosaline Barbour and John Schostak, 'Interviewing and Focus Groups', in Bridget Somekh and Cathy Lewin (eds.), *Research Methods in the Social Sciences* (Sage, London, 2005), 41.

<sup>41</sup> Danny Meetoo and Bogusia Temple, 'Issues in Multi-Method Research: Constructing Self-Care', *International Journal of Qualitative Methods*, 2/3 (September 2003), 4.

<sup>42</sup> Amel Ahmed and Rudra Sil, 'When Multi-Method Research Subverts Methodological Pluralism – or, Why We Still Need Single-Method Research', *Perspectives on Politics*, 10/4 (December 2012), 936.

<sup>43</sup> Burke Johnson, 'Examining the validity structure of qualitative research', 283.

<sup>44</sup> Ibid.

establish relationships between variables, having hypotheses and research questions that were specific, measurable and observable, collecting numeric data from a large number of people, and comparing groups of variables using statistical analysis. Quantitative research questions often sought answers to specific or narrow questions to obtain measurable data.<sup>45</sup> Furthermore, Yin supported the practice of using some quantitative data when conducting case studies, although this was excluded by some other case study theorists.<sup>46</sup>

There are a number of potential areas of research associated with military fuel sustainability in Australia that could be undertaken using quantitative analysis. For example, surveys of military fuel users could be undertaken quantitatively, as could an analysis of quantities of fuel being used across different eras. Such research was uncommon, and therefore would be of benefit to understanding military fuel sustainability; however, such methods could not achieve the aims of this thesis, and were therefore not fit for purpose. The literature review demonstrated that this broad area of study is poorly understood or isolated from broader defence policy, and it would have been difficult, and potentially highly misleading, to isolate specific issues under controlled conditions. Indeed, such isolation of military fuel sustainability as a discrete issue was criticised throughout this thesis. Furthermore, as Glaser and Strauss sought to emphasise, more qualitative research could also be undertaken to provide greater understanding of qualitative theory,<sup>47</sup> and verification or expansion of military fuel sustainability theory does not need to be, or indeed could not be, solely undertaken through quantitative research. With the existing body of knowledge identified in the literature review, the researcher sought to understand a particular phenomenon rather than determine a specific outcome.

The literature review demonstrated the dearth of analysis relating to, and a more pressing need to understand, the link between Australian defence policy and operational practice and military fuel sustainability. By seeking to understand the cause of this paucity of analysis, a critical realist may suggest that the cause has little to do with the number of

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<sup>45</sup> Creswell, *Educational Research: Planning, Conducting and Evaluating Quantitative and Qualitative Research*, 13.

<sup>46</sup> Yazan, 'Three Approaches to Case Study Methods in Education: Yin, Merriam, and Stake'; Robert K. Yin, *Case Study Research: Design and Methods* (Second Edition, Sage Publications, California, 1994), 109.

<sup>47</sup> Glaser and Strauss, *The Discovery of Grounded Theory: Strategies for Qualitative Research*, 5, 18.



times that something is observed to happen,<sup>48</sup> noting that such quantitative information may also prove useful. The common reductionist argument or assumption that military fuel sustainability could be considered independent of Australian defence policy and independent of military exceptionalism could best be understood, at this particular time, through qualitative research, and particularly through the use of case studies, as was outlined earlier in this chapter.

### *Avoiding bias*

A number of researchers argued that results of qualitative research or research in the social sciences could sometimes depend on the prejudices, experiences or expectations of the researcher.<sup>49</sup> Furthermore, the role of the researcher is particularly important in qualitative research, although in this thesis, the researcher was less actively included than he may otherwise have chosen to be. In this context, it is important to outline relevant aspects of the researcher's background. The researcher is a 42-year-old male, a senior military officer with 25 years of service. Vuga and Juvan highlighted that senior military officers could act as 'gatekeepers' within the organisation, and as a rule, they sought 'to make the organisation 'look good''.<sup>50</sup> Broadhead and Rist also identified the risk of gatekeepers in social research, including within the military; these gatekeepers limited entry, restricted scope and 'retain prerogatives with respect to publication'.<sup>51</sup>

This risk of this thesis being influenced in a way that resembled the approach of a gatekeeper was considered to be manageable, and was mitigated in a number of ways. Primarily, a strategy of non-reactive research<sup>52</sup> sought to significantly reduce the risk or perception of gatekeeper behaviour. Awareness of the possible risk associated with the researcher's position within Defence was a first important step. Second, this research was mostly focused on defence policy and the decisions of political leaders rather than of military commanders, acknowledging that the political approach to defence policy was the fundamental influence on military fuel sustainability. By in part focusing at the political

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<sup>48</sup> Sayer, *Realism and Social Science*, 14.

<sup>49</sup> Jack Fraenkel and Norman Wallen, *How to design and evaluate research in education*, 6<sup>th</sup> edition (New York, McGraw-Hill, 2006), 462.

<sup>50</sup> Vuga and Juvan, 'Inside the Military Organization: Experience of Researching the Slovenian Armed Forces', 122.

<sup>51</sup> Robert Broadhead and Ray Rist, 'Gatekeepers and the Social Control of Social Research', *Social Problems*, 23/3 (February 1976), 325.

<sup>52</sup> Brewer and Hunter, *Foundations of Multimethod Research: Synthesising Style*, 2.

level, the researcher could be considered further detached from any possible role as a gatekeeper. Third, the researcher has never worked in logistics or fuel sustainability areas within Defence, and therefore was not connected with the research topic through regular professional influence within these areas. Fourth, this research could be considered 'threshold' research, with the research seeking to inform a significant gap in knowledge. Any support or criticism of Defence was done with awareness that there is much for all to learn about the Australian approach to military fuel sustainability. Finally, the primary use of document analysis as part of a multi-method approach sought to reduce this research risk. Bowen identified that documents could not be influenced by the research process, although the researcher must ensure a complete set of documents was obtained.<sup>53</sup>

Therefore, it may have been difficult for the researcher to have adopted an approach such as a modified dualist/objectivist epistemology, where the reality may be approximated but never fully established, and 'the investigator and investigated 'object' were assumed to be independent entities, and the investigator to be capable of studying the object without influencing it or being influenced by it'.<sup>54</sup> Such an approach was not fit for purpose for this thesis. However, with awareness of the possible risks, and with a degree of mitigation, the risks of the researcher as a senior military officer acting as a gatekeeper were manageable, and the results of this research maintain validity.

### **Ability to generalise the research**

The issue of generalisation in qualitative research was labelled 'controversial', and the ability to generalise qualitative research was a point of contention even within the qualitative research community.<sup>55</sup> Of note, the case study method was regularly criticised for being unable to allow generalisations. Stake highlighted that the case study method could allow existing generalisations to be modified,<sup>56</sup> and by using multiple case studies this was the approach taken in this thesis.

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<sup>53</sup> Bowen, 'Document Analysis as a Qualitative Research Method', 31.

<sup>54</sup> Guba and Lincoln, 'Competing paradigms in qualitative research', 110.

<sup>55</sup> Denise Polit and Cheryl Beck, 'Generalization in quantitative and qualitative research: Myths and strategies' *International Journal of Nursing Studies*, 47 (2010), 1451-2.

<sup>56</sup> Stake, *The art of case study research*, 108; Merriam, *Qualitative Research and Case Study Applications in Education*, 7.

This thesis is mostly an example of ‘analytic generalisation’, a model of generalisation that is often linked to qualitative research, with the researcher seeking to ‘distinguish between information that is relevant to all (or many) study participants, in contrast to aspects of the experience that are unique to particular participants’.<sup>57</sup> Specifically, Chapter Two highlighted the significant body of literature identifying the disjunction between declared Australian defence policy and operational practice. Through a military fuel sustainability lens, and using the multi-method approach outlined earlier in this chapter, this thesis seeks to identify whether military fuel sustainability is an example of the policy-practice disjunction, and determine whether the existing generalisation should be modified or considered stronger. This thesis was also able to interact with existing observations on military exceptionalism, and insights may modify it in ways that enrich understanding.

In his examination of qualitative and quantitative research literature, Johnson concluded that a degree of generalisation was possible within qualitative research, and was best achieved when the people and the circumstances of the qualitative research study were similar to the broader population or circumstance that was being generalised about.<sup>58</sup> This thesis sought a degree of generalisation within the overall topic of Australian defence policy – that the approach of policymakers to military fuel sustainability was indicative of a belief in military exceptionalism and an expectation of Australia providing expeditionary forces to US-led military operations. In this sense, external validity could be achieved because the specific topic is a recognised sub-set of defence policy.

However, the researcher was careful to determine how far to generalise his findings. Specifically, this thesis does not seek to generalise results broader than the Australian and US contexts. The variables that may exist in anything broader than Australia and the US, such as national defence policies and national energy policies, would require additional research and may be best understood through a different methodology that was social context-dependent. Glatthorn and Joyner defined ‘delimitations’ as ways in which the findings of research may lack some generalisability.<sup>59</sup> Whilst it was considered that this research could support some generalisation, as the case studies were supported by

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<sup>57</sup> Polit and Beck, ‘Generalization in quantitative and qualitative research: Myths and strategies’, 1452.

<sup>58</sup> Burke Johnson, ‘Examining the validity structure of qualitative research’, 290.

<sup>59</sup> Allan Glatthorn and Randy Joyner, *Writing the winning thesis or dissertation* (Corwin Press, California, 2005), 168.

significant secondary analysis, this thesis only examined the Australian Department of Defence and the US Department of Defense, and did not consider other departments of government in detail. Whilst findings may be linked to broader public policy, Defence has unique or arguably exceptional features,<sup>60</sup> and linkages are made with caution.

### **Boundaries of thesis**

This thesis has four key boundaries, based on policy, time, location and concept.

First, this thesis focuses predominantly on policy rather than technology. The literature review highlighted that the development of fuel technology was rapid and extensive since the industrial revolution, and influenced military and broader policy; similarly, policy (and specifically, warfare) historically influenced technology development. However, examination of military fuel technology evolution is a major body of work, and is only referred to in this thesis, such as during discussion of air-to-air refuelling developments, and in the semi-structured interviews that were conducted with numerous Defence Science and Technology Group scientists.

Second, this thesis analyses Australian military fuel sustainability since INTERFET, a period where there was little expectation of major or existential conflict, to seek understanding and generalisations associated with contemporary Australia defence policy. Earlier related information was not excluded, however. The end of World War Two signified the commencement of an evolution, where policymakers exhibited less direct interest in military fuel sustainability as the risk of large-scale conflict and existential threat diminished. Whilst bounded by time, this thesis also referenced previous periods, again highlighted through the literature review, as this was important to understand strategic culture and the extent that policymakers previously influenced military fuel sustainability during periods of major or existential conflict.

Third, this thesis examines military fuel sustainability in Australia and in the US. Examination of the military forces of other nations, in particular non-Western nations with different strategies, tactics and resources, was not undertaken, because they had less

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<sup>60</sup> For example, Department of Defence, *Defence 2000: Our Future Defence Force* (White Paper, Canberra, 2000), viii, stated, 'Our armed forces are not simply a service provided by the Government. The Australian Defence Force reflects the kind of country we are, the role we seek to play in the world, and the way we see ourselves.'

relevance to Australian military operations, and there was less Australian focus on achieving military interoperability with non-Western nations. However, if threats (such as serious global energy supply constraints) arise that are consistent across more (or all) nations, the relevance would increase. Therefore, this thesis has a Western focus with findings that may be less applicable to other states. Similarly, the thesis maintains a nation-state focus throughout, because nation-states retained primacy in global security, and the role of non-state actors was not covered.

Finally, no assessment is made of the validity of concepts such as climate change in this thesis, although such concepts may be relevant to understanding some aspects of military fuel sustainability, and the literature review found that climate change was a common lens through which a number of commentators approached military fuel sustainability. Climate change has been an imprecise concept, so the implications on military fuel sustainability are even less clear. Detailed examination of the relevance of these concepts to the Australian military was not conducted, and this thesis is focused on the implications for defence policy that fuel supply constraints or price rises could cause, however these constraints or price rises may have occurred (climate change may be a reason for constraints or price rises).

### **Research limitations**

Beyond the limitations of specific research methods, there are several limitations to be acknowledged. Energy has been analysed through a broad range of social and natural science disciplines, including politics, security, geography and oceanography, engineering, economics, and others. Previous military research from a gender perspective was also conducted.<sup>61</sup> Focusing from a political and security perspective, as this thesis does, may constrain the conclusion within this academic discipline. Sayer warned that 'disciplinary parochialism' could be 'a recipe for reductionism, blinkered interpretations, and misattributions of causality'.<sup>62</sup> This thesis sought to mitigate such parochialism through a

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<sup>61</sup> Helena Carreiras and Ana Alexandre, 'Research relations in military settings', in Helena Carreiras and Celso Castro (eds.), *Qualitative Methods in Military Studies: Research Experiences and Challenges*, (Routledge, London, 2013), 112.

<sup>62</sup> Sayer, *Realism and Social Science*, 58.

more comprehensive and cross-disciplinary literature review than may sometimes be associated with qualitative research.

A broad range of opinion of military fuel sustainability from serving personnel was not sought. Indeed, the regular reference to policymakers throughout this thesis demonstrated the focus on national and organisational leadership, because these leaders make policy and interpret strategic guidance. This may limit the range of perspectives that influence this thesis, and reduce diversity, but the strategic focus of this thesis means that such an approach is fit for purpose. Practitioner insight is an area of future research opportunity and would also be open to more quantitative or mixed research methods being applied; the method of semi-structured interviews sought to target the individuals with the most experience of military fuel sustainability, noting that there are no specific rules in qualitative research to denote an essential or preferred sample size.

## **Conclusion**

Using a qualitative research methodology, through a critical realist ontological perspective, this thesis considers the factors that influenced Australian military fuel sustainability since INTERFET. This chapter identified multi-method qualitative research as the most appropriate approach; the findings of the literature review, in which military fuel sustainability was consistently presented as a topic that could be considered in isolation from broader consideration of defence policy and operational practice, is appropriately considered through case studies that directly analyse central aspect of Australian defence policy.

Document analysis, semi-structured interviews and case studies were the qualitative methods used to gain and understand the data for this thesis. Each method has strengths and weaknesses, and applying a multi-method approach seeks to improve triangulation, reduce bias, and thereby ensure trustworthiness. This chapter recognised the risk of bias associated with the researcher being a senior military officer, and identified a number of mitigation measures as a result.

Based on the methodology outlined, Chapter Four will now consider the contemporary approach of policymakers to military fuel sustainability in Australia.

## **CHAPTER FOUR – AUSTRALIAN MILITARY FUEL SUSTAINABILITY**

### **Introduction**

*My men can eat their own belts, but my tanks have gotta have gas.*<sup>1</sup>

Chapters Two and Three comprised a literature review and a description of the methodology used for this thesis, with the case made for how to better understand the factors affecting Australian military fuel sustainability. The Australian literature presented a consistent view that more should be done by the Department of Defence (herein titled 'Defence') to improve various aspects of military fuel sustainability, such as the security of supply. Further, Chapter Two identified that military logistics theorists from the twentieth century consistently reflected that logistics, including fuel supply, was not given sufficient priority in war planning by policymakers. This argument will now be examined in the Australian context in this chapter.

Using content analysis of declared policy and other artefacts and semi-structured interviews, this chapter will consider the deliberate actions that Defence has taken to improve military fuel sustainability. This chapter seeks to establish whether a coherent strategy for military fuel sustainability has existed in Australia since 1999; and, if no such coherence was present, whether this proved to be a strategic problem. Triangulating this chapter with analysis and case studies in subsequent chapters seeks to determine whether the existing literature provides a complete understanding of the factors affecting Australian military fuel sustainability, and whether the findings of this thesis can be extrapolated to determine if fuel sustainability is an indication of an Australian military structure optimised to support United States (US)-led operations rather than more independent operations.

As an operational commander during World War Two, General Patton's quote above indicates that he had little concern about expenditure on fuel for military operations; he just demanded that the fuel was available as required. Despite no current anticipation of a conflict of the magnitude of World War Two, this chapter will consider whether there are parallels between Patton's approach and the Australian approach to military fuel

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<sup>1</sup> Chester Wilmot, *The Struggle for Europe* (Wordsworth Editions, 1998), 473, quoted General George Patton.

sustainability. If sufficient fuel has been available for recent military operations, and if insufficient or expensive fuel supply did not cause significant strategic problems, was fuel able to be treated as a low priority within defence policy? Chapter Six will examine whether fuel sustainability was sufficient for a declared operational scenario, to further understand the most anticipated contingencies.

Many formal reviews and audits relating to military fuel sustainability have been undertaken since 1999, consistently demonstrating low levels of investment in fuel governance and compliance at the strategic level and in domestic facilities.<sup>2</sup> This chapter will examine the actions that were taken to improve fuel governance as a result of the adverse audits. Since 2014, deliberate actions to improve strategic and domestic aspects of military fuel sustainability have been significant, largely motivated by various adverse reviews and audits,<sup>3</sup> although fuel remained an issue that rarely gained senior level Defence attention.<sup>4</sup> Actions taken since 2015 include the formal appointment of a General Officer as Head of the Defence Fuel Supply Chain and other centralisation of accountabilities; the remediation of domestic fuel facilities and training deficiencies that posed safety risks; and, the establishment of the Fuel Services Branch within the Joint Logistics Command.

This chapter will also determine whether attempts to provide greater tactical fuel supply assurance to allow more effective independent operations in the nearer region were made (against a backdrop of improved fuel sustainability being foreshadowed regularly in policy). The difference between fuel for tactical operations, and domestic energy requirements, will be highlighted as an important distinction in Australia in this chapter, and in the US military context in Chapter Five. The Fuel Services Branch had a remit to support tactical operations, but this chapter considers whether its remit was mostly constrained to fuel governance and reputational issues (such as ensuring compliance with Workplace Health and Safety Legislation)<sup>5</sup> due to the extreme organisational risk that was identified and the resources that were assigned. The Defence Fuel Management

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<sup>2</sup> For example, Australian National Audit Office, *Defence's Procurement of Fuels, Petroleum, Oils, Lubricants, and Card Services* (Audit Report No. 28, 2017-2018), 8.

<sup>3</sup> Department of Defence, *Future Defence Fuel Network Implementation Strategy* (Joint Logistics Command – Fuel Services Branch, Fuel Network Review, July 2017), 5.

<sup>4</sup> Interview with Mr Dennis Richardson, Secretary of the Department of Defence (2012-2017) and Australian Ambassador to the United States (2005-2010), conducted on 15 April 2019.

<sup>5</sup> Defence Fuel Management Committee, *Minutes* (Meeting at Russell Offices, Canberra, 29 August 2013).



Committee (DFMC), a body mandated to represent Services and Defence Groups with a central role in fuel sustainability, often focused on short-term governance and expenditure issues.<sup>6</sup> Aspects of equipment procurement, science and research, and personnel management indicated a narrow approach to military fuel sustainability, and so are also examined in this chapter.

General Patton's desire for reliable fuel supply to his troops (particularly for armoured operations) was the extent of his concern about fuel sustainability, but his intent was clear, and influence was applied to ensure his force received sufficient fuel for their task. This chapter will consider whether the lack of priority associated with the Australian approach to tactical fuel supply is reasonable given the prevailing strategic circumstances and the ability to increase fuel supply capacity if required.

### **Military fuel sustainability domestic governance**

Military fuel sustainability was not a primary issue for recent Australian governments because the problems associated with military fuel sustainability were not strategically urgent or considered fundamental to the business of Defence. With no risk of immediate major or existential conflict, and with an expectation that military fuel sustainability could be relatively quickly improved when required, there were more important areas for Defence to invest time and resources into.<sup>7</sup> This view from a recent Secretary of Defence was indicative of a history of low levels of investment into Australian military fuel sustainability, with resources allocated above a low base level only when there was no choice. The most senior military logistician in Australia, the Commander Joint Logistics (CJLOG), stated that fuel governance hit a 'crisis point' around 2013 as the organisational risk with underinvestment in domestic fuel facilities became impossible for policymakers to ignore.<sup>8</sup> A chronology of military fuel sustainability since INTERFET will demonstrate how domestic fuel governance risks finally reached the point where major changes had to be made.

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<sup>6</sup> Department of Defence, *Defence Fuel Management Committee Terms of Reference* (29 October 2008), 1-2.

<sup>7</sup> Interview with Mr Dennis Richardson, Secretary of the Department of Defence (2012-2017) and Australian Ambassador to the United States (2005-2010), conducted on 15 April 2019; Interview with Colonel Mark Harnwell, Australian Army Fuel Advisor (2019), conducted on 26 February 2019.

<sup>8</sup> Interview with Major General David Mulhall, Commander Joint Logistics (2017-2019), conducted on 26 February 2019.

Chapter Two highlighted significant concerns about Defence's ability to supply fuel to deployed forces during INTERFET. While INTERFET was a tactical military mission, at the same time, evidence was emerging that Defence was facing significant domestic fuel governance challenges. Scrutiny was applied to military fuel sustainability through a 2002 Australian National Audit Office (ANAO) audit. ANAO made recommendations relating to fuel supply chain management that Defence agreed to implement.<sup>9</sup> The audit noted that numerous previous reviews of military fuel sustainability were not acted upon, an indication of the lower organisational priority of fuel sustainability at this time, even against the backdrop of external scrutiny. As a result of the audit, Defence reviewed and partially clarified the responsibilities of the many disparate military entities that were involved in fuel sustainability.<sup>10</sup> Even so, Defence did not always comply with government direction on fuel issues,<sup>11</sup> with no apparent repercussions as a result of non-compliance, an indication of a view of military operations as being exceptional and sometimes not subject to the same pressure to meet legislative and policy requirements.

In response to the 2002 ANAO review, Defence established the Defence Fuel Management Committee (DFMC). This was a notable military fuel sustainability structural change since INTERFET. DFMC minutes described the requirement of the DFMC to 'combat ANAO recommendations';<sup>12</sup> in part to take the actions necessary to comply with ANAO's recommendations, although use of the term 'combat' implies an intention to resist certain recommendations and limit the potential for unwanted criticism. This chapter will contend that the DFMC could only focus on responding to immediate fuel governance concerns due to the limited provision of resources to military fuel sustainability functions, despite the declared remit of the DFMC suggesting a wider interest, and there was little capacity in the DFMC to address shortfalls associated with tactical operations.

The first iteration of the DFMC commenced in December 2003. The DFMC met irregularly, with its declared primary role to focus on operational objectives and price risk

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<sup>9</sup> Australian National Audit Office, *Australian Defence Force Fuel Management* (Audit Report No. 44, Commonwealth of Australia, 2002), 25.

<sup>10</sup> *Ibid*, 16.

<sup>11</sup> For example, Defence Fuel Management Committee, *Minutes* (Meeting at Russell Offices, Canberra, 13 February 2006), 5, stated that Defence had not complied with government direction to use Ethanol blended E10 fuel for all government vehicles.

<sup>12</sup> Defence Fuel Management Committee, *Minutes* (Meeting at Russell Offices, Canberra, 13 February 2006), 2.

management.<sup>13</sup> The Joint Fuels and Lubricants Agency, an organisation within the Defence Materiel Organisation mostly concerned with the procurement of fuel rather than with more strategic matters, convened the DFMC at this time.<sup>14</sup> The focus was firmly on governance aspects. Other stated functions of the DFMC were to develop a strategic fuel policy for Defence, including monitoring future trends, to analyse fuel consumption,<sup>15</sup> and to manage price unpredictability and reduce (or prevent) growth in fuel expenditure.<sup>16</sup> Chapter Five will highlight that the nominal price of fuel was a small fraction of the total cost of delivering fuel to deployed tactical units; Defence's periodic sensitivity to domestic fuel price fluctuations is a normal aspect of in-year financial management, but it could also be an indication of the operational contingencies most anticipated, with the additional costs of deploying fuel to tactical elements consistently borne by the lead nation in US-led operations.

For most of its history, the DFMC was subordinate to the Defence Logistics Board (this entity became the Defence Logistics Committee (DLC)), and was careful to ensure that the role of the individual Services was not seen to be usurped.<sup>17</sup> The 2008 DFMC terms of reference positioned the committee as subordinate to the DLC, and highlighted that a one star military officer was the DFMC's Chair.<sup>18</sup> The DFMC comprised representatives from each of the Service headquarters, Joint Logistics Command, the Estate and Infrastructure Group, the Capability Acquisition and Sustainment Group, and Defence's strategic headquarters. The recent transition of the DFMC to become a near-equivalent entity to the DLC was due to the contemporary focus on fuel governance,<sup>19</sup> and will be examined later in this section.

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<sup>13</sup> Department of Defence, *Defence Instruction (General) Logistics 09-5: Responsibilities for the management of fuels and lubricants within the Australia Defence Force* (Canberra, 2004), 6-7.

<sup>14</sup> Australian National Audit Office, *Australian Defence Force Fuel Management*, 24, highlighted that the Joint Fuels and Lubricants Agency was formed just prior to being given this responsibility.

<sup>15</sup> Department of Defence, *Defence Fuel Management Committee Terms of reference* (Canberra, April 2004), 6.

<sup>16</sup> Andrew Gillespie, 'Fuel: Quenching Defence's Thirst', *The Link: Australian Defence Logistics Magazine* (Joint Logistics Command, Canberra, 2010), 11, highlighted the difficulty of unpredictable energy prices.

<sup>17</sup> Department of Defence, *Defence Fuel Management Committee Terms of reference* (Canberra, April 2004), 7.

<sup>18</sup> Department of Defence, *Defence Fuel Management Committee Terms of reference* (Canberra, 29 October 2008), 2.

<sup>19</sup> Interview with Air Commodore Stephen Winterton, Director General Fuel Services (2018-2019), conducted on 15 February 2019.

The first DFMC attendance list indicated that no military officer above the rank of Lieutenant Colonel regularly attended committee meetings.<sup>20</sup> This indicated that the Services saw only a limited role for the DFMC, and more broadly, had not prioritised fuel sustainability as a significant issue, despite the ANAO audit and the challenges associated with fuel supply during INTERFET. The first iteration of the DFMC continued for several years, with periodic indications that interest was waning. The minutes from the May 2005 DFMC indicated that the preceding DFMC meeting occurred more than eight months before, no minutes were produced, and the May 2005 meeting was declared to be a 'new start' for the committee.<sup>21</sup> Another indication of the lack of priority assigned to the DFMC was a consistently rotating or temporary fill-in for the Chair position. For example, in the minutes from 14 DFMC meetings from 2003 to 2013, there were ten different committee Chairs.

The Directorate of Strategic Fuel (the predecessor organisation to the Fuel Services Branch, within the Joint Logistics Command) and the DFMC occasionally stated a desire to be more expansive in addressing military fuel sustainability concerns beyond basic governance and domestic facility outcomes. For example, a 2004 DFMC suggested that its terms of reference could move away from remediating ANAO recommendations and towards contemporary issues and Service support.<sup>22</sup> In the May 2005 DFMC, a committee member argued that the terms of reference should 'focus somewhat less on the financial aspects of fuel management, but should aim to reflect the Committee's role as a body that coordinates fuel related activities across the whole of Defence'.<sup>23</sup>

However, the DFMC and Directorate of Strategic Fuel were not resourced to even finalise basic governance issues. For example, the need for an Electronic Fuel Management Information System was identified in the 2002 ANAO audit,<sup>24</sup> was estimated (in 2005) to be completed in the second half of 2006,<sup>25</sup> but in 2010 was estimated to be complete by mid-2011.<sup>26</sup> The Joint Fuel Information Management System was declared operational in

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<sup>20</sup> Defence Fuel Management Committee, *Attendance List* (Canberra, 27 April 2004), 1.

<sup>21</sup> Defence Fuel Management Committee, *Minutes* (Meeting at Defence Plaza Sydney, 19 May 2005), 1.

<sup>22</sup> Defence Fuel Management Committee, *Minutes* (Meeting at Russell Offices, Canberra, 27 April 2004), 8.

<sup>23</sup> Defence Fuel Management Committee, *Minutes* (Meeting at Defence Plaza Sydney, 19 May 2005), 2.

<sup>24</sup> Australian National Audit Office, *Australian Defence Force Fuel Management*, 14.

<sup>25</sup> Defence Fuel Management Committee, *Minutes* (Meeting at Defence Plaza Sydney, 19 May 2005), 3.

<sup>26</sup> Defence Fuel Management Committee, *Minutes* (Meeting at Russell Offices, 16 March 2010), 3.

December 2011, but required ongoing enhancement.<sup>27</sup> Demonstrating that the problem was not trivial, an ANAO report from 2017-2018 again identified information technology deficiencies causing fuel supply chain problems, with an anticipated systems remediation date of 2022.<sup>28</sup> If fuel sustainability was a higher priority and was provided more resources, earlier completion of this project (and fewer delays) could reasonably have been expected.

The first iteration of the DFMC was disbanded in 2007, with no reasons outlined in DFMC correspondence. The likely reasons were waning Service interest and the long period of time that had elapsed since the ANAO audit, despite a belief that there was still a need for the function provided by the committee.<sup>29</sup> The 2004 DFMC terms of reference focused on addressing the ANAO audit recommendations,<sup>30</sup> and as corporate knowledge of this audit diminished over time, and as some tasks were achieved, the need for the DFMC reduced. The loss of Service interest in the forum was indicated through DFMC minutes from 2006, with an appeal to the Services to 'provide an honest assessment as to the value and future direction of the DFMC'.<sup>31</sup> Chapter five will identify the mid-2000s as a period where US interest in military fuel sustainability was rising, indicating a possible lag between US development and the uptake of policy and technology by Defence.

Governance and expenditure concerns soon provided the impetus for a DFMC-like function. Defence re-established the DFMC in 2008, as the price of oil reached 148 dollars per barrel.<sup>32</sup> At the same time, political interest in military fuel sustainability was again piqued, with a Senate Standing Committee recommending that Defence 'adopt a more assertive strategy' towards mitigating oil shocks and developing alternative fuels to reduce a perceived dependence on oil-based platforms. The Joint Standing Committee recommended, imprecisely and without any stated reasons, that Defence should be able

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<sup>27</sup> Defence Materiel Organisation, *Joint Electronic Fuel Management Project Newsletter* (12, December 2011), 1.

<sup>28</sup> Australian National Audit Office, *Defence's Procurement of Fuels, Petroleum, Oils, Lubricants, and Card Services*, 8.

<sup>29</sup> Interview with Air Commodore Stephen Winterton, Director General Fuel Services (2018-2019), conducted on 15 February 2019.

<sup>30</sup> Department of Defence, *Defence Fuel Management Committee Terms of reference* (Canberra, April 2004), 6-7.

<sup>31</sup> Defence Fuel Management Committee, *Minutes* (Meeting at Russell Offices, Canberra, 13 February 2006), 1.

<sup>32</sup> Defence Fuel Management Committee, *Minutes* (Meeting at Russell Offices, 16 September 2008), 1.

to deploy military hardware that was not reliant on oil, within ten years.<sup>33</sup> This was an example of actors with different motives, aside from a desire to improve military performance, seeking to influence military fuel sustainability – an issue to be explored later in this chapter. Cost was a motive for some on the Joint Standing Committee, and some external experts considered it to be in Defence's best interests for more extensive modelling and scenarios to be established to mitigate the risk of crude oil price rises.<sup>34</sup> Defence did not endorse this non-binding and non-realistic recommendation, and confirmed that military equipment would remain reliant on oil for at least 20 years.<sup>35</sup> However, the motivation for senior military commanders to reinvigorate a coordinating entity for fuel issues was evident, both to respond to cost and governance pressures and to mitigate political pressure.

The September 2008 DFMC minutes indicated that the DFMC had been 're-invigorated'.<sup>36</sup> Reinvigoration was a theme that was also applied to wider military logistical functions in 2010,<sup>37</sup> although as Chapter Two argued, logistics was consistently treated as a low priority across most military forces, with military logistics capacity in Australia consistently and pragmatically reduced rather than reinvigorated. 'Reinvigoration' could not reasonably imply the enhancement of fuel or logistical capacity to a previous high level, because there was no previous high level of logistical capacity.<sup>38</sup> The second iteration of the DFMC was made a somewhat higher priority than the first iteration. Defence star-rank and other senior officers formed part of the second DFMC,<sup>39</sup> although some senior officers delegated attendance to their subordinates after the first meeting.<sup>40</sup> Unlike other military

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<sup>33</sup> Australian Government, *Australian Government response to the Joint Standing Committee on Foreign Affairs, Defence and Trade report: Review of the Defence Annual Report 2013-14* (Canberra, November 2016), 8.

<sup>34</sup> Interview with Dr Hugh Saddler, Australian energy industry consultant, conducted on 23 November 2010.

<sup>35</sup> Australian Government, *Australian Government response to the Joint Standing Committee on Foreign Affairs, Defence and Trade report: Review of the Defence Annual Report 2013-14*, 8-9. Defence argued that the higher cost of oil by 2030 would stimulate additional research into alternatives to oil, implying that it was prudent for Defence to not take any major action until this time.

<sup>36</sup> Defence Fuel Management Committee, *Minutes* (Meeting at Russell Offices, Canberra, 16 September 2008), 1.

<sup>37</sup> Although Department of Defence, *Australian Defence Strategic Logistics Strategy* (Joint Logistics Command, Canberra, November 2010), 8-9, 27, identified fuel to be the greatest supply chain risk.

<sup>38</sup> Mark Thomson, *War and Profit: Doing business on the battlefield* (Australian Strategic Policy Institute, Canberra, March 2005), 28.

<sup>39</sup> Defence Fuel Management Committee, *Stakeholder List* (Version 2, Canberra, February 2010), 1, listed a Brigadier as the Chair of the DFMC, and numerous full Colonel equivalents as members.

<sup>40</sup> Defence Fuel Management Committee, *Minutes* (Meeting at Russell Offices, Canberra, 16 September 2008), 1, indicated that CJLOG and an Army Brigadier attended the 'reinvigorated' committee meeting,

forces such as the United Kingdom Ministry of Defence, with a two star officer designated as the 'Military Climate and Energy Security Envoy', the Australian Directorate of Strategic Fuel did not have a senior military officer as Director; an indication of a low priority for the entity at the time.

Similar to the first DFMC iteration, the 2008 DFMC attempted to move into broader fuel issues. The 2008 DFMC terms of reference declared that the committee's primary role was to 'develop the whole of Defence agenda for fuel by providing strategic guidance and policy direction on fuel issues to ensure effective support to ADF operations.'<sup>41</sup> The Directorate of Strategic Fuel also developed a 'vision' and strategic objectives for military fuel sustainability, although without policymakers actively supporting and resourcing such ambitious objectives, they were not achieved.<sup>42</sup> Despite concerns about the exclusive governance focus of the DFMC, governance and consumption forecasting remained the DFMC's primary function.<sup>43</sup>

There were emerging references to fuel in defence policy. Consistent with US actions around the same time (to be outlined in Chapter Five) and concomitant with record oil prices, the Rudd Government used the 2009 White Paper and other policy documents to acknowledge that improved military fuel sustainability was necessary. The 2009 White Paper stated,

Defence's fuel management will be improved. This will have national impacts, as Defence is a significant national user of fuel. A strategic fuel management program will be put in place to coordinate all aspects of fuel management.<sup>44</sup>

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whereas Defence Fuel Management Committee, *Minutes* (Meeting at Russell Offices, Canberra, 3 December 2008), 1, indicated that attendees were Colonel-equivalent and below.

<sup>41</sup> Department of Defence, *Defence Fuel Management Committee Terms of reference* (Canberra, 29 October 2008), 1.

<sup>42</sup> Six fuel management objectives were outlined in Defence Fuel Management Committee, *Minutes* (Meeting at Russell Offices, Canberra, 22 September 2010), 26. These included the need to incorporate surge requirements into supply arrangements; actively manage fuel and reduce fuel demand; advise and support operations; support a national approach to mitigate the challenges of Peak Oil; emphasise fuel efficiency; and, be a 'fast follower' in technology.

<sup>43</sup> Defence Fuel Management Committee, *Minutes* (Meeting at Russell Offices, Canberra, 16 September 2008), 1.

<sup>44</sup> Department of Defence, *Defending Australia in the Asia Pacific Century: Force 2030* (White Paper, Commonwealth of Australia, 2009), 124.

This was evidence of an emerging understanding of some of the strategic risks that were appearing in domestic fuel infrastructure, but with few specific actions outlined. However, the 2009 White Paper suggestion that Defence influenced national fuel markets was broadly rejected.<sup>45</sup> A 2009 Senate Standing Committee report stated, 'Defence is a comparatively minor user of fuel within the broader national context'.<sup>46</sup> Interviews with military subject matter experts reinforced the view that while the fuel industry saw Defence as a valued customer, Defence did not influence the market (military procurement of fuel was described as a 'rounding error' in the national context; that is, an insignificant proportion of national consumption), and concern about military preparedness certainly did not influence national decisions such as petroleum refining capacity in Australia.<sup>47</sup>

From within Defence, frustrated by a perceived lack of action to address the emerging issue of fuel availability risk,<sup>48</sup> numerous military officers formed a group known as the Australian Defence Force Peak Oil Study Group (APOSG). This group was active for several years, commencing around the time of the 2009 White Paper. This group publicly argued that global oil depletion was a pressing concern, but that military commanders had not taken sufficient action to mitigate the risk posed by a decline in global oil production and higher costs.<sup>49</sup> With links to the Association for the Study of Peak Oil and Gas (ASPO), a classified forum was established to allow interested military personnel to exchange ideas. Although the Australian Defence Force Peak Oil Study Group and the classified forum generated some interest from serving personnel, there was no evidence that this resulted in any actions being taken at that time.

Lower level defence policy and procedures continued to emphasise the importance of fuel for military operations in 2009 and 2010, but without gaining high profile. For example, Defence refined its processes in the event of an activation of the Liquid Fuel Emergency

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<sup>45</sup> Interview with Major General David Mulhall, Commander Joint Logistics (2017-2019), conducted on 26 February 2019.

<sup>46</sup> Senate Standing Committee on Foreign Affairs, Defence and Trade, *Defence Submission to Joint Standing Committee on Foreign Affairs, Defence and Trade Inquiry into the Defence Annual Report 2007-08* (Canberra, 2009), 4.

<sup>47</sup> Interview with Group Captain Tim Pedley, Director of Fuel Operations (2017-2018), conducted on 13 February 2019.

<sup>48</sup> Interview with Major Cameron Leckie, Australian Defence Force Peak Oil Study Group, conducted on 1 November 2010.

<sup>49</sup> For example, Cameron Leckie, 'Peak Oil and the Australian Army', *Australian Army Journal* (Summer 2007), 23-25.



Act and the need for military prioritisation.<sup>50</sup> Defence fuel doctrine also continued to be released.<sup>51</sup>

The DFMC could not be considered fully effective if assessed against its 2008 terms of reference, given such declared roles as influencing 'design criteria for new capability acquisitions'.<sup>52</sup> However, the DFMC addressed some important governance issues, and the mere formation of the DFMC to mitigate political concerns could also be considered successful. The DFMC brought scrutiny to Defence fuel budgets and forecasts. Although not always stated in this way, these were clearly its most important objectives, demonstrating the comparative lack of focus on operational contingencies such as the scenario to be presented in Chapter Six. The DFMC also oversaw important fuel-related issues and projects, such as rationalisation of fuel types,<sup>53</sup> and necessary improvements to some domestic fuel facilities.<sup>54</sup> The transition from Service to Joint responsibility for the purchase and distribution of fuel was a challenging but required action from the ANAO audit,<sup>55</sup> and was successfully achieved. The second iteration of the DFMC (from 2008) was more consistent in its achievements than the first DFMC iteration, and it was agreed (including by groups such as the ADF Peak Oil Study Group)<sup>56</sup> that there was improvement made to aspects of military fuel sustainability from the re-establishment of the 2008 DFMC. However, further external scrutiny made it clear that military fuel sustainability risks were continuing to increase.

#### *More warning signs and eventual action*

As we turned over rocks, we found nasty things.<sup>57</sup>

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<sup>50</sup> Department of Defence, *Defence Logistics Manual* (Commonwealth of Australia, Edition 1, January 2010), Part 2, Volume 2, Annex C to Chapter 3.

<sup>51</sup> Department of Defence, *Defence Instruction (General) Logistics 4-1-011: Defence Management of Fuels and Lubricants* (Canberra, 2009), 1.

<sup>52</sup> Department of Defence, *Defence Fuel Management Committee Terms of reference* (Canberra, 29 October 2008), 2.

<sup>53</sup> The single battlefield fuel policy was regularly discussed in DFMC minutes since 2003. Whilst ambitious in scope, the DFMC provided consistency in managing this policy.

<sup>54</sup> Defence Fuel Management Committee, *Minutes* (Meeting at Russell Offices, Canberra, 22 June 2010), 2.

<sup>55</sup> Australian National Audit Office, *Australian Defence Force Fuel Management*, 23.

<sup>56</sup> For example, Interview with a member of the Australian Defence Force Peak Oil Study Group, conducted on 22 November 2010. The member stated that the Directorate of Strategic Fuel had significantly improved fuel sustainability.

<sup>57</sup> Interview with Air Commodore Stephen Winterton, Director General Fuel Services (2018-2019), conducted on 15 February 2019.

There were at least six major external reviews into military fuel sustainability after 2010. These included reviews by Marshall, KPMG, Jacobs/SKM and Aurecon.<sup>58</sup> Further, 2011 federal workplace health and safety legislation led to a significant Defence undertaking to ensure compliance.<sup>59</sup> A fuel remediation plan, led by a two star officer, commenced in 2012. This plan sought to resolve Defence non-compliance with legislation and policy, and the legislation was considered to be a strong incentive to prompt Defence action.<sup>60</sup> As part of this plan, the DFMC was (once again) thought to require a 'refocus', and the lack of centralised management and lack of action taken on 'lots of audits' were considered fundamental problems to address.<sup>61</sup> The 2013 Defence Fuels Seminar was almost entirely focused on these legislative compliance efforts, as were subsequent DFMC meetings.<sup>62</sup> The involvement of the two star officer highlighted the importance that Defence placed on ensuring compliance with the Workplace Health and Safety Act, 2011.

The many reviews into military fuel sustainability were punctuated by further warning signs arising from non-fuel specific reviews and policy. A 2012 Force Structure Review highlighted previously-raised concerns about domestic fuel governance, and labelled 'Strategic Fuel Issues' as the primary critical risk to sustaining operations.<sup>63</sup> The 2013 White Paper went further, outlining support to remediate the fuel sustainability recommendations from the 2012 Force Structure Review. The 2013 White Paper restated the need to make domestic improvements to military fuel sustainability, particularly in Australia's north.<sup>64</sup> The 2015 'First Principles Review' sought to make Defence's governance and expenditure more accountable by establishing a 'strong strategic centre' to optimise the advice provided to government on strategy, capability and resourcing, with greater monitoring of organisational performance.<sup>65</sup> Some argued that the creation of Joint headquarters in Defence, such as Headquarters Joint Operations Command,

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<sup>58</sup> Bob Richards and Ken Noye, *Defence Fuel Transformation Program* (Presentation to the Defence Fuel Symposium, Canberra, 2017), Slide 3.

<sup>59</sup> Peter Marshall, *Fuels Remediation Summit* (Presentation, Canberra, 21-22 August 2013), Slides 1-3.

<sup>60</sup> Training Systems Services, *Interim Report: Review of Defence Fuel Training* (Report for Strategic Logistics Branch, 2013), 5.

<sup>61</sup> Marshall, *Fuels Remediation Summit*, Slide 10.

<sup>62</sup> Defence Fuel Management Committee, *Minutes* (Meeting at Russell Offices, Canberra, 29 August 2013).

<sup>63</sup> Allan Hawke and Ric Smith, *Australian Defence Force Posture Review* (Canberra, 30 March 2012), vii.

<sup>64</sup> Department of Defence, *Defence White Paper 2013* (White Paper, Commonwealth of Australia, Canberra, 2013), 51.

<sup>65</sup> Department of Defence, *Annual Report 16-17* (Commonwealth of Australia, Edition 12 October 2017), 2, 14.

brought a number of fuel and logistical problems to the fore over time,<sup>66</sup> and there was broad acceptance at senior levels within Defence that too much risk was being accepted in the domestic management of fuel.<sup>67</sup>

The 'crisis point' identified by Major General Mulhall<sup>68</sup> came to a head through the (classified) 2013 Wraith Review.<sup>69</sup> The Wraith Review identified significant fuel governance concerns, some of which were repeated from earlier reviews,<sup>70</sup> including exposure to 'extreme (workplace health and safety) risks'; Defence 'remediating facilities that ought to be closed'; and, the need for Defence to 'establish access to competent advice'.<sup>71</sup> A former Director of Fuel Operations indicated that these issues resulted in a significantly increased interest in fuel from senior military commanders, including from Chiefs of Service. For example, the Chief of Navy personally signed into effect a decision to change fleet-wide fuel consumption, allowing for the consumption of generic marine diesel fuel rather than a more specialised military-specific blend that had been used for decades.<sup>72</sup>

The Wraith Review led to structural changes, with the consequences of this review more influential than other fuel reviews. A former Vice Chief of the Defence Force acknowledged the difficult issues that the Wraith Review had brought up for Defence, but considered the review to be 'mostly right'.<sup>73</sup> The Wraith Review in its entirety remains classified. However, a number of other government and Defence publications provided an insight into the content of the Wraith Review. For example, a political review of a Defence Annual Report stated that the establishment of the Fuel Services Branch to support CJLOG as Head of the Defence Fuel Supply Chain arose from the Wraith Review, and that this

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<sup>66</sup> Interview with Lieutenant Colonel David Beaumont, senior Army logistics officer, conducted on 19 February 2019.

<sup>67</sup> Interview with Air Commodore Stephen Winterton, Director General Fuel Services (2018-2019), conducted on 15 February 2019.

<sup>68</sup> Interview with Major General David Mulhall, Commander Joint Logistics (2017-2019), conducted on 26 February 2019.

<sup>69</sup> Spectrum Energy, *Australian Government Department of Defence: External Review Defence Fuel Supply Chain and Remediation Program* (The Wraith Review, 31 December 2013).

<sup>70</sup> Richards and Noye, *Defence Fuel Transformation Program*, Slide 3.

<sup>71</sup> Spectrum Energy, *Australian Government Department of Defence: External Review Defence Fuel Supply Chain and Remediation Program*, 9, 11.

<sup>72</sup> Interview with Group Captain Tim Pedley, Director of Fuel Operations (2017-2018), conducted on 13 February 2019.

<sup>73</sup> Interview with Vice Admiral Ray Griggs, Vice Chief of Defence Force (2014-2018) and Chief of Navy (2011-2014), conducted on 18 April 2019.

branch focused on remediating issues associated with the integrity of Defence fuel installations, safety and individual training.<sup>74</sup> Pricing and procurement of fuel in Australia, poor inventory management, and low competence and knowledge within Defence relating to fuel sustainability (which could be improved through support by commercial industry) were all identified as components of the Wraith Review.<sup>75</sup> Part of the Wraith Review was released following a freedom of information request by *The Canberra Times*,<sup>76</sup> and this highlighted safety and fuel holdings and the need to close some domestic Defence fuel facilities as key issues, and implied that a more centralised mechanism to safeguard fuel accountabilities and governance was necessary.<sup>77</sup> The Turnbull Government accepted the majority of the Wraith Review recommendations,<sup>78</sup> and implementation of the Wraith Review recommendations became the responsibility of the Fuel Services Branch, with good progress made.<sup>79</sup>

Senior-level oversight of the fuel supply chain was formalised. Centralised powers relating to military fuel sustainability were enhanced, with the Turnbull Government assessing previous arrangements to be ‘fragmented and dysfunctional’ with no ‘clear roles or lines of responsibility’.<sup>80</sup> CJLOG was appointed ‘Head of the Defence Fuel Supply Chain’ in February 2014,<sup>81</sup> with a Fuel Services Branch established under his leadership. Joint Logistics Command also became a focal point for various external relationships.<sup>82</sup>

Command and control for military fuel sustainability was simplified. CJLOG is a two star military officer responsible for ‘the oversight and assurance of the Defence Logistic

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<sup>74</sup> Australian Government, *Australian Government response to the Joint Standing Committee on Foreign Affairs, Defence and Trade report: Review of the Defence Annual Report 2013-14*, 9.

<sup>75</sup> Australian National Audit Office, *Defence’s Procurement of Fuels, Petroleum, Oils, Lubricants, and Card Services*, 36.

<sup>76</sup> Department of Defence, *Response to Canberra Times reporting on fuel supply in Defence*, [website], (17 April 2015), <<https://news.defence.gov.au/media/on-the-record/response-canberra-times-reporting-fuel-supply-defence>>, accessed 1 April 2019.

<sup>77</sup> Spectrum Energy, *Australian Government Department of Defence: External Review Defence Fuel Supply Chain and Remediation Program*, 9.

<sup>78</sup> Australian Government, *Australian Government response to the Joint Standing Committee on Foreign Affairs, Defence and Trade report: Review of the Defence Annual Report 2013-14*, 9.

<sup>79</sup> Department of Defence, *Annual Report 17-18* (Commonwealth of Australia, Canberra, 2018), 127.

<sup>80</sup> Australian Government, *Australian Government response to the Joint Standing Committee on Foreign Affairs, Defence and Trade report: Review of the Defence Annual Report 2013-14*, 9.

<sup>81</sup> Department of Defence, *Defence Fuel Management Committee Terms of Reference* (Joint Logistics Command, 29 February 2016), 1.

<sup>82</sup> For example, Defence Fuel Management Committee, *Minutes* (Meeting at Russell Offices, Canberra, 22 September 2010), 5, indicated earlier collaboration between the Defence Science and Technology Organisation and the Department of Resources Energy and Trade. Joint Logistics Command also has representation on the National Oil Energy Security Committee.

Capability’, reporting to the Chief of the Defence Force through the Commander Joint Capabilities (a three star military officer). When a deployment occurs, responsibility for fuel sustainability and broader logistics coordination resides with the Headquarters Joint Operations Command ‘Director General Support’, who is responsible to the Commander of Headquarters Joint Operations Command.<sup>83</sup>

Supporting CJLOG in this role was the Defence Logistics Committee (DLC). The DLC met quarterly, and was responsible for the coordination of Joint logistics elements and logistics policy. Doctrinally, this included military fuel sustainability.<sup>84</sup> The DLC’s membership comprised representatives from the Service headquarters, Headquarters Joint Operations Command, Joint Logistics Command, the Capability Acquisition and Sustainment Group, the Chief Information Officer Group, and the Estate and Infrastructure Group.

The DFMC was previously a subordinate committee to the DLC. The DFMC was elevated in importance as a result of the assessed need to improve fuel governance, with CJLOG now chairing both the Defence Logistics Committee and the DFMC. Many issues discussed at the DFMC are no longer discussed by the DLC.<sup>85</sup> This was a pragmatic decision, given the Chair and the attendees of the DLC and the DFMC are either the same people, or from the same organisations, although Major General Mulhall did note that ‘fuel is sufficiently unique to warrant an enterprise approach’, inferring that a higher degree of organisational oversight is important.<sup>86</sup> The Director General of Fuel Services Branch is not a standing member of the DLC,<sup>87</sup> but does not need to be given the raised profile of the DFMC and CJLOG’s chairmanship of both committees.

CJLOG assigned a weight of effort to fuel governance issues, including the closure of 137 of 140 high risk fuel governance concerns during financial year 2017-2018.<sup>88</sup> Given the volume of evidence, it would be difficult to argue that such measures were not needed, or were not worthy of major organisational focus. However, CJLOG and his staff had a finite work capacity. Defence’s ability to ensure fuel for tactical forces was modelled

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<sup>83</sup> Australian Army, *Land Warfare Doctrine 4-0 Logistics* (Canberra, 2018), 45.

<sup>84</sup> Department of Defence, *Defence Logistics Manual*, Volume 1, Chapter 3.

<sup>85</sup> Interview with Air Commodore Stephen Winterton, Director General Fuel Services (2018-2019), conducted on 15 February 2019.

<sup>86</sup> Interview with Major General David Mulhall, Commander Joint Logistics (2017-2019), conducted on 26 February 2019.

<sup>87</sup> Department of Defence, *Defence Logistics Manual*, Volume 1, Chapter 3.

<sup>88</sup> Department of Defence, *Annual Report 17-18*, 127.

against classified scenarios,<sup>89</sup> but was not a significant organisational effort, and tactical aspects were hardly referred to in government and military fuel sustainability artefacts from 2014 onwards. This was a reasonable prioritisation decision, and indicated where policymakers saw the most risk – not for operational deployments or contingencies, but in domestic facilities. The lower priority of tactical aspects of military fuel sustainability will be considered later in this chapter.

Reviews into aspects of military fuel sustainability continued. Some Defence fuel practitioners considered the ‘Cost Assurance Review’ conducted prior to the 2016 White Paper to have been significant because it resulted in the progression of various funding proposals for fuel.<sup>90</sup> A 2018 ANAO audit compelled a number of military fuel sustainability governance actions.<sup>91</sup> Other reviews and directives that were not fuel-specific, such as a 2018 ‘Commonwealth Protective Security Framework’ directive, assigned further responsibility to CJLOG (in the case of the Commonwealth Protective Security Framework directive, for security relating to Defence’s fuel installations).<sup>92</sup> The domestic fuel governance focus was unequivocal. Senior Defence leaders were kept informed of various fuel issues; a former Secretary of Defence indicated that concern about aging and unsafe fuel facilities, particularly in Darwin, was the main fuel-related issue he dealt with during his tenure,<sup>93</sup> and the need to ensure some control over military fuel supply through the Chinese-leased Darwin Port was another peripheral issue that had been considered at the highest levels of Defence,<sup>94</sup> although not necessarily acted upon.

Wraith, the ANAO audit and other review mechanisms clearly focused Defence on pressing problems relating to fuel, and Defence improved its domestic governance aspects of military fuel sustainability. The partially approved ‘Defence Fuel Transformation Program’ was a resulting response, and this program forecast the need for 1.21 billion

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<sup>89</sup> Interview with Major General David Mulhall, Commander Joint Logistics (2017-2019), conducted on 26 February 2019; Interview with Air Commodore Martin Smith, Director General Logistics-Air Force (2019), conducted on 1 April 2019.

<sup>90</sup> Interview with Air Commodore Stephen Winterton, Director General Fuel Services (2018-2019), conducted on 15 February 2019.

<sup>91</sup> Australian National Audit Office, *Defence’s Procurement of Fuels, Petroleum, Oils, Lubricants, and Card Services*, 7-11.

<sup>92</sup> *Ibid*, 50.

<sup>93</sup> Interview with Mr Dennis Richardson, Secretary of the Department of Defence (2012-2017) and Australian Ambassador to the United States (2005-2010), conducted on 15 April 2019.

<sup>94</sup> Interview with Vice Admiral Ray Griggs, Vice Chief of Defence Force (2014-2018) and Chief of Navy (2011-2014), conducted on 18 April 2019.

Australian dollars (2017 figures) over 30 years to reduce risk and improve the fuel supply chain.<sup>95</sup> Most of this funding proposal is yet to be agreed by the Australian Government, but the funding has been foreshadowed in the Defence Integrated Investment Plan,<sup>96</sup> the 2016 White Paper<sup>97</sup> and in a 2016 Defence Industry Policy Statement,<sup>98</sup> giving some confidence that the funding will be provided. There was no similar funding allocation for fuel in the 2012 Defence Capability Plan. Instead, a non-forecast allocation of 150 million Australian dollars (2013 figures) from the Defence Support and Reform Group (now known as Estate and Infrastructure Group) was necessary, outside the Defence Capability Plan process, to remediate fuel sustainability safety concerns and shortfalls under federal legislation and other reviews, once non-compliance was identified.<sup>99</sup> The 2016 funding allocation demonstrated a level of forward planning for fuel infrastructure and governance investment that was not previously apparent, with an intention to ensure Defence was ‘continuously developing, monitoring and maintaining critical infrastructure’ including fuel facilities.<sup>100</sup>

Of note, the transformation program was described in the Defence Annual Report 2017-18 as a ‘corporate enabling service’,<sup>101</sup> offering an indication of the non-tactical lens through which policymakers viewed fuel sustainability priorities. A military fuel sustainability practitioner interviewed felt that visibility of the transformation program went no lower than the respective Service headquarters, because of the focus on fixed infrastructure and not on tactical aspects.<sup>102</sup> More candidly, a tactical commander of a fuel supply unit stated, ‘no one in the Fuel Platoon has heard of it’.<sup>103</sup> The Commanding Officer of HMAS Sirius, the Royal Australian Navy’s oil tanker, reported a similar lack of specific knowledge of the transformation program within her crew.<sup>104</sup> Although many

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<sup>95</sup> Richards and Noye, *Defence Fuel Transformation Program*, Slide 3.

<sup>96</sup> Department of Defence, *2016 Integrated Investment Program* (Commonwealth of Australia, 2016), 61.

<sup>97</sup> Department of Defence, *2016 Defence White Paper* (White Paper, Commonwealth of Australia, 2016), 84, 96, 108.

<sup>98</sup> Department of Defence, *2016 Defence Industry Policy Statement* (Commonwealth of Australia, 2016), 25.

<sup>99</sup> Marshall, *Fuels Remediation Summit*, Slide 10.

<sup>100</sup> Department of Defence, *2016 Integrated Investment Program*, 15.

<sup>101</sup> Richards and Noye, *Defence Fuel Transformation Program*, Slide 3.

<sup>102</sup> Interview with Colonel Mark Baldock, G4 Headquarters Forces Command (2019), conducted on 20 February 2019.

<sup>103</sup> Interview with Lieutenant Colonel Neil Peake, Commanding Officer, 10<sup>th</sup> Force Support Battalion (2019), conducted on 25 February 2019.

<sup>104</sup> Interview with Commander Melanie Verho, Commanding Officer HMAS Sirius (2019), conducted on 16 March 2019.

references to the Defence Fuel Supply Chain implied that the transformation program encompassed an 'end-to-end' view all of Defence's fuel sustainability interests,<sup>105</sup> the 'end-to-end' focus ceased at a handover point to the Services. The Services, rather than Joint Logistics Command, would normally take responsibility for the tactical aspects of fuel supply, distribution and security.<sup>106</sup>

The more senior involvement in military fuel sustainability post-2014 solved other problems. There was evidence from earlier DFMCs that the power imbalance between the Services and the Joint environment was at times considered limiting for military fuel sustainability and other logistics issues.<sup>107</sup> The 2015 First Principles Review and the greater empowerment of a 'strong strategic centre' almost certainly supported more collegiate outcomes.<sup>108</sup> A recent Director of Fuel Operations spoke of good relationships between the Services and the Joint environment in relation to fuel. He saw problems solved in a collegiate way, although he acknowledged that there was consistently organisational reluctance when a change was first proposed. He considered the role of the Defence Science and Technology Group as very important, from a science and evidence perspective, to support change management efforts that affected the Services and the Joint environment.<sup>109</sup>

CJLOG's oversight of the Defence Fuel Supply Chain allowed resolution of other deep-seated organisational problems. For example, the challenge of gaining ongoing Service consensus for progression towards a 'single battlefield fuel' was discussed in many pre-2015 DFMC meetings, but with little progress.<sup>110</sup> A recent Navy decision to change its operational fuel to the commonly used marine diesel, away from the military specification F-76, was an indication of recent progression, with middle-ranked 'gatekeepers' in Defence previously preventing this change from being made.<sup>111</sup> The December 2012

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<sup>105</sup> Spectrum Energy, *Australian Government Department of Defence: External Review Defence Fuel Supply Chain and Remediation Program*, 9.

<sup>106</sup> Interview with Warrant Officer Class One Jason Hartley, Conductor of Fuel (2019), Headquarters 17<sup>th</sup> Combat Service Support Brigade (2019), conducted on 25 February 2019.

<sup>107</sup> Gary Waters and John Blackburn, *Australian Defence Logistics: The Need to Enable and Equip Logistics Transformation* (Kokoda Paper No. 19, June 2014), 9, highlighted the power imbalance.

<sup>108</sup> First Principles Review Team, *First Principles Review: Creating One Defence* (Report, Canberra, 2015), 5.

<sup>109</sup> Interview with Group Captain Tim Pedley, Director of Fuel Operations (2017-2018), conducted on 13 February 2019.

<sup>110</sup> For example, Defence Fuel Management Committee, *Minutes* (Meeting at Russell Offices, 16 March 2010), 2.

<sup>111</sup> Interview with Air Commodore Stephen Winterton, Director General Fuel Services (2018-2019), conducted on 15 February 2019.



DFMC acknowledged that Defence had been unable to implement a business continuity plan for fuel. DFMC members were asked to raise this issue through their respective commands, indicating concern with the lack of action,<sup>112</sup> with progression only achieved after 2014.

In sum, significant external scrutiny and criticism eventually led to a view that military fuel sustainability was facing a 'crisis' in safety and governance. The Wraith Review finally incentivised changes to organisational structures and greater investment, optimised to improve accountability at the strategic level. CJLOG experienced 'nothing but a strengthening of authority for the CJLOG position' in military fuel sustainability.<sup>113</sup> The focus was on domestic issues, as no overseas or operational deployment issues were considered to be as contemporarily important as these governance issues for policymakers.<sup>114</sup> Some domestic fuel infrastructure investment had links to operational matters. The 2016 White Paper highlighted the need to 'independently and decisively respond to military threats, including incursions into Australia's air, sea and northern approaches',<sup>115</sup> and fuel infrastructure such as storage facilities in northern Australia was important for this.<sup>116</sup> However, the clear recent focus has been on reducing governance and enterprise risk through actions such as closing domestic military fuel facilities – including multiple fuel farms in Darwin<sup>117</sup> – creating efficiencies, and establishing clearer accountability. The actions taken to influence tactical aspects of military fuel sustainability will now be considered.

### **Tactical aspects of military fuel sustainability**

There was a consistent gap between the concerns identified in the bulk of the Australian literature relating to military fuel sustainability, and the more pressing concerns that emerged through government and external reviews. Chapter Two found that the primary concerns identified in the literature related to operational issues, such as sustainability of

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<sup>112</sup> Defence Fuel Management Committee, *Minutes* (Meeting at Russell Offices, Canberra, 5 December 2012), 4.

<sup>113</sup> Interview with Major General David Mulhall, Commander Joint Logistics (2017-2019), conducted on 26 February 2019.

<sup>114</sup> Interview with Air Commodore Stephen Winterton, Director General Fuel Services (2018-2019), conducted on 15 February 2019.

<sup>115</sup> Department of Defence, *2016 Defence White Paper*, 17.

<sup>116</sup> Department of Defence, *Future Defence Fuel Network Implementation Strategy*, 79.

<sup>117</sup> Spectrum Energy, *Australian Government Department of Defence: External Review Defence Fuel Supply Chain and Remediation Program*, 13.

fuel supply to Australian forces during periods of conflict, and with concerns about the environmental implications of fuel consumption. Meanwhile, successive governments almost exclusively focused on the growing concerns about governance of the fuel supply chain, and this was the catalyst for more significant actions being taken from 2014.

With the eventual focus on fuel governance established, this chapter will now examine the tactical aspects of military fuel sustainability, to demonstrate the relatively low priority of tactical actions when compared to the eventual focus on fuel governance actions. These tactical aspects include the actions taken by the DFMC and Fuel Services Branch to influence tactical fuel consumption; the Australian approach to fuel supply for contingencies and contemporary operations; and, the procurement of tactical equipment for fuel supply purposes.

#### *Actions taken by DFMC and Fuel Services Branch*

The mandate of the DFMC included the requirement to support tactical aspects of military fuel sustainability. The 2016 DFMC terms of reference stated that its primary role is ‘...to ensure effective support to Australian Defence Force operations’.<sup>118</sup> There were also indications that some tactical units and operations were ‘outside the currently designated fuel supply chain’ and needed to be brought under the control of CJLOG.<sup>119</sup> However, the sheer scale of the domestic tasks expected of Fuel Services Branch and the DFMC meant that there was little capacity for tasks that were unrelated to fixing and maintaining appropriate levels of fuel safety and governance in domestic facilities.

The Defence Fuel Transformation Program has been resourced as the main Defence effort for military fuel sustainability. Joint Logistics Command has been assigned as the lead organisation for progressing the 1.21 billion dollar (2017 figures) Defence Fuel Transformation Program, rather than the Capability Acquisition and Sustainment Group (the group normally assigned primary responsibility for progressing major capital procurement through the Defence Integrated Investment Program). The task of bringing project documentation to government, and expending allocated money, has already

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<sup>118</sup> Department of Defence, *Defence Fuel Management Committee Terms of Reference* (Joint Logistics Command, 29 February 2016), 1.

<sup>119</sup> Interview with Colonel Mark Harnwell, Army Fuel Advisor (2018-2019), conducted on 26 February 2019.

proven to be particularly onerous for Joint Logistics Command.<sup>120</sup> As a 30 year program, implementation of the Defence Fuel Transformation Program will continue to be a major undertaking for CJLOG and the Fuel Services Branch. The effort required to implement the Defence Fuel Transformation Program has left little residual capacity.

The 2016 DFMC terms of reference positioned the DFMC to influence major combat equipment procurement and ‘actively reduce fuel needs of new capabilities’.<sup>121</sup> However, there was little evidence that military fuel sustainability experts were asked to contribute meaningfully to procurement decisions. For example, the DFMC minutes were silent during the deliberations and eventual government decision to move away from a previously articulated strategy of consolidating the number of combat aircraft types, a decision with significant fuel implications,<sup>122</sup> particularly for declared contingencies where Australia would be required to act independently, as will be examined in Chapter Six. An interview with the Director General Fuel Services Branch indicated that CJLOG may, in the future, be able to influence major procurements through technical advice on fuel, but that such a process was yet to be established.<sup>123</sup> CJLOG indicated that the Joint Logistic Command was tasked only to ‘supply to requirement’, and while there was an unresolved question for Defence relating to the role of Joint Logistics Command in influencing the procurement of military equipment on matters such as fuel, he had not been alarmed by any procurement decisions that had been made.<sup>124</sup>

The 2014 ‘Defence Energy Integration Framework’ foreshadowed an intention for energy considerations to inform capability acquisition. The Framework stated,

Defence’s energy profile is heading in a direction that is strategically unsustainable and operationally vulnerable.<sup>125</sup>

The Framework presented a sense of urgency that Defence needed to be more proactive to address risks in tactical fuel sustainability. However, given the length of time it took for

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<sup>120</sup> Interview with Air Commodore Stephen Winterton, Director General Fuel Services (2018-2019), conducted on 15 February 2019.

<sup>121</sup> Department of Defence, *Defence Fuel Management Committee Terms of Reference*, 2.

<sup>122</sup> Mark Thomson, *The Cost of Defence* (Australian Strategic Policy Institute, Defence Budget Brief, 2013-2014, Canberra, 2013), vi-viii.

<sup>123</sup> Interview with Air Commodore Stephen Winterton, Director General Fuel Services (2018-2019), conducted on 15 February 2019.

<sup>124</sup> Interview with Major General David Mulhall, Commander Joint Logistics (2017-2019), conducted on 26 February 2019.

<sup>125</sup> Department of Defence, *Defence Energy Integration Framework* (Canberra, 2014), 1.

major acquisitions to occur, the Framework mostly outlined what should be done, rather than what was actually done. Furthermore, the Framework defined the concept of a 'Fully Burdened Cost of Fuel' – a US term that sought to incorporate all expenditure and personnel costs required to deliver fuel to deployed units. US analysis highlighted that the nominal cost of fuel was a small fraction of overall costs,<sup>126</sup> relevant to distant operations but also for independent Australian operations in the nearer region, and this will be analysed in Chapter Five.

Therefore, although there was a declared intent to ensure that fuel considerations were taken into account for major capital acquisition, no clear actions had been taken to establish a repeatable process to do so. The fuel experts within Joint Logistics Command were not part of the process to influence fuel requirements for major capital acquisition, and this chapter will later argue that the Defence Science and Technology Group was only involved in fuel technology for equipment acquisition in a piecemeal way. This was an indication of the low priority of military fuel sustainability during tactical equipment acquisition, and therefore an expectation that the fuel consumption of certain combat equipment would not be a particular limitation on the tactical employment of that equipment.

The Joint Logistics Command focus on governance rather than operations was also based on the fact that there were few problems with fuel supply to deployed forces. Senior leaders within Joint Logistics Command indicated that tactical problems 'were not on the radar', and when relatively minor concerns did arise, Defence 'had people looking after it'.<sup>127</sup> Recognised problems and risks for deployed forces, such as assurance of fuel quality and fuel contract management, had not become major problems, and therefore Joint Logistics Command was able to adopt a pragmatic approach and leave these tasks to Headquarters Joint Operations Command to manage.<sup>128</sup>

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<sup>126</sup> United States Defense Science Board, *More Capable Warfighting Through Reduced Fuel Burden* (Office of the Under Secretary of Defense for Acquisition, Technology and Logistics, Washington, D.C., January 2001), 15.

<sup>127</sup> Interview with Air Commodore Stephen Winterton, Director General Fuel Services (2018-2019), conducted on 15 February 2019.

<sup>128</sup> Interview with Major General David Mulhall, Commander Joint Logistics (2017-2019), conducted on 26 February 2019.

There were simply insufficient resources assigned to the Joint Logistics Command and others involved in military fuel sustainability to achieve more expansive goals beyond critical governance and facilities improvements, and this chapter has demonstrated the weight of action eventually directed towards domestic fuel governance concerns. This was an indication that more demanding tactical contingencies, particularly those requiring the conduct of independent operations in the nearer region, were considered unlikely. Given the low risk associated with current operations and with major equipment procurement, no major problems had arisen, and this provided a level of validation to commanders such as CJLOG that the current approach was appropriate, despite acknowledgement that there were future operational risks associated with fuel (also identified in the Chapter Two literature review). Urgent attention was required in domestic governance aspects of military fuel sustainability. The Australian approach will be contrasted with the resources assigned to tactical aspects of US military fuel sustainability in Chapter Five, particularly within the Defense Logistics Agency-Energy, which had broad tactical fuel supply responsibilities.

#### *Australian approach to fuel for contingencies and operations*

The Australian approach to contingencies and current operations provides another view of the relative low priority of tactical aspects of military fuel sustainability. The national approach to the prioritisation of fuel for military operations, should it be required, offers an insight into the priorities of successive governments, and the attitude of military commanders to current operational commitments presents a similar perspective. A pragmatic approach to fuel supply for contingencies and operations was taken, with no strategic problems arising as a result of the lower priority of military fuel sustainability.

The focus on tactical aspects of military fuel sustainability during the period immediately following World War Two was significant (as identified in Chapter Two) given the potentially existential nature of the past threat and the importance of fuel to victory in World War Two. At this time, the criticality of military fuel sustainability during twentieth century warfare and in tactical military actions was reflected in political actions. For example, the Chifley Government codified the prioritisation of national fuel resources for the military in times of need, with the 1949 Liquid Fuel (Defence Stocks) Act legislated. This Act was explicitly dedicated to military requirements and was framed in the context

of the importance of fuel in an existential conflict.<sup>129</sup> Parliamentary debates from this period presented a similar concern and urgency about fuel stocks for conflict,<sup>130</sup> and the 1946 'Strategic Basis' stated:

The Empire's capacity to wage war would be seriously jeopardised should it be denied supplies of oil from the Netherlands East Indies.<sup>131</sup>

Despite some minor references to the military importance of an assured national supply of crude oil in subsequent Strategic Basis policy documents,<sup>132</sup> direct interest in the tactical aspects of military fuel sustainability did not prove to be enduring or consistent, with no significant operational concerns being raised in defence policy since the 1949 Act was established.

The military focus of Australian national fuel legislation reduced over time. The 1984 Liquid Fuel Emergency Act replaced the 1949 Act and was a clear departure from a military focus. An emphasis on emergency services and on economic continuity emerged.<sup>133</sup> Further amendments to the Liquid Fuel Emergency Act reinforced the economic continuity focus and the 'many different circumstances that could require the exercise of the Government's powers under the Act'.<sup>134</sup>

The 1987 Defence White Paper foreshadowed that Defence should be self-sufficient for fuel in low level conflict contingencies (which were assessed as the most likely contingencies).<sup>135</sup> Further, while political leaders regularly made specific reference to military fuel sustainability around the time of World War Two,<sup>136</sup> the discussion became more general over time, with common reference to broader concerns about 'energy security'; a term which was used by different Australian governments in policy to denote

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<sup>129</sup> Commonwealth of Australia, *Liquid Fuel (Defence Stocks) Act* (Canberra, 1949), Section 4.

<sup>130</sup> Rowley James, *Parliamentary Debates* (House of Representatives, Estimates 1936-37, Additions, New Works, Buildings, etc, Speech, Commonwealth of Australia, 16 September 1936); Sir Donald Cameron, *Parliamentary Debates* (House of Representatives, National Oil Proprietary Limited Agreement Bill, Second Reading, 10 September 1937).

<sup>131</sup> Defence Committee, *An Appreciation of the Strategical Position of Australia February 1946* (Commonwealth of Australia, 1946), Paragraph 61c.

<sup>132</sup> Defence Committee, *The Strategic Basis of Australian Defence Policy October 1956* (Commonwealth of Australia, 1956), Paragraph 27.

<sup>133</sup> Commonwealth of Australia, *Liquid Fuel Emergency Act* (Canberra, 1984), Part I, Section 6.

<sup>134</sup> Commonwealth of Australia, *Liquid Fuel Emergency Amendment Bill* (Canberra, 2007), 3.

<sup>135</sup> Department of Defence, *The Defence of Australia* (White Paper, Commonwealth of Australia, 1987), 76.

<sup>136</sup> James, *Parliamentary Debates*; Cameron, *Parliamentary Debates*.

diverse concerns including rising energy prices,<sup>137</sup> security of energy distribution,<sup>138</sup> and 'insecure and contracting' foreign energy supplies,<sup>139</sup> thus blurring the strategic focus of the original legislation.

Whilst these references to military fuel sustainability are outside the period of interest for this thesis (from 1999), they indicate the progression of an issue that was (at one point) an important interest to policymakers when there was a concern about major or existential conflict, but of less interest as the assessed threat became more remote.

The almost complete absence of military references in a 2003 liquid fuel emergency simulation – 'Exercise Tanker' – was indicative of a perception that a contingency operations requiring the national prioritisation of fuel for the military was particularly unlikely. 'Exercise Tanker' made no recommendations specifically relating to military fuel sustainability and did not include Defence on the Inter-Departmental Task Force that responded to the emergency.<sup>140</sup> There was no sense that Defence was an important actor in these discussions. Similarly, the Howard Government's 2004 Energy White Paper made no reference to the potential for military prioritisation of fuel, despite the presence of a specific section on 'energy security'.<sup>141</sup> The Howard and Gillard Governments, and military commanders at the time, referred in only general terms to the inter-departmental National Oil Security Emergency Committee when responding to questions about military fuel vulnerabilities and relative prioritisation of fuel for the military in situations of need.<sup>142</sup>

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<sup>137</sup> For example, Department of Prime Minister and Cabinet, *Securing Australia's Energy Future* (Energy White Paper, Canberra, 2004), 116.

<sup>138</sup> For example, Department of Primary Industries and Energy, *Energy 2000: National Energy Policy Paper* (Australian Government Publishing Service, Canberra, 1988), 1.

<sup>139</sup> For example, Department of National Development, *Australian energy policy: a review* (Australian Government Publishing Service, 1979), 1-2.

<sup>140</sup> MC2 Pacific Pty Ltd, *National Oil Supplies Emergency Committee Liquid Fuel Emergency Simulation 'Exercise Tanker'* (Australian Capital Territory, 4 August 2003), 8.

<sup>141</sup> Department of Prime Minister and Cabinet, *Securing Australia's Energy Future*, 115-130.

<sup>142</sup> Commonwealth of Australia, *Parliamentary Debates* (House of Representatives, Questions on Notice, Fuel: Diesel Shortage, Question 2112, 12 August 2003), 2-3; Senate Standing Committee on Foreign Affairs, Defence and Trade, *Defence Submission to Joint Standing Committee on Foreign Affairs, Defence and Trade Inquiry into the Defence Annual Report 2007-08*, 4; Government of Australia, *Joint Standing Committee on Foreign Affairs, Defence and Trade* (Report into the Defence Annual Report 2007-08, Canberra, October 2009), Paragraphs 9.21-9.22.

It was rare for tactical aspects of military fuel sustainability to be a focus for political leaders even when these issues were raised from within parliament. David Feeney, a Parliamentary Secretary for Defence from 2010 to 2013, stated:

Australia's fuel security has been left in a perilous state...New (military) capabilities will increase fuel consumption...without fuel security it could quickly be rendered useless...What is the point in investing billions in our armed forces if they would run out of fuel within weeks in the event of war?<sup>143</sup>

Senator Jim Molan also outlined various fuel concerns relating to tactical matters and to national supply.<sup>144</sup> Senator Molan believed that internal Liberal Party pressure from himself and other key Members of Parliament was the only reason that the Morrison Government announced a 2018 review into Australia's liquid fuel security;<sup>145</sup> a rare example of tactical aspects of military fuel sustainability being considered important enough to be given deeper consideration.

Of note, a former Secretary of Defence indicated that Defence would be unlikely to offer a strong position on any future review that considered national holdings of petroleum. Mr Dennis Richardson argued that there was a risk in Defence being considered the primary advocate for increasing national fuel supply. Such a position (adopted by Defence) could result in the Defence budget being used as a funding source, for an issue of lower priority than other contemporary military capability issues.<sup>146</sup> Former Vice Chief of the Defence Force, Vice Admiral Ray Griggs, supported the view that Defence had to be careful in choosing which issues to 'securitise' because of the constant risk to Defence budgets. He also believed that the risk of a national fuel shortfall could result in Defence being

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<sup>143</sup> David Feeney (Assistant Federal Opposition spokesman for Defence), 'Weak links in fuel supply chain threaten defence capabilities', *Australian*, [website], (1 June 2017), <<http://www.theaustralian.com.au/opinion/weak-links-in-fuel-supply-chain-threaten-defence-capabilities/news-story/3b2daec35d196951bbbd21f860fa896c>>, accessed 1 June 2017.

<sup>144</sup> Henry Belot and Dan Conifer, 'Jim Molan, former military chief turned Liberal senator, issues stark warning over defence capabilities', *ABC News*, [website], (4 January 2018), <<http://www.abc.net.au/news/2018-01-04/jim-molan-issues-stark-warning-over-adf-capabilities/9303810>>, accessed 6 January 2018.

<sup>145</sup> Interview with Senator Jim Molan, Senator for New South Wales (2018-2019), conducted on 7 March 2019.

<sup>146</sup> Interview with Mr Dennis Richardson, Secretary of the Department of Defence (2012-2017) and Australian Ambassador to the United States (2005-2010), conducted on 15 April 2019.



compelled to provide commercial access to its own storage of fuel to supplement broader national supplies, and this could make it challenging to sustain Defence operations.<sup>147</sup> Even when the opportunity for a deeper examination of tactical aspects of military fuel sustainability arose, there was a reluctance from Defence to engage on the matter due to a perceived risk to its budget and its existing priorities.

Senator Molan has significant concerns about military fuel sustainability, but argued that these problems were symptomatic of no clear national security strategy being articulated by successive governments. Molan posited that Defence was structured to take fuel from the US during expeditionary deployments, and while fuel supply for current deployments had been successful, Australia had become over-reliant on the US, and needed to change this philosophy due to emerging regional uncertainties and his assessment that Defence may need to be more prepared to act independently.<sup>148</sup>

It remains to be seen whether any policymaker interest in military fuel sustainability will develop,<sup>149</sup> based on the review into the Liquid Fuel Emergency Act announced by Minister Frydenberg in 2018.<sup>150</sup> CJLOG assessed that this review may become a 'low level election issue' for 2019,<sup>151</sup> with the Leader of the Opposition similarly linking national fuel supply to tactical aspects of military fuel sustainability.<sup>152</sup> However, outside the resource allocation for the Defence Fuel Transformation Program,<sup>153</sup> the same priority was not evident in initiatives designed to ensure sufficient fuel supply for declared independent contingencies, as will be discussed in Chapter Six.

There were other recent indications of internal Defence interest in tactical aspects of military fuel sustainability, but these were not substantial. A 2018 Defence 'DEFGRAM'

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<sup>147</sup> Interview with Vice Admiral Ray Griggs, Vice Chief of Defence Force (2014-2018) and Chief of Navy (2011-2014), conducted on 18 April 2019.

<sup>148</sup> Interview with Senator Jim Molan, Senator for New South Wales (2018-2019), conducted on 7 March 2019.

<sup>149</sup> Interview with Brigadier Andrew Freeman, Commander 17<sup>th</sup> Combat Service Support Brigade (2018-2019), conducted on 18 February 2019. Brigadier Freeman highlighted the challenges for certain logistics issues to remain an area of focus, given the many competing demands.

<sup>150</sup> Josh Frydenberg, *Fuel security review* (Minister for the Environment and Energy, Media Release, 7 May 2018).

<sup>151</sup> Interview with Major General David Mulhall, Commander Joint Logistics (2017-2019), conducted on 26 February 2019.

<sup>152</sup> Bill Shorten, 'Labor commits to creation of Australian fuel reserve', *The Strategist*, [website], (28 February 2019), <<https://www.aspistrategist.org.au/labor-commits-to-creation-of-australian-fuel-reserve/>>, accessed 28 February 2019.

<sup>153</sup> Department of Defence, *2016 Defence White Paper*, 84, 96, 108.

noted the existence of a recently produced classified 'Strategic Policy Statement on Fuel Security'. Highlighting that 'liquid fuel is a key enabler in support of Defence operations and capabilities', the DEFGRAM identified the existence of a framework to offer 'a secure and resilient liquid fuel supply'.<sup>154</sup> It is possible that this classified statement addresses operational fuel sustainability matters, or that the DEFGRAM was an indication that other classified actions had been directed to occur. However, this statement was recent, and interviews and primary document analysis found no indication that this statement had resulted in further action across Defence to improve military fuel sustainability, as might be expected to have occurred from higher level direction. Therefore, this classified statement did not change the assessments made in this chapter (or thesis).

The approach by military commanders to ongoing tactical operations in Afghanistan and Iraq provided a view of the relative priority of tactical aspects of military fuel sustainability, and the pragmatic approach to fuel which saw no strategic problems arise.

With military operations viewed as being an exceptional task, no fuel restrictions on tactical units were identified during data collection for this thesis. Some political scrutiny demonstrated that there were impracticalities and challenges in enforcing fuel consumption or emissions limits for tactical operations. For example, Senator Scott Ludlam outlined his concern that Defence was unwilling to estimate the amount of carbon it emitted during expeditionary operations.<sup>155</sup> However, this was largely impractical, was not followed up, and no government could reasonably be expected to impose carbon emissions limits on operational commanders in situations where lives and important missions may be at risk.

The limited organisational concern about tactical fuel sustainability was emphasised in an interview with the Australian Defence Force fuel contract manager for the Middle East and North Africa. His observation of 'virtually no senior level interest' in the fuel provision to that operational deployment related to the fact that the deployment was such a standard and long-standing arrangement, with very little organisational risk; although he

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<sup>154</sup> Department of Defence, *Strategic Policy Statements: Fuel Security and Cyber* (DEFGRAM 367/2018, 12 July 2018), 1.

<sup>155</sup> House of Representatives, *Joint Standing Committee on Foreign Affairs, Defence and Trade* (Estimates Transcript, Canberra, 2 June 2011).

assessed that a major negative fuel issue would be likely to generate interest.<sup>156</sup> He indicated that Australia would always seek to procure fuel from commercial suppliers wherever the infrastructure was in place. In the Middle East, this was done either directly through government suppliers (depending on the country), or through the robust US Mutual Logistics Support Agreement (or contracted US fuel supply companies) in conflict zones. By relying on these arrangements, the burden on the Australian military for ensuring fuel supply to its forward elements was particularly low, and even the process of renewing contracts was considered to be straightforward. The many concerns associated with security of supply convoys, to be discussed in the US context in Chapter Five, were of peripheral importance to Defence.<sup>157</sup> Other interview participants believed that in an emergency, the economics of military fuel consumption were unimportant – the government would just need to pay,<sup>158</sup> an indication of military exceptionalism.

Relatively minor tactical fuel-related issues in the Middle East were quickly solved. For example, challenges identified by the Commander Joint Operations in fuelling Australian aircraft in Afghanistan during the deployment of combat aircraft were able to be resolved through support from the US.<sup>159</sup>

There were signs that Defence was not well practiced or versed in the military fuel supply requirements for a large scale, nearer region operational contingency. For example, the September 2008 minutes indicated that the DFMC was unaware of the treatment of revenue from sale of Defence fuel to foreign military forces.<sup>160</sup> Whilst the DFMC was only in the first year of its 'reinvigorated' format, and the issue was mostly resolved in the subsequent DFMC meeting,<sup>161</sup> the limited awareness of this aspect of policy demonstrated that Australian-led, nearer region operational scenarios, with Australia supplying fuel to smaller partners (like the US did for Australia in operations in the Middle East), was a somewhat novel concept.

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<sup>156</sup> Interview with Mr Craig McConachy, Australian Fuel Contract Manager – Middle East and North Africa Region (2019), conducted on 13 February 2019.

<sup>157</sup> Ibid.

<sup>158</sup> Interview with Senator Jim Molan, Senator for New South Wales (2018-2019), conducted on 7 March 2019.

<sup>159</sup> Interview with Air Marshal Mel Hupfeld, Commander Joint Operations (2018-2019), conducted on 25 February 2019.

<sup>160</sup> Defence Fuel Management Committee, Minutes (Meeting at Russell Offices, Canberra, 16 September 2008), 3.

<sup>161</sup> Defence Fuel Management Committee, (Meeting at Russell Offices, Canberra, 3 December 2008), 1.

In another example of a lack of focus on military fuel sustainability for nearer region operations, it became apparent in 2011 that Defence Minister Smith was unaware of the non-deployable status of key logistics and fuel supply vessels, Her Majesty's Australian Ships (HMAS) Kanimbla, Manoora and Tobruk.<sup>162</sup> This was exposed after extensive media attention highlighted Defence's inability to conduct regional humanitarian assistance.<sup>163</sup> A long list of problems with these vessels became public.<sup>164</sup> It would be unlikely for a similar lack of knowledge to be demonstrated for a combat unit. The public debate on the serviceability of the Collins Class submarines was evidence of a different and more comprehensive understanding of combat units.<sup>165</sup> HMAS Choules was procured as an interim replacement vessel for the non-deployable logistics vessels, although it was not declared within the Defence Capability Plan; it was announced towards the end of a financial year to cover the identified gap.<sup>166</sup>

There was further evidence in Australian doctrine of limited focus on nearer region military fuel sustainability matters. The Defence Instructions (General) Fuel Management and Responsibilities Directive only referred in passing to any fuel supply arrangement that may be established for a deployed location. The tasks listed for each agency were focused on training only. With an expectation of US logistic support in most operational theatres, the limited focus on fuel arrangements for forward deployments was reasonable. If independent nearer region operations were a higher priority, this key fuel sustainability instruction contained inadequate detail.<sup>167</sup>

Where military fuel sustainability was required to be achieved independently in Australia or the nearer region, the missions were small and successful. For example, Defence established four refuelling points for communities in North Queensland following the 2019 floods, and did so at short notice and very successfully, mostly using commercial

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<sup>162</sup> Tony Eastley, 'Defence Minister disappointed over high and dry fleet', *AM with Tony Eastley*, Australian Broadcasting Corporation (ABC), [website], (16 February 2011), <<http://www.abc.net.au/am/content/2011/s3139938.htm>>, (accessed 16 April 2019), suggested that Minister Smith was not kept abreast of the seaworthiness of Defence's amphibious fleet.

<sup>163</sup> For example, *Canberra Times*, 'Amphibious capability?', Editorial, 1 March 2011.

<sup>164</sup> Waters and Blackburn, *Australian Defence Logistics: The Need to Enable and Equip Logistics Transformation*, 17. Nicholas Jans, *The Chiefs: A Study of Strategic Leadership* (Australian Defence College, Commonwealth of Australia, 2013), 44.

<sup>165</sup> Derek Woolner, *Getting in Early: Lessons of the Collins Submarine Program for Improved Oversight of Defence Procurement* (Australian Parliamentary Library, Research Paper 3, 18 September 2001).

<sup>166</sup> Stephen Smith, *Largs Bay Acquisition* (Media Release, MIN80/11, Canberra, 6 April 2011).

<sup>167</sup> Department of Defence, *Defence Instruction (General) Logistics 09-5: Responsibilities for the management of fuels and lubricants within the Australian Defence Force*, 5.

equipment.<sup>168</sup> In an interview with the military three star Commander of Joint Operations, Air Marshal Mel Hupfeld indicated that he did watch fuel closely for emerging tactical requirements, having directly experienced some fuel supply challenges in the past, including problems with deploying sufficient fuel supply at Royal Australian Air Force Base Learmonth during the search for the missing MH370 aircraft in the Indian Ocean, although the military contribution to the search was ultimately well regarded.<sup>169</sup>

There was an organisational acceptance in Defence that expenditure on fuel in the Middle East was just the price of doing business. There were indications of very little price sensitivity in Defence in terms of procuring fuel for Middle East operations.<sup>170</sup> Chapter Five will identify whether similarly few limitations were applied to fuel consumption for US combat operations. In Defence's use of energy for domestic use, legislation and internal Defence policies were often applied to achieve efficiencies, mostly to reduce expenditure; for example, the Howard Government directed all departments to implement an Environmental Management System in 2002.<sup>171</sup> Government legislation and internal Defence policies to reduce domestic energy consumption and carbon emissions were numerous and were regularly enacted or planned,<sup>172</sup> and restrictions were imposed on new facility construction.<sup>173</sup>

Some interview participants felt that there was insufficient knowledge of the complexities and risks associated with tactical fuel sustainability across Defence (although not wilful ignorance), and that a greater understanding of the tactical risks being accepted could incentivise additional interest from senior military commanders.<sup>174</sup> A number of interview participants felt that the largest fuel consumer in Defence – the Royal Australian Air Force

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<sup>168</sup> Interview with Brigadier Andrew Freeman, Commander 17<sup>th</sup> Combat Service Support Brigade (2018-2019), conducted on 18 February 2019.

<sup>169</sup> Interview with Air Marshal Mel Hupfeld, Commander Joint Operations (2018-2019), conducted on 25 February 2019.

<sup>170</sup> Interview with Mr Craig McConachy, Australian Fuel Contract Manager – Middle East and North Africa Region, conducted on 13 February 2019.

<sup>171</sup> Department of Defence, *Defence Public Environment Report*, 5.

<sup>172</sup> These policies were outlined by Robert Lean, *Briefing to Defence Fuel Management Committee* (Presentation, Directorate of Climate Change and Sustainable Development, Canberra, 26 August 2009), Slide 4.

<sup>173</sup> For example, see Department of Sustainability, Environment, Water, Population and Communities, *Policy Framework for Greening of Government*, [website], (2010), <<http://www.environment.gov.au/sustainability/government/purchasing/policy.html>>, accessed 14 November 2010.

<sup>174</sup> Interview with Brigadier Andrew Freeman, Commander 17<sup>th</sup> Combat Service Support Brigade (2018-2019), conducted on 18 February 2019.

– was very effective in ensuring short term fuel supply success for tactical activities such as major exercises, again making the tactical risk appear less than what it really is. Chapter Six will highlight the challenges for the Royal Australian Air Force and broader Defence if required to maintain fuel for ‘bare base’ operations – three air bases in northern Australia that are managed by a small skeleton staff throughout the year, until activated for an exercise or operation – for an extended period.<sup>175</sup> The fuel challenges are particularly difficult for bare bases such as Scherger in north Queensland, where roads (the predominant means of bulk fuel supply) are regularly closed due to weather.<sup>176</sup> Other interview participants argued that fuel was forecast well in advance, and consumption was often over-estimated, and this masked some of the challenges that may be experienced in conflict situations, again reducing the perceived tactical risk associated with fuel supply.<sup>177</sup>

The consistent policymaker approach to fuel for contingency and current operations was pragmatic and minimalist, and no strategic problems arose as a result of this approach. The likelihood that Defence would not offer a strong position on a national fuel supply review; the lack of concern about fuel for current operations, given sufficient fuel was consistently available for operations in the Middle East through US supplies; and, the transition of national fuel emergency legislation away from a military focus, all indicate a low policymaker priority for the tactical aspects of military fuel sustainability.

### *Approach to procurement*

Finally, the approach to major equipment procurement can offer an insight into the low priority of tactical aspects of military fuel sustainability. Outlining the allocation of resources for major equipment procurement, the Defence Integrated Investment Program (IIP) – previously known as the Defence Capability Plan (DCP) – articulated successive governments’ military procurement priorities, including for military fuel

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<sup>175</sup> Interview with Air Commodore Stephen Winterton, Director General Fuel Services (2018-2019), conducted on 15 February 2019; Interview with Group Captain Nicholas Hogan, Officer Commanding 84 Wing, conducted on 15 February 2019; Interview with Group Captain Tim Pedley, Director of Fuel Operations (2017-2018), conducted on 13 February 2019.

<sup>176</sup> Interview with Air Commodore Michael Kitcher, Commander Air Combat Group (2018-2019), conducted on 20 February 2019.

<sup>177</sup> Interview with Colonel Mark Baldock, G4 Headquarters Forces Command (2019), conducted on 20 February 2019. Interview with Air Commodore Stephen Winterton, Director General Fuel Services (2018-2019), conducted on 15 February 2019.

equipment and infrastructure. Alongside the government's major plans for Defence, 'unreliable funding commitments' and 'competing demands' were a feature of defence procurement across many decades, and IIP entries relating to military fuel sustainability remained subject to those pressures, like other projects.<sup>178</sup> A senior Defence logistics officer described logistics as a 'victim of prioritisation',<sup>179</sup> and this description was consistent with expenditure on tactical aspects of military fuel sustainability, such as the procurement of fuel-related equipment since INTERFET. Investments typically either remediated obvious tactical weaknesses, or replaced existing fuel equipment to a similar level.

Glaring tactical fuel supply shortfalls became apparent during INTERFET, identified in Chapter Two, and this led to some immediate investment in tactical fuel equipment. The Howard Government's 2000 White Paper outlined its intention to rapidly procure some tactical fuel equipment.<sup>180</sup> As a result, Joint Project 2059 provided Defence with tactical fuel storage, distribution and testing equipment.<sup>181</sup> This project was originally planned for delivery in 2004, but was undertaken earlier to mitigate significant problems from INTERFET.<sup>182</sup> An interview with the Commander of the Army's 17<sup>th</sup> Combat Service Support Brigade identified that some equipment components delivered through Joint Project 2059 had great potential but were underutilised. For example, the 'dracone' towed fuel barges offered logistics flexibility for amphibious operations, but the capability 'was not well known about' and had limitations operating in difficult sea state conditions.<sup>183</sup> This was indicative of the type of operations that Defence was required to support after INTERFET, which were in support of the US where capabilities like the dracones were not required because the US supplied fuel to operations in the Middle East.

Procurement of HMAS Sirius, the modified commercial oil tanker, was expedited, although only to create overlap in capability with the aging HMAS Success and to avoid legal concerns associated with ongoing operations of its single-hull predecessor oiler HMAS

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<sup>178</sup> Mark Thomson, 'Funding and Delivering the 2016 Defence White Paper', *Security Challenges*, 12/1 (2016), 65.

<sup>179</sup> Interview with Lieutenant Colonel David Beaumont, senior Army logistics officer, conducted on 19 February 2019.

<sup>180</sup> Department of Defence, *Defence 2000: Our Future Defence Force* (White Paper, Canberra, 2000), 84.

<sup>181</sup> Paul Firth, 'Petroleum Support', *The Link Defence Logistics Magazine*, 3 (Canberra, 2008), 21.

<sup>182</sup> Australian National Audit Office, *Australian Defence Force Fuel Management*, 107.

<sup>183</sup> Interview with Brigadier Andrew Freeman, Commander 17<sup>th</sup> Combat Service Support Brigade (2018-2019), conducted on 18 February 2019.

Westralia, which had to be quickly decommissioned.<sup>184</sup> The oiler procurement was foreshadowed in the 2000 White Paper,<sup>185</sup> and came into service in 2006. While this was a significant purchase to improve fuel supply capacity in militarily benign environments, it was a unique vessel (the only vessel of its type in the Navy fleet), and the Navy was without this vessel for extended periods of planned and unplanned maintenance.<sup>186</sup> Its commercial design also means that it is vulnerable to interdiction in any scenario with a threat to maritime supply lines,<sup>187</sup> a factor to be examined in Chapter Six. The 2016 White Paper foreshadowed the replacement of the Navy's one replenishment ship and one oiler with two maritime logistics replenishment vessels by the early 2020s,<sup>188</sup> a decision which offered more flexibility for maritime resupply, but maintained a similar fuel supply capability.

After the rapid tactical fuel supply procurements to fill obvious capability gaps that had emerged during INTERFET, the low priority of tactical aspects of military fuel sustainability was visible through the capability acquisition programs.

A major project that would have offered a significant improvement to military fuel sustainability was Joint Project 2048 – specifically the 'strategic sealift' component of that project – but the main logistical improvements within the project were either delayed or removed from the IIP. Joint Project 2048 aimed to procure an 'amphibious deployment and sustainment system'. The requirement for strategic sealift to support the amphibious platforms was initially identified within the project, as the final phase. This phase aimed to:

...enable the ADF to transport bulk equipment, supplies and forces into a theatre of operations and provide significant ongoing support to deployed forces.<sup>189</sup>

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<sup>184</sup> Department of Defence, *Getting Sirius: A Project Manager's Story* (Defence Materiel Organisation, Commonwealth of Australia, 2008), 25.

<sup>185</sup> Department of Defence, *Defence 2000: Our Future Defence Force*, 90.

<sup>186</sup> See *Daily Telegraph*, 'Australian Navy struggles to sail the seven seas', [website], 27 November 2011, <<http://www.news.com.au/national/australian-navy-struggles-to-sail-the-seven-seas/story-e6frfkvr-1226207090187>>, accessed 10 December 2018.

<sup>187</sup> Interview with Commander Melanie Verho, Commanding Officer HMAS Sirius (2019), conducted on 16 March 2019.

<sup>188</sup> Department of Defence, *2016 Defence White Paper*, 84, 96, 108.

<sup>189</sup> Department of Defence, *Defence Capability Plan 2010-2020* (Public Version, 2010), 17.



The 2006 DCP estimated the year of delivery for this phase (titled Phase 4C) to be 2016 to 2018, but the 2010 DCP articulated a retitled 'Phase 5' sealift component with a delayed year of delivery to no sooner than 2019. The 2012 DCP outlined no sealift project, highlighting that Joint Project 2048 Phase 5 had become a project to procure landing craft able to transport armoured vehicles from the amphibious vessels and insert them ashore.<sup>190</sup>

The sealift component of the amphibious capability procurement could have significantly enhanced force projection of fuel for nearer region operations. According to the 2010 DCP, the sealift component was required to 'provide ongoing sustainment support for deployed forces',<sup>191</sup> although an operational model which saw a reliance on the US for fuel supply mitigated the risk of not progressing this procurement. Delays were a normal aspect of the IIP process. However, the significant delay in (and subsequent cancellation of) the project was an indication of competing pressures and the high level of expenditure required,<sup>192</sup> and the assessment that its non-procurement would not be tactically unsound for anticipated scenarios. The 2012 DCP did not state how ongoing sustainment to the amphibious vessels would occur, and this was consistent with a view that 'in a fiscally constrained environment, capability managers will go for platforms and systems hoping and praying that logistic and administrative wherewithal will somehow come later'.<sup>193</sup> Amphibious combat scenarios were developed without the ability to independently sustain them,<sup>194</sup> including through the cancellation of key logistic and fuel supply equipment. Joint Project 2048 Phase 5 was considered an important logistical component of the amphibious vessel procurement.<sup>195</sup> In this case, the amphibious combat vessels progressed, but the supporting logistics were delayed or cancelled. The combat element had less logistical support, leading to a more unbalanced force to achieve declared nearer region operations, but with less problem if the expectation of policymakers was to provide expeditionary forces to support US-led operations.

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<sup>190</sup> Department of Defence, *Defence Capability Plan 2012* (Public Version, 2012), 109.

<sup>191</sup> Department of Defence, *Defence Capability Plan 2010-2020*, 132.

<sup>192</sup> Ibid, 94, stated the acquisition cost would be between 0.5 to 1.5 billion dollars (2010 figures).

<sup>193</sup> Interview with Mr Bob Wylie, Defence procurement expert, conducted on 7 March 2011.

<sup>194</sup> David Beaumont, *Transforming Australian Army Logistics to sustain the Joint Land Force* (Australian Army Occasional Paper, Future of Army Series 001, October 2017), 31, argued that most logistics concepts had been retained in the 'intellectual domain' rather than being enacted.

<sup>195</sup> Department of Defence, *Defence Capability Plan 2010-2020*, 17.

Joint Project 157, a project providing aviation ground refuelling capacity (fuel tankers and some infrastructure) with an estimated investment between 100 and 300 million dollars (2012 figures), was another procurement that demonstrated the pattern of tactical fuel equipment being procured only when existing equipment was failing. The replacement tankers were described as essential to replace ‘an aged and failing, under-capacity aviation refuelling fleet’.<sup>196</sup> The timing of the equipment delivery still slipped at least two years (until late 2019),<sup>197</sup> an indication that there was little perceived risk with a poorly maintained and insufficient vehicle tanker fleet being used to supply fuel to air bases in Australia and to Royal Australian Air Force Base Butterworth in Malaysia. There were also senior level concerns about how well these tankers were integrated into the broader fuel system.<sup>198</sup>

Although only nascent, Defence Project 8190 may be scoped to simply replace existing tactical fuel provision equipment for the Services.<sup>199</sup>

The language associated with military fuel procurements was largely non-specific, offering some flexibility in the level of capability that was actually procured and the timeline associated with the procurement. For example, the 2000 White Paper declared that the Howard Government would ‘increase the capacity to supply deployed forces by a series of investments’ and ‘enhance petroleum supply units’.<sup>200</sup> Similarly non-specific promises were made in the 2009 White Paper, which promised that ‘Defence’s fuel management will be improved’, and ‘a strategic fuel management program will be put into place’,<sup>201</sup> with similar statements in the 2013 White Paper.<sup>202</sup> Conversely, other military hardware requirements were consistently precisely articulated – for example, procurement of 12

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<sup>196</sup> Parliamentary Standing Committee on Public Works, *Report 1/2018: Referrals made December 2017* (Canberra, Commonwealth of Australia, March 2018), 23.

<sup>197</sup> Australian Government, *Budget 2017-18* (Portfolio Budget Statements 2017-18, Budget Related Paper No. 1.4A, Defence Portfolio, Commonwealth of Australia, 2017), 154.

<sup>198</sup> Interview with Major General David Mulhall, Commander Joint Logistics (2017-2019), conducted on 26 February 2019.

<sup>199</sup> Interview with Warrant Officer Class One Jason Hartley, Conductor of Fuel, Headquarters 17<sup>th</sup> Combat Service Support Brigade (2019), conducted on 25 February 2019.

<sup>200</sup> Department of Defence, *Defence 2000: Our Future Defence Force*, 84.

<sup>201</sup> Department of Defence, *Defending Australia in the Asia-Pacific Century: Force 2030* (White Paper, Canberra, 2009), 124.

<sup>202</sup> Department of Defence, *Defence White Paper 2013*, 51.

submarines, 12 major surface vessels, 72 Joint Strike Fighter aircraft and seven Triton aircraft.<sup>203</sup>

The exception to the simple replacement or remediation of tactical fuel provision equipment, and also to the lack of specificity in describing the fuel-related capability, was air-to-air refuelling. The requirement for air-to-air refuelling was first identified in the 1976 White Paper,<sup>204</sup> and has been emphasised in every White Paper since.<sup>205</sup>

Air-to-air refuelling aircraft, directly supporting combat aircraft missions, remained a purely military task performed by military personnel, which could not easily be commercially provided. This was unlike most other aspects of the military fuel supply chain. For example, despite its role in supporting combat ships, HMAS Sirius was a modified commercial oil tanker with limited self-defence, and was not exposed to any military threat. Leasing was sometimes assessed to be a suitable option for the replacement of HMAS Sirius.<sup>206</sup>

Air-to-air refuelling was directly associated with the application of air power, and after World War Two, was central to the US conception of strategic competition.<sup>207</sup> Similar to a 44-billion-dollar appropriation for air-to-air refuelling capability in the US to be discussed in Chapter Five, successive Australian governments demonstrated strong support despite the significant costs for this type of equipment. After the KC-30A air-to-air refuelling aircraft were received by Defence in 2011, some were deployed to Iraq in 2014 to operate in the US-led coalition. The 2016 White Paper declared the Turnbull Government's intention to procure additional air-to-air refuelling aircraft.<sup>208</sup> Chapters Five and Six will consider air-to-air refuelling capability in more detail.

The often lower priority given to fuel sustainability equipment in the IIP was partly explained by the political preference to publicly announce combat equipment

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<sup>203</sup> Department of Defence, *2016 Defence White Paper*, 90-95.

<sup>204</sup> For example, Department of Defence, *Australian Defence* (White Paper, Canberra, 1976), 18.

<sup>205</sup> For example, Department of Defence, *Defence 2000: Our Future Defence Force*, 85, 87, 93; Department of Defence, *Defending Australia in the Asia-Pacific Century: Force 2030*, 122-4.

<sup>206</sup> Abraham Gubler, 'Defence Business: Sirius supply stalwarts Success', *Australian Defence Magazine*, [website], (1 May 2008), <<http://www.australiandefence.com.au/2BB89700-F807-11DD-8DFE0050568C22C9>>, accessed 20 February 2019.

<sup>207</sup> Dennis Ryan, *Air Force Air Refueling for Naval Operations: History, Practice and Recommendations* (Airpower Research Institute, Air University Press, August 1990), 3.

<sup>208</sup> Department of Defence, *2016 Defence White Paper*, 95-6.

procurement,<sup>209</sup> with little attraction to do the same for supporting fuel sustainability and logistic procurement. This combat equipment focus occurred for reasons such as the political desire to seek domestic political advantage or to pre-empt an announcement from political opposition; perceptions of Australia's 'rightful role'; pressure from allies; and, Ministers seeking to avoid threats to their budget.<sup>210</sup> Logistical and fuel procurements tended to be lower profile. Some fuel projects, such as the Joint Electronic Fuels Management were included in the DCP,<sup>211</sup> but they did not gain the public interest of combat equipment. Political opportunism (to be discussed further in the US context in Chapter Five) was regularly apparent when fuel sustainability announcements were made. For example, in announcing a fuel information system in 2008, Minister Combet focused almost exclusively on the Australian industry involvement rather than military output.<sup>212</sup> Minister Clare similarly focused on Australian industry in 2011 when announcing an Australian company was to build fuel tank covers (among other things) for the Joint Strike Fighter.<sup>213</sup>

Procurement of tactical fuel equipment demonstrated its low priority. Its procurement was often to solve problems that had already manifested and to replace existing equipment. Other projects that would have enhanced fuel capacity were planned but not procured. Policy statements were consistently non-specific about the level of fuel-related capability that would be procured, allowing flexibility in terms of the capacity that would be required and the timeline associated with the procurement. Air-to-air refuelling was the only tactical military fuel sustainability capability that was prioritised, because it was considered so fundamental to combat aircraft operations.

In summary, this section has considered tactical aspects of military fuel sustainability, and demonstrated their low priority. The lack of priority from organisations such as the DFMC to address tactical fuel concerns; the lack of policymaker focus on fuel supply for current operations given the successful achievement of the necessary fuel supply through US and

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<sup>209</sup> Fred Bennett, 'The Seven Deadly Risks of Defence Projects', *Security Challenges*, 6/3 (Spring 2010), 104.

<sup>210</sup> Graeme Cheeseman, *Over-reach in Australia's Regional Military Policy* (Peace Research Centre, Working Paper No. 71, Australian National University, August 1989), 10-12.

<sup>211</sup> Department of Defence, *Defence Annual Report 2009-10 Volume 2, Defence Materiel Organisation* (Commonwealth of Australia, 2010), 90.

<sup>212</sup> Greg Combet, *Joint Fuels Information Management System Contract Signature* (Minister for Defence Material Media Release 7/08, 27 February 2008).

<sup>213</sup> Jason Clare, *Parts of Next Generation Fighter Planes to be Built in Bankstown* (Minister for Defence Material Media Release, 2 February 2011).

commercial support; the potential reluctance for Defence to be seen as a key stakeholder in discussions such as the 2019 review of Australian national fuel holdings; the transition of the legislation relating to emergency prioritisation of fuel away from a military focus; and, the low priority of tactical fuel procurement within the IIP all pointed to a lower priority of tactical fuel provision when compared to the effort to solve domestic fuel governance problems. However, domestic fuel governance was only a marginally higher priority, with resources only allocated when there was no other option and when there was an obvious crisis. This low priority could be compared to the wake of World War Two when a potential existential threat was faced, and tactical aspects of fuel provision were given priority by policymakers.

This information will now be triangulated with other considerations relating to tactical aspects of military fuel sustainability – personnel management and science and technology.

### **Personnel supporting military fuel sustainability**

Chapter Two referred to the long-standing debate concerning civil-military relations. Smith wrote widely about the ‘military profession’ in Australia, highlighting that few tasks were the exclusive prerogative of the military, and this challenged a sense of military identity.<sup>214</sup> Fuel sustainability is not one of the few tasks exclusive to the military, and has always comprised significant commercial support. Whilst this chapter has outlined Defence’s efforts to improve fuel governance, aspects such as personnel management may further clarify the factors affecting military fuel sustainability.

Employment of fuel specialists is an enduring Defence requirement. The Services trained fuel specialists to perform tactical fuel provision and supply functions, and also to support some domestic fuel functions. Supporting the fuel practitioners are other military personnel such as career management staff.

The fuel provision trades in each Service are similar, with some Service-specific requirements. For example, the Army has a trade designated as ‘Operator Petroleum’, responsible for the supply and handling of bulk fuel, with tasks such as positioning fuel

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<sup>214</sup> Hugh Smith, ‘The Decline of the Military Profession in Australia?’, *Defence Force Journal*, 74 (January/February 1989), 7.

resupply facilities for vehicles and helicopters and conducting fuel quality control.<sup>215</sup> The commensurate Air Force trade positions fuel points for aircraft.

The external fuel reviews undertaken prior to 2014 regularly made comment on personnel training. However, these recommendations were often based on training for domestic tasks, rather than for deployed tasks.<sup>216</sup> For example, a 2013 review into training for military fuel sustainability arose from numerous audits and compliance shortfalls. This review was a major component of a Fuel Remediation Program, where the training for 'all components' of the Defence Fuel Supply Chain was re-evaluated. Training and currency for Defence fuel trades were found to have been neglected over a long period. The report identified that Navy refuelling personnel had a training gap of 67 per cent – of the 88 tasks expected to be performed, personnel only received formal training in 19 of the tasks. Navy also employed Australian Public Service refuelling staff, with some staff reporting that they had undertaken no formal training in over 20 years.<sup>217</sup>

Other reviews outlined training and skill deficiencies in military fuel sustainability for domestic tasks. The Wraith Review assessed, 'Defence has little organic fuels capability and skills', and the use of major contracting companies with generic skill sets (rather than niche specialists) compounded the problem.<sup>218</sup> However, this finding was inconsistent with several of the interviews conducted for this thesis. Senior military practitioners identified that tactical fuel operators were sufficiently trained, and did not believe that the Wraith Review recommendation was consistent with their own experiences.<sup>219</sup> Through the use of such language (in the Wraith Review) – an implication that all of Defence suffered from training shortfalls, rather than specifically the operators responsible for base fuel installations and other strategic functions – the Wraith Review perhaps inadvertently demonstrated a tension between strategic and tactical tasks, and

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<sup>215</sup> Interview with a senior representative from the Soldier Career Management Agency-Army, conducted on 14 February 2014.

<sup>216</sup> Interview with Warrant Officer Class One Jason Hartley, Conductor of Fuel, Headquarters 17<sup>th</sup> Combat Service Support Brigade (2019), conducted on 25 February 2019.

<sup>217</sup> Training Systems Services, *Interim Report: Review of Defence Fuel Training*, 1, 5.

<sup>218</sup> Spectrum Energy, *Australian Government Department of Defence: External Review Defence Fuel Supply Chain and Remediation Program*.

<sup>219</sup> Interview with Colonel Mark Baldock, G4 Headquarters Forces Command (2019), conducted on 20 February 2019; Interview with Brigadier Andrew Freeman, Commander 17<sup>th</sup> Combat Service Support Brigade (2018-2019), conducted on 18 February 2019; Interview with Lieutenant Colonel Neil Peake, Commanding Officer, 10<sup>th</sup> Force Support Battalion, conducted on 25 February 2019.

the relative organisational priority, with tactical tasks either a lower priority or not considered.

Advice from the Army's Soldier Career Management Agency indicated that the Army petroleum operator was at times a difficult trade to recruit into, compounded by inconsistent recruiting efforts, but numbers were satisfactory to meet existing and known tasks.<sup>220</sup> The commander of a large percentage of the petroleum operator trade described it as a 'hard and often dirty trade' with lengthy periods of tedium, although he believed that the trade was still reasonably postured to do the recent jobs it was asked to do.<sup>221</sup> Tactical commanders had confidence that personnel numbers were sufficient, and were also confident in training levels; a Commanding Officer highlighted that outdated equipment was more of a problem than insufficient training, at the tactical level.<sup>222</sup> Further, Defence fuel specialist trades were recently subjected to personnel reductions through Service-initiated efficiency reviews, where combat elements were not targeted for personnel reductions in the same review,<sup>223</sup> an example of the lower priority afforded to logistics identified in Chapter Two. Some military fuel personnel believed that this was concerning, because even with no pressure for petroleum operators to deploy forward into operational theatres, there were still concerns about the overall state of the trade. The trade would face significant challenges sustaining declared contingency operations from a bare base or a forward operating base in the nearer region.<sup>224</sup> An ongoing debate within Defence related to whether petroleum operators should be grouped centrally, or spread out to tactical units.<sup>225</sup>

Although a number of manageable concerns were present, there is a functional system in place to ensure tactical petroleum operators are available to support combat units for anticipated tasks. This was in contrast to the system in place for domestic fuel tasks prior to 2014. Less emphasis is placed on fuel specialists for higher-level management,

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<sup>220</sup> Interview with a senior representative from the Soldier Career Management Agency-Army, conducted on 14 February 2014.

<sup>221</sup> Interview with Brigadier Andrew Freeman, Commander 17<sup>th</sup> Combat Service Support Brigade (2018-2019), conducted on 18 February 2019.

<sup>222</sup> Interview with Lieutenant Colonel Neil Peake, Commanding Officer, 10<sup>th</sup> Force Support Battalion, conducted on 25 February 2019.

<sup>223</sup> Interview with a senior Army logistics officer, conducted on 4 March 2011.

<sup>224</sup> Interview with Mr Craig McConachy, Australian Fuel Contract Manager – Middle East and North Africa Region, conducted on 13 February 2019.

<sup>225</sup> Interview with Warrant Officer Class One Jason Hartley, Conductor of Fuel, Headquarters 17<sup>th</sup> Combat Service Support Brigade (2019), conducted on 25 February 2019.

capability development and acquisition, where decisions have long-term implications. The Director General Fuel Services Branch stated:

There is no organisational structure to allow the Australian Defence Force to regenerate military folks to be fuel 'experts'. We are getting better, but specialised Australian Public Servants are needed. The long term goal is to transition away from contractors performing these roles, but this cannot happen yet.<sup>226</sup>

Some military officers undertake aeronautical engineering degrees, either sponsored or through the Australian Defence Force Academy, and this degree has fuel and energy technology components. However, fuel is treated as a niche topic within this degree, and there was little likelihood that graduates would be employed in fuel supply functions.<sup>227</sup>

Non-qualified officers with no previous fuel sustainability experience fill some positions requiring expertise in fuel supply.<sup>228</sup> Army's only specialist fuel training for officers is a single posting in the United Kingdom, and there is little ability for military personnel to progress to senior ranks through this specialisation.<sup>229</sup> The one star officer appointed as Director General of Fuel Services for Defence may need to be extended in his current role in 2020 due to a limited number of personnel able to replace him.<sup>230</sup> This ad hoc training and limited opportunity for progression is different to other specialisations such as civil engineering, where graduates are often allocated to roles requiring expertise in that discipline, and have good progression prospects. It could reasonably be expected that degree-qualified engineers would be employed in fuel sustainability roles if it were a higher priority or if fuel sustainability became more of an operational problem, but such a shortfall is not necessarily a major problem if there is a primary expectation of Defence contributing to US-led operations rather than independent operations.

In an organisational sense, there is little evidence that officers filling fuel sustainability positions are treated as a critical component of the military profession. This observation

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<sup>226</sup> Interview with Air Commodore Stephen Winterton, Director General Fuel Services (2018-2019), conducted on 15 February 2019.

<sup>227</sup> Interview with a senior Royal Australian Air Force aeronautical engineer, conducted on 4 March 2011.

<sup>228</sup> Training Systems Services, *Interim Report: Review of Defence Fuel Training*, 8.

<sup>229</sup> Interview with a senior representative from the Soldier Career Management Agency-Army conducted on 14 February 2014.

<sup>230</sup> Interview with Air Commodore Stephen Winterton, Director General Fuel Services (2018-2019), conducted on 15 February 2019.



bears similarities to the findings of both Huntington and Janowitz, who wrote about the phenomena of military exceptionalism. They specifically addressed the different degrees of exceptionalism present within military forces. For example, Huntington highlighted that military science and strategy were higher and more enduring skills and tasks than others such as tactics and logistics.<sup>231</sup> Janowitz highlighted that military tasks other than high-end combat, such as policing, were held in lower esteem.<sup>232</sup> This challenged what some perceived to be a 'military identity.'<sup>233</sup> Huntington was specific about this issue, questioning whether functions other than combat forces were professional in the military, concluding that the 'management of violence' was the professional task that could not be undertaken by other professions. While skills such as logistics may be necessary to achieve the mission, Huntington considered them 'basically auxiliary vocations'.<sup>234</sup> The limited training and career progression prospects for personnel involved in military fuel supply is consistent with Huntington's conclusion about the military profession, and an expectation that logistics functions such as fuel supply will simply be provided for military operations should they be required.

Without a consistent flow of degree-qualified fuel specialists, Defence relies on external expertise for some functions, and the production of key military fuel sustainability policy has been undertaken outside Defence.<sup>235</sup> If fuel was an important part of defence policy, such external contracting (or a lack of ability to scrutinise the work of external organisations) would be unlikely. To remediate Workplace Health and Safety risks, it is notable that senior military personnel were assigned the responsibility.

In summary, maintenance of fuel specialists was a necessary but relatively low personnel priority for Defence, with the number of personnel maintained at a level that could satisfactorily achieve existing tasks. The tactical provision of fuel is prioritised relatively higher than the senior management or capability acquisition appointments, but neither task is considered exceptional, because those tasks are not exclusive to the military and are pragmatically made a lower priority, they do not involve the management of violence, and they potentially can be expanded if necessary. This chapter now turns to the

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<sup>231</sup> Samuel Huntington, *The Soldier and the State* (Harvard University Press, 1957), 71.

<sup>232</sup> Morris Janowitz, *The Professional Soldier* (Free Press, New York, 1971), 419.

<sup>233</sup> Smith, 'The Decline of the Military Profession in Australia?', 5.

<sup>234</sup> Huntington, *The Soldier and the State*, 11-12.

<sup>235</sup> Defence Fuel Management Committee, *Minutes* (Meeting at Russell Offices, Canberra, 22 June 2010), 1-2.

treatment of fuel sustainability in scientific development to further understand the priority of military fuel sustainability.

### **Military fuel sustainability science and research**

The regular involvement of the Defence Science and Technology Group (DSTG) – formerly known as the Defence Science and Technology Organisation (DSTO) – in military-related fuel research suggests an area that has academic interest and where research offers a perceived benefit to Defence. However, a lack of organisational coordination of fuel technology research is apparent, further reflecting a lack of Defence priority into military fuel sustainability (and consistent with previous examination of equipment procurement and personnel management).

The DSTG mission is to apply science and technology to protect and defend Australian interests, providing expert impartial advice and innovative solutions, meeting the specific demands of Defence.<sup>236</sup> There are numerous reasons why DSTG undertakes research into an area of Defence interest; for example, to inform a discrete military procurement, or to support Australian industry to develop certain equipment, or because it meets a researcher's specific interests. There is also a requirement for DSTG's efforts to be coordinated. A previous Chief Defence Scientist argued, 'Today we are less interested in specific product development and more focused on finding total solutions...Our defence scientists today take a systems-based approach'.<sup>237</sup> There is limited evidence of a systems-based approach to fuel.

Development of energy and fuel technology is part of the DSTG mission. Power and Energy was established as a 'Corporate Research Initiative' in 2008, although notably, power and energy were not considered 'Priority Industry Capabilities' by the Rudd Government in 2009 – priority industries being those considered 'strategically significant'.<sup>238</sup> DSTG was the organisation 'responsible for coordinating research and providing specialist scientific advice' on military fuel sustainability, partnering with scientific bodies from countries such as the US and civilian organisations such as the Commonwealth Scientific and Industrial

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<sup>236</sup> Defence Science and Technology Organisation, *Introducing the DSTO* (Canberra, 2010), 2-3.

<sup>237</sup> Peter Donovan, *Anticipating Tomorrow's Defence Needs: A Century of Australian Defence Science* (Commonwealth of Australia, 2007), v.

<sup>238</sup> Department of Defence, *Priority Industry Capabilities* (Defence Materiel Organisation, Fact Sheet, July 2009), 3-4.

Research Organisation.<sup>239</sup> This is an appropriate and potentially useful role, particularly given the importance of fuel technology to the outcome of major twentieth century conflicts, outlined in Chapter Two.

The recent higher organisational priority and clearer military fuel sustainability accountabilities vested in CJLOG improved collaboration between DSTG and military fuel sustainability practitioners, and improved the coordination of DSTG research into fuel. The Director General Fuel Services stated, 'DSTG is very focused on supporting Fuel Services Branch and the Services,' and the Fuel Services Branch funding applied to some DSTG research facilitated some organisational coherence. Where budgetary prioritisation was required, DSTG collaborated with the Fuel Services Branch and other partners. Further, the Director General highlighted several collaborative projects with DSTG that proved cost effective and useful.<sup>240</sup> The recent prioritisation of research into thermal and storage stability was closely aligned with the introduction of the Joint Strike Fighter.<sup>241</sup>

However, there was other evidence that DSTG did not have the capacity to support prioritised fuel research, with challenges supporting major projects, and with fuel expertise diffused through DSTG.<sup>242</sup> The lack of formal links between different fuel research teams suggested more coordination may be possible or desirable.<sup>243</sup> Further, DSTG fuel research teams did not provide direct input into Defence's recent major capital acquisitions, suggesting a limit on their level of influence, coordination and resourcing.<sup>244</sup>

It is reasonable to assess that there was improved DSTG prioritisation after 2014, as domestic aspects of military fuel sustainability also saw improved coherence, although it is too soon to determine if improved prioritisation will eventually lead to significant organisational outcomes, particularly if resources become constrained, because fuel research is historically not well coordinated within Defence.

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<sup>239</sup> Senate Standing Committee on Foreign Affairs, Defence and Trade, *Defence Submission to Joint Standing Committee on Foreign Affairs, Defence and Trade Inquiry into the Defence Annual Report 2007-08*, 6.

<sup>240</sup> Interview with Air Commodore Stephen Winterton, Director General Fuel Services (2018-2019), conducted on 15 February 2019.

<sup>241</sup> Interview with Dr Paul Rawson, Defence Science and Technology Group Aerospace Division, conducted on 21 March 2019.

<sup>242</sup> Interview with Major General David Mulhall, Commander Joint Logistics (2017-2019), conducted on 26 February 2019.

<sup>243</sup> Interview with Dr Paul Rawson, Defence Science and Technology Group Aerospace Division, conducted on 21 March 2019.

<sup>244</sup> Ibid.

Prior to 2015, there was noticeable activity, but limited evidence of coordination of scientific and research efforts into fuel. For example, a DSTG presentation at the 2013 Defence Fuels Seminar highlighted that a goal of the Power and Energy program was to see energy considerations and solutions incorporated into the capability development and life cycle sustainment processes – in the process, highlighting that the desired coordination was not apparent, five years after the DSTG program was established.<sup>245</sup> Similarly, the link between DSTO and the DFMC was declared to be ‘enhanced’ in 2010, and several ‘focus areas’ were identified,<sup>246</sup> but there was no evidence that coordination improved as a result.

For over 30 years, DSTG scientists periodically undertook piecemeal research into fuel and energy technology. An early example was a 1981 study recommending the examination of wind turbines to mitigate the risk from shortage and rising cost of non-renewable energy sources.<sup>247</sup> The rising US military interest in alternative energy in the 1970s resulted in a significant increase in available information for DSTG researchers.<sup>248</sup>

DSTG conducted numerous studies relating to fuel technology with military applicability. Although a number were unique scientific studies in their own right, and there were different legitimate reasons why studies were initiated, there was little or ambiguous organisational guidance apparent for most of these studies, many of which were initiated by the individual DSTG scientists (or their internal branches) as discrete projects. For example, in an interview with a DSTG scientist who undertook a fuel related study in 2009, Dr Chris Hulston indicated that DSTO initiated a research program into alternate fuels because there was significant academic and commercial interest, and DSTO sought to influence industry to support the technical and certification requirements for certain

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<sup>245</sup> Kevin Gaylor, *Power and Energy as a Defence Capability Enabler* (Defence Science and Technology Organisation, Presentation, 2009), Slide 2.

<sup>246</sup> At the 2010 Defence Fuel Management Seminar at the Royal Military College, Canberra, held on 24 August 2010, a DSTO representative outlined priority areas for research, which included modelling the fully burdened cost of fuel, decreasing maritime fuel use, developing alternative energy for land systems in partnership with commercial organisations, and developing fuel systems for unmanned capabilities.

<sup>247</sup> M.L. Robinson, ‘The Darrieus Wind Turbine for Electrical Power Generation’, *Aeronautical Journal* (June 1981), 244. Whilst Robinson did not advocate wind turbines specifically for military use, the author’s research was sponsored by DSTO.

<sup>248</sup> US studies such as Joseph Breen, ‘Energy, America, and the Military: Can we get there from here?’, *Air University Review* (November-December 1980); Battelle Pacific Northwest Laboratories, *An Analysis of Federal Incentives to Stimulate Energy Production* (USA, February 1980), examined the perceived risk of fuel supply problems for the US military.

fuels.<sup>249</sup> The fact that research into alternative fuels was discontinued was an indication of the policy to follow the US lead on this technological development.<sup>250</sup>

Demonstrating more effective organisational coordination, another DSTG scientist, Dr Andrew Scardino, indicated that he initiated research in 2008 to remove fouling from Navy vessels at the Navy's request, because the price of oil was high at the time – a cost saving measure. This research program is ongoing, with the Navy still interested in minimising transit costs for its vessels with less fouling present.<sup>251</sup>

While the mission of DSTG stated that it would meet the specific needs of Defence, this implies that Defence would inform DSTG of its specific priorities, rather than exclusively relying on DSTG to develop its own view of Defence requirements. It is important for DSTG to identify emerging technology with military relevance, but in many cases, DSTG scientists have acted on their own initiative to develop or analyse fuel technology. Despite a DSTG desire to raise the priority of military fuel sustainability,<sup>252</sup> including a long-term goal to raise Power and Energy as a Defence Fundamental Input into Capability,<sup>253</sup> it is clear that fuel technology research prior to 2014 occurred with varied levels of Defence or government direction.

Further, the pre-2014 fuel technology studies were initiated by and conducted in different DSTG Divisions. These included Ship Structures and Materials Division,<sup>254</sup> Weapon System

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<sup>249</sup> Interview with Dr Chris Hulston, Defence Science and Technology Group Maritime Division, conducted on 25 February 2019.

<sup>250</sup> Interview with Dr Paul Rawson, Defence Science and Technology Group Aerospace Division, conducted on 21 March 2019.

<sup>251</sup> Interview with Dr Andrew Scardino, Defence Science and Technology Group, conducted on 26 February 2019.

<sup>252</sup> Interview with Dr Kevin Gaylor, Defence Science and Technology Organisation, conducted on 13 December 2010. Dr Gaylor argued that DSTO was examining fuel technology because of the potential future implications for Defence, not because Defence had sought comprehensive examination of the issue.

<sup>253</sup> Kevin Gaylor, *Power and Energy as a Defence Capability Enabler*, Slide 3.

<sup>254</sup> The studies by Gregory Clark, *Conceptual Study on Replacing the Raven Back Pack Radio Batteries with a Solid Polymer Fuel Cell* (Defence Science and Technology Organisation, DSTO-TN-0014, Melbourne, 1995), on replacing radio batteries, and Peter Mart and Jenny Margeridis, *Fuel Cell Air Independent Propulsion of Submarines* (Defence Science and Technology Organisation, DSTO-GD-0042, Melbourne, May 1995), on submarine propulsion, were conducted in Ship Structures and Materials Division.

Research Lab,<sup>255</sup> Maritime Platforms Division,<sup>256</sup> Maritime Systems Division,<sup>257</sup> Undersea Platform Systems,<sup>258</sup> Land Operations Division,<sup>259</sup> the Fuels and Lubricants Section,<sup>260</sup> and the Science Planning and Coordination Division.<sup>261</sup> While each Division reasonably had an interest in fuel research, no coordinating function was present.<sup>262</sup> Piecemeal research was of less military value. Collaboration with external organisations such as the Commonwealth Scientific and Industrial Research Organisation was also piecemeal,<sup>263</sup> with Commonwealth Scientific and Industrial Research Organisation links described as ‘frequent informal contact’.<sup>264</sup>

The premise of some of the earlier DSTG research into fuel technology was imprecise. For example, Dr Peter Mart recommended the investigation and development of an air independent propulsion system for submarines should the Australian Government purchase additional Collins Class submarines.<sup>265</sup> In an interview, Dr Mart indicated that the politics around the Collins Class submarine development, and the unwillingness of the Howard Government to accept any additional risk with that capability, resulted in the study losing relevance, but the study continued for some time after.<sup>266</sup> Prior to this,

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<sup>255</sup> The study by M.L. Robinson, ‘The Darrieus Wind Turbine for Electrical Power Generation’, on wind turbines was conducted in Weapon Systems Research Lab.

<sup>256</sup> The study by Lyn Fletcher and Andrew Scardino, *Reducing Fuel Demand for Maritime Forces* (Defence Science and Technology Organisation, Presentation, South Australia, 2008), on reducing maritime fuel demand was conducted in Maritime Platforms Division.

<sup>257</sup> The presentation by Chris Hulston and Sonja Jenkinson, *Certification and Approval* (Presentation to the Future Fuels for Defence Capability Seminar, Canberra, May 2009), on certification and approval of non-petroleum feedstocks, was developed within Maritime Systems Division.

<sup>258</sup> The presentation by Gaylor, *Power and Energy as a Defence Capability Enabler*, was developed within the Undersea Platform Systems.

<sup>259</sup> The study by Peter Dortmans, *Alternative Fuels and Propulsion Systems: Some Technology Trends and Possible Future Implications for the Future Army* (Defence Science and Technology Organisation, DSTO-TN-0551, South Australia, 2004), on alternative fuels and propulsion was conducted in Land Operations Division.

<sup>260</sup> The presentation by Chris Hulston and Sonja Jenkinson, *Certification and Approval* (Presentation to the Future Fuels for Defence Capability Seminar, Canberra, May 2009), on algal fuels was developed within the Fuels and Lubricants Section.

<sup>261</sup> The study by Jennifer Palmer, ‘Addressing Energy as a Military Cost’, *Australian Defence Force Journal*, 178 (2009), on addressing energy as a military cost was conducted in the Science Planning and Coordination Division, and was supported by members of the Air Vehicles Division.

<sup>262</sup> Interview with Dr Kevin Gaylor, Defence Science and Technology Organisation, conducted on 13 December 2010.

<sup>263</sup> Commonwealth Scientific and Industrial Research Organisation, *Flexible Integrated Energy Device* (Future Energy Issues for Defence Capability Seminar, Canberra, 7 May 2009), 1, outlined an alternate energy technology applicable to military operations.

<sup>264</sup> Interview with Dr Paul Rawson, Defence Science and Technology Group Aerospace Division, conducted on 21 March 2019.

<sup>265</sup> Mart and Margeridis, *Fuel Cell Air Independent Propulsion of Submarines*, ES2.

<sup>266</sup> Interview with Dr Peter Mart, Defence Science and Technology Group Maritime Division, conducted on 27 February 2019.

propulsion was listed nearly 20 years earlier in the 1976 White Paper as an area for further investigation,<sup>267</sup> an example of an attempt at organisational coordination that was unsuccessful.

The long-standing DSTG involvement in fuel studies allowed policymakers to argue that DSTG was intimately involved in the process to improve fuel sustainability. For example, the Rudd Government's response to a Joint Standing Committee report indicated that DSTG was involved in Defence's efforts to promote alternative fuel use, and was involved in international forums for the same purpose.<sup>268</sup> However, with no serious political intent to adopt alternative fuels, and with alternative fuel studies eventually discontinued,<sup>269</sup> the limited nature of the DSTG studies indicated that the Rudd Government's response was overstated.

Greater organisational coherence for domestic aspects of military fuel sustainability appear to have improved DSTG coordination for fuel technology research after 2014, but it is too early to determine if this will be a permanent aspect of Australian military fuel sustainability, and DSTG resources remain thinly spread across a range of research interests. Despite a significant amount of sophisticated research, there was a historical lack of coordination and limited or shifting guidance to DSTG from Defence or the government. Although there was no sense that policymakers did not want DSTG to undertake fuel research, the lack of coordination was simply an indication of a lower organisational priority for military fuel sustainability.

This chapter will now consider whether there were any significant pressures on Defence to reduce the tactical consumption of fuel.

### **Reducing tactical fuel consumption**

Military logistics theorist Eccles highlighted the 'emergent fact that economics is the limiting factor in the development of a military defense system'.<sup>270</sup> Australian domestic military energy usage was regularly subjected to expenditure reduction pressures,

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<sup>267</sup> Department of Defence, *Australian Defence*, 49.

<sup>268</sup> House of Representatives, Joint Standing Committee on Foreign Affairs, Defence and Trade, *Report into the Defence Annual Report 2007-08* (Canberra, July 2010), 8, 10.

<sup>269</sup> Interview with Dr Paul Rawson, Defence Science and Technology Group Aerospace Division, conducted on 21 March 2019.

<sup>270</sup> Henry Eccles, *Logistics in the National Defense* (Naval War College Press Edition in the Logistics Leadership Series, Rhode Island, 1959), 8.

consistent with the commercialisation of many non-combat functions over previous decades.<sup>271</sup> This commercialisation has been regularly referred to as New Public Management, based on a neo-liberal agenda that was prevalent in public policy in Australia and in other Western countries since the 1970s.<sup>272</sup> The demand for a 'business-like culture' in cutting non-operational Defence costs was never far from the surface.<sup>273</sup> For example, the predominant outcome of the Wrigley Review from the 1990s was the implementation of expenditure reduction and privatisation measures (named the 'Commercial Support Program'), despite the predominant concern of the review being the nature of civil-military relations.<sup>274</sup> The implementation of New Public Management methodology across government has been analysed extensively.<sup>275</sup>

There was occasional budgetary pressure on fuel consumption and fuel sustainability equipment for domestic activities such as training. However, several interview participants described an attitude of fuel being 'treated as a free good' by combat personnel, with an expectation that fuel will just be provided when necessary.<sup>276</sup>

Defence expenditure on fuel was quite consistent in the past decade. In 2010-11, fuel expenditure was estimated to be 440.3 million dollars, approximately 2.5 per cent of the Defence budget.<sup>277</sup> In 2017, fuel expenditure was estimated at 430 million dollars per year, with the vast majority for domestic activities (more than 80 per cent).<sup>278</sup> Consequently, domestic fuel consumption was periodically viewed by some as an area to be targeted for efficiencies, albeit not in way that affected ongoing operations.

The 2009 Strategic Reform Program demonstrated a view that domestic fuel expenditure could be reduced when required. Domestic fuel expenditure was designated a 'non-

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<sup>271</sup> Richard Doyle, *Outsourced Procurement Training for Defence in Australia* (International Public Procurement Conference Proceedings, Canberra, 21-23 September 2006), 587, highlighted the long history of defence outsourcing and commercialisation.

<sup>272</sup> Laurence Lynn, *New Public Management: reform, change and adaptation* (Routledge, New York, 2006), 107.

<sup>273</sup> Department of Defence, *The Strategic Reform Program: Delivering Force 2030* (Commonwealth of Australia, 2009), 4.

<sup>274</sup> Alan Wrigley, *The Defence Force and the Community* (Australian Government Publishing Service, Canberra, 1990), 7.

<sup>275</sup> Lynn, *New Public Management: reform, change and adaptation*, 107.

<sup>276</sup> Interview with Colonel Mark Baldock, G4 Headquarters Forces Command (2019), conducted on 20 February 2019.

<sup>277</sup> Defence Fuel Management Committee, Minutes (Meeting at Russell Offices, Canberra, 16 March 2010), 1.

<sup>278</sup> Department of Defence, *Future Defence Fuel Network Implementation Strategy*, 5.



equipment procurement' cost to be reduced.<sup>279</sup> A 2010 DFMC meeting highlighted an in-year budget reduction of 110 million Australian dollars (2010 figures) for fuel in financial year 2009-2010. Further substantial reductions in the domestic fuel budget occurred in subsequent years.<sup>280</sup> Some argued that reductions often occurred because fuel usage was known to be regularly over-forecast in budget estimates,<sup>281</sup> which meant that fuel price fluctuations mostly had little impact. One interview participant, who asked for this comment to not be attributed, described Defence fuel forecasting as an 'Automatic Teller Machine', with underspends able to be redirected to higher priority uses.

Defence training was occasionally affected by a lack of fuel availability. Although there were scant details in the public domain, Exercise Pitch Black 2018, a major biennial, multinational air power training exercise which tested high intensity combat aircraft operations in multilateral coalitions (relating to Australian Strategic Defence Objectives),<sup>282</sup> experienced a break or shortfall in fuel supply towards the end of the activity. Combined with the fact that exercise objectives were complete, this may have influenced some exercise timing decisions.<sup>283</sup> Senator Molan believed that fuel incidents (one of contamination, one of excessive consumption) had affected two separate Exercise Pitch Black activities, and it was 'a joke' that the principle method of fuel supply for the activity needed to be 'a tanker moored in Darwin Harbour'.<sup>284</sup> Exercise Pitch Black fuel incidents were mentioned in a number of interviews, highlighting the challenges of supplying fuel even when there was time to forecast its consumption, and the potential impact in the event of fuel shortages.

In-year increases in fuel prices caused some budgetary adjustments for Defence. Major mid-financial year cycle budgetary reallocations occurred in 2009, with Air Force supplementing the Defence fuel budget by 43 million Australian dollars to allow for

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<sup>279</sup> Department of Defence, *The Strategic Reform Program: Delivering Force 2030*, 18.

<sup>280</sup> Defence Fuel Management Committee, *Minutes* (Meeting at Russell Offices, Canberra, 16 March 2010), 3.

<sup>281</sup> Interview with Colonel Mark Baldock, G4 Headquarters Forces Command (2019), conducted on 20 February 2019; Interview with Air Commodore Stephen Winterton, Director General Fuel Services (2018-2019), conducted on 15 February 2019.

<sup>282</sup> Department of Defence, *2016 Defence White Paper*, 72, 101.

<sup>283</sup> Interview with Air Commodore Michael Kitcher, Commander Air Combat Group (2018-2019), conducted on 20 February 2019.

<sup>284</sup> Interview with Senator Jim Molan, Senator for New South Wales (2018-2019), conducted on 7 March 2019.

expanded C-17 aircraft employment.<sup>285</sup> Some Air Force training was reduced, to minimise fuel expenditure, but with no immediate operational impact.<sup>286</sup>

The Navy demonstrated some sensitivity to rising fuel prices during training. With no suggestion of a reduction in resources for operational tasks, ship commanders were directed (for a short period) to reduce transit speeds for non-operational journeys. Maximum speed was only allowable in certain circumstances, to reduce expenditure on fuel.<sup>287</sup> Some minor fuel efficiency measures were part of the 2009 Strategic Reform Program, such as the advertised Navy 'Reform Success Story' to reduce fuel consumption by removing hull and propeller fouling (hardened marine growth on vessels).<sup>288</sup> As the Service with the lowest consumption, Army did not make any substantial fuel consumption reductions during the same period. The relative importance of fuel sustainability to the three Services changed since World War Two, and will be discussed in detail in Chapter Six, with the case study highlighting the magnitude of the difference between Air Force and Army fuel consumption.

Defence was subject to some fuel procurement constraints that commercial entities were not and this minimally affected some domestic activities. For example, Defence was legislatively constrained from adopting cost reduction measures that some commercial entities were able to undertake, such as amortising in the market or accepting long-term fixed prices for energy past a financial year.<sup>289</sup> Depending on fuel prices, this was sometimes detrimental. Conversely, financial year 2009-2010 highlighted an 80 million dollar (2009 figures) underspend on fuel, due to price changes.<sup>290</sup> Price variations were compounded by a lack of accurate knowledge of Service fuel consumption, operational holdings and strategic reserves,<sup>291</sup> however the recent improvement to fuel governance

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<sup>285</sup> Defence Fuel Management Committee, *Minutes* (Meeting at Russell Offices, Canberra, 22 June 2010), A-2.

<sup>286</sup> In a presentation to the Australian Defence College at Weston Creek on 9 March 2010, a senior Air Force officer stated that operational capability had previously been affected by high oil prices, with aircraft flying hours (for training) restricted to reduce expenditure on occasion, but with no operational effect.

<sup>287</sup> Interview with Mr Andrew Gillespie, Director of Strategic Fuel, conducted on 26 November 2010.

<sup>288</sup> Department of Defence, *Reform Success Story – Saving Money at the Bowser* (Royal Australian Navy, April 2011), 1.

<sup>289</sup> A senior Air Force officer made this point in a presentation to the Australian Defence College on 25 March 2010.

<sup>290</sup> Defence Fuel Management Committee, *Minutes* (Meeting at Russell Offices, Canberra, 1 December 2009), 2.

<sup>291</sup> Defence Fuel Management Committee, *Minutes* (Meeting at Russell Offices, Canberra, 26 August 2009), 3.

reduced this as an ongoing risk. The lack of specific knowledge on fuel expenditure was an indication of fuel being a low priority, and of a low price sensitivity for fuel in some areas within Defence. The centralisation of fuel accountabilities under Joint Logistics Command is likely to allow expenditure to be more closely managed.

*Pressure on fuel consumption relating to environmental performance*

Chapter Two highlighted numerous commentators who argued Defence should limit its environmental impact, through either reducing fuel consumption or by using more alternative fuels. Chapter Two identified the frequent *conflation* of national environmental arguments with military fuel sustainability, despite some key differences.

This line of argument was not confined to Australian commentary. Defence's approach to climate change and fuel consumption was raised on numerous occasions in the Australian Parliament. In 2018, Defence came under scrutiny during a Senate References Committee review of the national security implications of climate change. This committee examined in detail the realistic possibility that Defence may respond more frequently than in the past to climate change-related events. However, as was common in the literature, the committee extrapolated this reasonable possibility, to recommend that Defence set ambitious targets for its own emissions and operational fuel consumption reductions. A formal recommendation was:

...that the Department of Defence establish emissions reductions targets across stationary and operational energy use, and report against these in its annual report.<sup>292</sup>

This recommendation was split along political party lines, with coalition senators raising their objection to internal reductions targets for Defence in a separate submission,<sup>293</sup> lending some weight to Thomas' view that Defence as an apolitical institution faced many challenges from a deeply partisan climate change debate.<sup>294</sup>

The logic of the formal recommendation was dubious. The final report indicated broad acceptance of the fact that Defence emissions and fuel consumption was 'a drop in the

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<sup>292</sup> The Senate Foreign Affairs, Defence and Trade References Committee, *Implications of climate change for Australia's national security* (Commonwealth of Australia, May 2018), viii.

<sup>293</sup> Ibid, 97, 101.

<sup>294</sup> Michael Thomas, *Climate Securitization in the Australian Military* (Refereed paper presented to the Second Oceanic Conference on International Studies, University of Melbourne, 9-11 July 2014), 15.

ocean’ compared to national figures, and that ‘military vessels contribute a relatively small proportion of greenhouse gas emissions compared to civilian fleets’. However, participants in the committee continued to raise arguments such as, ‘there is no reason why Defence should not set an ambitious target in terms of moving towards alternative fuels’. The Senate report indicated that ‘submissions focused on how the major (government) emitter, Defence, could reduce its emissions’.<sup>295</sup>

Such a significant and overstated focus on the nationally insignificant level of Defence greenhouse gas emissions was an indication of the lens through which many of the review participants viewed the problem – Defence was simply another emitter. The only non-Government department participants (in the review) were entities with little involvement in military affairs and with fundamental organisational aims to reduce greenhouse gas emissions. Participant organisations were the Climate Council, the Australian Council for International Development, Oxfam Australia, ActionAid Australia, Breakthrough-National Centre for Climate Restoration, and the Centre for Policy Development. The final lengthy inquiry report did not indicate the presence of any alternative perspectives, such as that a reduction in fuel consumption for operational use could reduce military performance. The focus was also indicative of the trend identified in Chapter Two, where military fuel sustainability was often *isolated* from broader defence policy.

The current Australian Defence Force Chief of Joint Operations was a senior Defence representative at the inquiry. When asked in an interview how the committee came to that specific recommendation, he indicated that the committee’s perspective was that ‘every little bit helps’ (in terms of greenhouse emissions reduction), and that as a Government department, Defence had to ‘set the right example as a responsible environmental citizen’.<sup>296</sup> In other words, the perception of Defence being seen to be contributing was a strong incentive for the recommendation to be formally made.

In response to this line of argument, Defence was imprecise in identifying the actions that it had taken, or was planning, with vague undertakings of future action.<sup>297</sup> The incentives

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<sup>295</sup> The Senate Foreign Affairs, Defence and Trade References Committee, *Implications of climate change for Australia’s national security*, 58-62.

<sup>296</sup> Interview with Air Marshal Mel Hupfeld, Commander Joint Operations (2018-2019), conducted on 25 February 2019.

<sup>297</sup> The Senate Foreign Affairs, Defence and Trade References Committee, *Implications of climate change for Australia’s national security*, 55-59.

for Defence to take this approach were clear; by stating a reasonable alternative perspective – that Defence should not be compelled to seek ambitious operational fuel consumption reductions because it was an emitter of such low national significance and the exceptional military mission should not be compromised – Defence could open itself to criticism.

Within the 2018 inquiry, Defence made many imprecise statements alluding to action on emissions reduction being taken, but without tangible results identified. Among many other statements, Defence was ‘progressively embedding climate change in its core business functions’; was ‘considering the impact of climate change in its policy settings’; was ‘reviewing its investment business processes...to ensure...adequate consideration of climate change’; ‘will continue to incorporate climate change into existing risk frameworks’; ‘will incorporate input from agencies monitoring changes in biophysical geography...into capability development planning and risk assessment processes’; was ‘exploring renewable energy generation options and reducing carbon emissions’; and was ‘pursuing best practice in delivering energy to bases’.<sup>298</sup> Defence deflected criticism from an issue that was not a priority and had the potential to reduce operational effectiveness, and from an inquiry that did not fully acknowledge the exceptional military mission and treated military operations simply as another source of emissions.

The pattern of pressure being applied to Defence to reduce fuel and energy consumption, and Defence providing non-committal responses, was repeated over a number of years.

A 2009 Joint Standing Committee review into a Defence Annual Report made similar criticisms of Defence relating to energy security and climate change. The final report stated, ‘Defence’s current policy (relating to alternative fuel usage) does not sufficiently protect Australia’s defence capability against foreseeable risk’, and it questioned Defence’s commitment to carbon reduction given it had ‘a large discretionary budget’.<sup>299</sup>

Similar to the 2018 inquiry, Defence made non-specific commitments and identified actions that entailed little organisational commitment. For example, Defence stated, ‘the Defence Science and Technology Organisation is (the) capability developer on the suitability of alternative fuels for Defence platforms’, and had ‘recently completed a study’

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<sup>298</sup> Ibid.

<sup>299</sup> Joint Standing Committee on Foreign Affairs, Defence and Trade, *Review of the Defence Annual Report 2007-2008* (Commonwealth of Australia, Canberra, October 2009), 103-111.

relating to fuel demands. Further, the Defence Science and Technology Organisation 'is a partner with the United States, the United Kingdom and Canada in a Study Group examining military power and energy requirements'.<sup>300</sup> A formal Rudd Government response to the 2009 review highlighted the importance of the DFMC. It stated that Defence's oil shock preparedness was being addressed by the 2008 establishment of the DFMC, adopting a 'Whole-of-Defence approach to fuel management'. Again referring to the DFMC, the Rudd Government advised, 'Defence has established a number of bodies as a response to the raising (sic) cost of oil, as well as to examine potential alternative fuel options'.<sup>301</sup>

In reviewing the performance of the DFMC, this chapter previously identified that the DFMC had ensured greater efficiency in domestic fuel sustainability and had implemented a number of important governance actions. However, it was simply not resourced to achieve the wide remit contained within its terms of reference. Specifically relating to alternative fuel and oil shocks, there was no evidence that substantive outcomes were achieved. Whilst it is not unreasonable to expect an organisation to fill more than one role, the number of stated DFMC responsibilities greatly exceeded the capacity of the (then) three Directorate of Strategic Fuel public servants to achieve.

Therefore, although it is possible that the Rudd Government informed the Joint Standing Committee that the DFMC was working on these issues because it believed that it would be able to achieve important outcomes, it is more likely that the DFMC was identified to deflect any immediate criticism. This research found no criticism of the DFMC in primary documents or in secondary commentary, and concluded that the government's referral of tasks to the DFMC (and also to the Defence Science and Technology Group) occurred for reasons of *politicisation* (identified in Chapter Two), and there was little follow up scrutiny of Defence's actions to gauge their efficacy.

Through policy documents, Defence regularly sought to limit accusations of negative environmental impact relating to fuel usage. The 2009 White Paper described Defence's aim of 'leaving a positive (environmental) legacy for future generations'.<sup>302</sup> Defence once

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<sup>300</sup> Ibid.

<sup>301</sup> Department of Defence, *Joint Standing Committee on Foreign Affairs, Defence and Trade, Report into the Defence Annual Report 2007-08: Government Response* (Australian Government, 2010), 8.

<sup>302</sup> Department of Defence, *Defending Australia in the Asia Pacific Century* (White Paper, Commonwealth of Australia, 2009), 122.

even highlighted that it would ‘minimise its environmental footprint’ in the conduct of overseas operations,<sup>303</sup> a claim not repeated so strongly in subsequent environmental documentation.<sup>304</sup> The Royal Australian Air Force goal of minimising the amount of fuel aircraft dumped before landing was presented in the Defence Environmental Strategic Plan 2006-2010, with no identified success metrics, and the aspiration was caveated ‘where operationally feasible’.<sup>305</sup> The second highest ‘environmental risk’ identified in the Defence Environmental Strategic Plan 2006-2009 was ‘public outcry at the local, regional and national level as a result of poor environmental performance’.<sup>306</sup> This risk was clearly not an environmental risk at all, but a perception concern that Defence sought to mitigate.

There ultimately appeared to be little expectation that Defence could actually achieve significant national benefit in environmental improvement through reducing fuel consumption. The Vice Chief of Defence Force Group ran an extensive ‘Global Change Seminar Series’ in 2013, asking prominent military, political, business and academic leaders to discuss the role of Defence in aspects of climate change and crude oil depletion. Few specific points about what Defence could do, apart from contribute to a whole-of-society effort, were raised. In a large presentation (during this Seminar Series) on the risk associated with global supply chains, a single slide identified that Defence should understand its supply chains and stockholdings, but that ‘much is outside Defence’s control – hence the need for your broad based support to address the issues...it will be a team effort across Government and Industry’.<sup>307</sup>

In summary, several parliamentary reviews and inquiries sought excessive actions from Defence, with limited justification or with skewed external representation, particularly to take actions such as reduce fuel consumption or transition tactical forces to alternative fuels. In response, Defence and the Government of the day used non-committal language, and referred to nascent or exploratory actions undertaken by organisations within Defence, to avert attention from an issue that was not a priority and from a lack of

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<sup>303</sup> Department of Defence, *Defence Environmental Strategic Plan 2010-2014* (Canberra, November 2010), 5.

<sup>304</sup> Department of Defence, *Environmental Strategy 2016-2036* (Canberra, June 2016).

<sup>305</sup> Department of Defence, *Defence Environmental Strategic Plan 2010-2014*, 16.

<sup>306</sup> Department of Defence, *Defence Environmental Strategic Plan 2006-2009* (Canberra, 2006), 11.

<sup>307</sup> John Blackburn, *Global Supply Chain Risks* (Presentation to the Vice Chief of Defence Force Global Change Seminar Series, Canberra, 28 February 2013), Slide 17.

progression in the areas that were identified. This dynamic was relevant as a factor that influenced perceptions of military fuel sustainability.

The minimal reduction in fuel usage, based on external pressures, can be compared to the pressure on other types of energy used in domestic installations, and Chapter Two noted the blurring in the literature between tactical fuel consumption and energy for domestic consumption. The delineation is important. Chapter Five will identify that legislation and Executive Orders in the US resulted in actions to reduce domestic military energy consumption,<sup>308</sup> but these domestic actions were often justified by questionably linking tactical fuel supply assurance. Similarly in Australia, an important catalyst that compelled actions to be taken to reduce Defence energy consumption was government legislation and policy, imposed on Defence.<sup>309</sup>

Some commentators argued that targeting non-operational energy consumption was likely to see the greatest expenditure reduction benefit for Defence,<sup>310</sup> and this perspective was shared within Defence. Policy and resource allocation reduced Defence's energy expenditure at various times, noting that in a wider context, Defence energy consumption was estimated to be only 0.42 per cent of total national energy consumption in 2014;<sup>311</sup> while Defence did not consolidate its energy consumption figures over time, Defence's total annual energy consumption is approximately 17 million Gigajoules.<sup>312</sup> Senator Molan described Defence's energy usage as 'miniscule' in national terms.<sup>313</sup> Defence (fairly) portrayed a sense of being a small and non-influential energy consumer in a country where the Government and some commercial entities had significant influence in international energy markets.<sup>314</sup>

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<sup>308</sup> Anthony Andrews, *Department of Defense Facilities Energy Conservation Policies and Spending* (United States Congressional Research Service, Washington, D.C., 19 February 2009), Summary Page.

<sup>309</sup> Robert Lean, *Future energy issues for Defence capability* (Presentation, Directorate of Climate Change and Sustainable Development, Canberra, 2010), Slide 8, discussed the impact of carbon pricing on Defence.

<sup>310</sup> Anthony Bergin and Jacob Townsend, *A Change in Climate for the Australian Defence Force* (Australian Strategic Policy Institute, Special Report 7, July 2007), 6.

<sup>311</sup> Department of Defence, *Defence Estate Energy Strategy 2014-2019* (Commonwealth of Australia, 2014), 5.

<sup>312</sup> Ibid.

<sup>313</sup> Interview with Senator Jim Molan, Senator for New South Wales (2018-2019), conducted on 7 March 2019.

<sup>314</sup> Senate Standing Committee on Foreign Affairs, Defence and Trade, *Defence Submission to Joint Standing Committee on Foreign Affairs, Defence and Trade Inquiry into the Defence Annual Report 2007-08*, 4.



At various times, Defence implemented programs to improve energy efficiency and environmental management for some domestic facilities, with broad goals set to seek to reduce energy consumption over time. Cost reduction was consistently the principle goal.<sup>315</sup> For example, in 2003 a three-year energy efficiency program delivered a reduction in Defence's energy consumption of 456,408 Gigajoules.<sup>316</sup> A government report praised Defence for its 'highly commendable' improvement despite not meeting all prescribed goals.<sup>317</sup> The 2009 Strategic Reform Program sought reductions in energy expenditure.<sup>318</sup> Defence also reported a decrease in domestic energy usage in financial year 2014-2015 of 4.4 per cent compared to the previous year,<sup>319</sup> and a decrease of 0.13 per cent in financial year 2016-2017.<sup>320</sup> These reductions in domestic energy consumption were interspersed with consumption increases. For example, after outlining a commitment to reducing energy consumption, a Defence Annual Report indicated that Defence energy consumption increased by 13.9 per cent in 2015-2016 compared to the previous year.<sup>321</sup>

In summary, there were minor pressures, but no specific actions taken, to reduce fuel consumption for deployed elements on military operations for environmental reasons. Of greater relevance, policymakers viewed fuel expenditure as the price that needed to be paid to operate with the US in the Middle East, an operational model that could be sustained with much less effort and fewer resources when compared to independent operations in the nearer region. There were periodic efforts to reduce energy consumption costs for domestic fuel and energy usage, although given the low total energy consumption of Defence compared to national consumption, efficiency measures created some savings at times, but could not achieve the nationally significant improvements to environmental outcomes that some commentators forecast (identified in Chapter Two). Some fuel expenditure reduction measures that were implemented had an occasional impact on training, but with no indication that this affected military preparedness.

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<sup>315</sup> Department of Defence, *The Strategic Reform Program: Delivering Force 2030*, 18.

<sup>316</sup> Department of Defence, *Defence Public Environment Report* (Commonwealth of Australia, 2003), 13.

<sup>317</sup> Australian Greenhouse Office, *Energy Use in the Australian Government's Operations* (Industry, Communities and Energy Division, December 2003), viii.

<sup>318</sup> Department of Defence, *The Strategic Reform Program: Delivering Force 2030*, 18.

<sup>319</sup> Department of Defence, *Defence Annual Report 2015-16: Volume one – performance, governance and accountability* (Commonwealth of Australia, October 2016), 133.

<sup>320</sup> Department of Defence, *Annual Report 17-18*, 127.

<sup>321</sup> Department of Defence, *Annual Report 16-17*, 132.

## Conclusion

After World War Two, when Australian policymakers were concerned about the risk of existential conflict, military fuel sustainability was a high organisational priority. As the threat of existential conflict reduced, and as Australian military commitments were typically in support of US-led operations (where fuel supply was provided by the US or by commercial entities), military fuel sustainability became a lower priority.

Commander Joint Logistics led a significant effort to improve domestic fuel governance and accountabilities from 2014, with resources applied to reduce organisational risk. This major effort was a necessary priority, given the vast range of adverse review findings presented over the course of two decades. The post-2014 period was a high point for organisational interest in military fuel sustainability, but for specific non-operational reasons. The pre-2014 period demonstrated that organisations such as the DFMC were under-resourced for their declared purpose, as there was no organisational priority that required the resources to be provided, an indication of an operational model that anticipated support to US-led operations over independent operations.

Primary document analysis and semi-structured interviews indicated that notwithstanding the increased coherence for strategic and domestic fuel matters, the tactical aspects of military fuel sustainability remained a low priority. Despite the inability of tactical fuel units to meet major declared contingencies (examined in detail in Chapter Six), they could meet current tasks, and policymakers saw little risk with existing fuel supply arrangements, including in current operations in the Middle East. If resources were required by the military when they were really needed, there was a belief that the resources would be provided, and no operational scenario requiring rapid mobilisation of national resources was considered realistic in the short term.

Further, the triangulation of information relating to the procurement of fuel equipment, personnel management and research efforts demonstrated the relatively low priority of military fuel sustainability within Defence. None of those three areas was the subject of a deliberate attempt to under-resource fuel sustainability – it was just that fuel was prioritised lower than combat functions when resources were constrained. This was consistent with views of the twentieth century logistics theorists, and those commentators analysing fuel and logistics problems during INTERFET, identified in

Chapter Two. The lower priority of fuel, compared to combat functions, was also consistent with the reluctance of senior Defence personnel to take a strong stance on national fuel issues, such as mandated fuel stockholdings, because it was felt that advocating for a more robust national fuel stockholding policy could have seen the Defence budget come under threat to allow for an increase in national capacity.

Chapter Two observed that Australian literature focused on tactical risk and environmental risk associated with military fuel sustainability. The lack of action taken to improve tactical aspects of military fuel sustainability indicated that policymakers did not see the same level of risk, and faced more pressing challenges. Procurement of fuel from the US or other commercial entities for military operations was considered a non-fungible cost that policymakers were prepared to pay, similar to the implication in the introductory quote from General Patton. In comparison, broader domestic energy consumption was periodically subject to legislative and policy constraints, and cost-cutting measures. The periodic pressure on Defence to reduce fuel consumption to improve environmental outcomes resulted in no consequential action from Defence.

Conclusions from this chapter will be triangulated with subsequent chapters, to determine if this evidence remains consistent through different lenses, and to consider other factors affecting military fuel sustainability. Chapter Five will now consider US military fuel sustainability as a case study, to compare and contrast this to the Australian experience.

## **CHAPTER FIVE – MILITARY FUEL SUSTAINABILITY: UNITED STATES CASE STUDY, AND THE IMPLICATIONS FOR AUSTRALIA**

### **Introduction**

What our military understands is that if we're smart on energy, that saves Department of Defense budgets (allowing) them to do a whole bunch of other things.<sup>1</sup>

Chapter Four examined military fuel sustainability in the Australian Department of Defence (herein titled 'Defence') since the 1999 International Forces in East Timor (INTERFET) mission. Through primary document analysis and semi-structured interviews, Chapter Four found that there was limited organisational focus on the tactical aspects of Australian military fuel sustainability, and some significant shortfalls relating to fuel supply for nearer region independent operations. A series of adverse external reviews eventually led to an emerging focus on domestic fuel facilities, accountabilities and governance requirements,<sup>2</sup> but Chapter Six will demonstrate in practical terms the scale of the tactical fuel supply deficiencies.

These were not the only factors affecting Australian military fuel sustainability since INTERFET. This chapter will examine the closest Australian ally, the United States (US), and the actions of US policymakers taken to influence military fuel sustainability to determine if the US experience can be used as a model to further understand the Australian context. This chapter will identify some similarities in the respective approaches of the US and Australia, and will also contrast differences based on distinct strategic interests and anticipated contingencies. This case study data will be triangulated with Chapters Four and Six, in order to determine the key factors that have influenced Australian military fuel sustainability.

President Obama's 2012 quote (above) is representative of the regular political and military interest in US Department of Defense (US DoD) energy requirements in the

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<sup>1</sup> Quote from President Barack Obama, January 2012, in Donna Miles, 'Obama praises DoD's energy leadership, stewardship', *Air Force News*, [website], (27 January 2012), <<https://www.af.mil/News/Article-Display/Article/111794/obama-praises-dods-energy-leadership-stewardship/>>, accessed 30 March 2019.

<sup>2</sup> Interview with Major General David Mulhall, Commander Joint Logistics (2017-2019), conducted on 26 February 2019.

twenty-first century. President Obama is one of many US political leaders who have argued for improvements to US military fuel and energy sustainability, similar to the declared position of some Australian policymakers identified in Chapter Four. However, this chapter will argue that aspects of US military fuel sustainability and broader military energy requirements became *politicised*, a trend identified in Chapter Two, but such politicisation was rarely identified within the literature.<sup>3</sup> This US trend was important in the Australian context, with the regular suggestion that Australia should take more significant military fuel sustainability actions because the US was doing so.<sup>4</sup> This chapter characterises US actions to influence military fuel sustainability as incremental rather than revolutionary.

Some ambitious military fuel sustainability objectives for tactical forces were set during the Obama Administration (2008 to 2016), particularly by a former Secretary of Navy, Mr Ray Mabus.<sup>5</sup> Despite this, with fuel accounting for 75 per cent of all US DoD energy usage,<sup>6</sup> there were many aspects of tactical fuel provision that even the dominant military force in the world found difficult or undesirable to change.<sup>7</sup> The substantial amount of often repetitive publicly available information on the advances made in US military fuel sustainability did not mean that transformational military alternatives to reduce petroleum consumption or diversify into alternative sources for tactical operations had been found, or that US DoD fuel consumption had been reduced.<sup>8</sup> The Trump Administration changed the rhetoric about military fuel sustainability – effectively ignoring the issue in key strategic documents – but this chapter will consider whether the

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<sup>3</sup> Sandra Erwin, 'Pentagon's Influence in Green Energy Innovation Overestimated, Study Says', *National Defense Magazine*, [website], (28 March 2012), <<http://www.nationaldefensemagazine.org/articles/2012/3/27/pentagons-influence-in-green-energy-innovation-overestimated-study-says>>, accessed 20 March 2019, was a minor exception.

<sup>4</sup> Anthony Bergin and Zoe Glasson, *Implications of climate change for Australia's national security* (Submission 3 to Foreign Affairs, Defence and Trade Committee, 26 July 2017), 7.

<sup>5</sup> United States Government Accountability Office, *Defense Energy: Observations on DoD's Investments in Alternative Fuels* (GAO-15-674, Report to the Chairman, Committee on Armed Services, House of Representatives, July 2015), 13.

<sup>6</sup> United States Department of Defense, *Strategic Sustainability Performance Plan* (Washington, D.C., 20 September 2012), ES-6.

<sup>7</sup> Jerry Warner and Peter Singer, *Fuelling the Balance: A Defense Energy Strategy Primer* (Foreign Policy Paper Series No. 17, The Brookings Institution, Washington, D.C., 2009), 4, argued that there was a lack of institutional support, and no coherent military energy strategy.

<sup>8</sup> United States Department of Defense, *Fiscal Year 2017 Operational Energy Annual Report* (Office of the Under Secretary of Defense for Acquisition and Sustainment, B-2BEE8A1, 2018), 5-17.

rhetoric during the Obama Administration was overstated, given the incremental nature of the changes made to military fuel sustainability during his presidency.

The exceptional nature of the military will be considered in this chapter, including through an examination of high-level US DoD direction<sup>9</sup> and legislation to apply the ‘fully burdened cost of fuel’ – a proposed planning tool which incorporates both the nominal price of fuel and the price for distribution, security and conversion – in planning for new capability acquisition.<sup>10</sup> A common belief in military exceptionalism is prevalent in the US and Australia, demonstrated in the recent Afghanistan and Iraq conflicts, where no constraints were placed on substantial operational fuel expenditure and consumption,<sup>11</sup> despite the high number of US casualties suffered during fuel and logistics resupply missions.<sup>12</sup> The desire for the most technologically sophisticated military equipment (regardless of the fuel requirements), was of primary concern to both nations’ military forces, with no evidence uncovered in this thesis that the cost of fuel was ever an influence on US military operations. However, the clear US requirement to ensure a sustained fuel supply for deployed tactical forces anywhere in the world will be contrasted and triangulated with the lack of priority afforded to the tactical aspects of military fuel sustainability in Australia, outlined in Chapter Four.

US policy regularly highlighted concern about the US reliance on foreign energy suppliers, particularly for petroleum. These national level concerns were regularly extrapolated as equivalent concerns for the US DoD.<sup>13</sup> This thesis seeks to challenge the logic behind the direct *conflation* of national and military fuel issues, and this chapter will examine whether an exaggerated or unnecessary sense of concern about assurance of fuel supply for

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<sup>9</sup> Under Secretary of Defense (Acquisition, Technology and Logistics), *Fully burdened cost of fuel pilot program* (Department of Defense, Washington, D.C., 10 April 2007), 1-2.

<sup>10</sup> United States Defense Science Board, *More Capable Warfighting Through Reduced Fuel Burden* (Office of the Under Secretary of Defense for Acquisition, Technology and Logistics, Washington, D.C., January 2001), 15-16.

<sup>11</sup> Interview with Chief Warrant Officer Joel Lane, United States Central Command J4 Fuels Officer (2018-2019), conducted on 13 March 2019.

<sup>12</sup> The CNA Military Advisory Board, *Advanced Energy and US National Security* (Virginia, United States, 2017), 38.

<sup>13</sup> For example, Michael Hornitschek, *War Without Oil: A Catalyst for True Transformation* (Occasional Paper No. 56, Centre for Strategy and Technology, Air University, Maxwell Air Force Base, Alabama, 17 February 2006), 6.

military use was displayed.<sup>14</sup> The declared and long-standing concern about foreign petroleum suppliers (also prevalent in Australia) had only minor influence in changing tactical fuel supply behaviours, with reversion to the most expedient supply of fuel for military consumption wherever possible. This was demonstrated in the Middle East.<sup>15</sup> The same reversion to the most expedient supply was also evident in discussions about alternative fuel usage,<sup>16</sup> and this will be examined. Such reversion to expedient sources of supply indicated that the risk that the US DoD associated with foreign fuel supply was ultimately less problematic than some of the rhetoric suggested.

### **Relevance of US military fuel sustainability to Australia**

Chapter Three identified the need for case study research to avoid ‘examplimg’, where case studies could be chosen to confirm a specific theory.<sup>17</sup> The use of two separate and distinct case studies, with each of the case studies examining factors central to Australian defence policy, sought to avoid this risk. In regard to this chapter’s case study, the US alliance was fundamental to Australian defence policy since World War Two, and therefore US military fuel sustainability could not reasonably be considered a niche example chosen to establish a pre-determined outcome. Triangulation of this information with other data discovered in this thesis further reduced any chance of ‘examplimg’.

Examination of US military fuel sustainability is relevant to the Australian context for the following five reasons.

First, the decades-long alliance with the US remains central to Australian defence policy. The Ministerial foreword to the 2016 White Paper emphasised this, stating ‘An important part of the Government’s strategy is to continue to strengthen our alliance with the United States’,<sup>18</sup> and this theme was prevalent through all White Papers since the first was

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<sup>14</sup> Stephen Walt, ‘“Scary Monsters”: A Halloween Tribute List’, *Foreign Policy Online*, [website], (30 October 2009), <<http://foreignpolicy.com/2009/10/30/scary-monsters-a-halloween-tribute-list/>>, accessed 31 December 2018, discussed fear in US defense policy formulation.

<sup>15</sup> Interview with Chief Warrant Officer Joel Lane, US Central Command J4 Fuels Officer (2018-2019), conducted on 13 March 2019.

<sup>16</sup> For example, the discontinued plan to develop a ‘Hybrid Humvee’ after significant public attention. See Candace Lombardi, ‘Hybrid Humvee Coming Up Over the Horizon’, *CNET*, [website], (5 November 2009), <<https://www.cnet.com/news/hybrid-humvee-coming-up-over-the-horizon/>>, accessed 5 April 2019.

<sup>17</sup> Barney G. Glaser and Anselm L. Strauss, *The Discovery of Grounded Theory: Strategies for Qualitative Research* (Aldine Transaction, New Brunswick and London, 1967, Reprinted 2006), 5.

<sup>18</sup> Department of Defence, *2016 Defence White Paper* (White Paper, Commonwealth of Australia, 2016), 9.

released in 1976.<sup>19</sup> While military fuel sustainability was never a central consideration for the alliance, this chapter seeks to understand the influence of the alliance on Australian military fuel sustainability. Further, Chapter Two demonstrated that fuel became a relevant aspect of the military relationship between the US and Australian military forces during World War Two.<sup>20</sup> As Australia's closest ally, US military fuel sustainability actions remain an influence on Defence.

Second, demonstrating commitment to the alliance, Australian political leaders continually reinforced the fundamental need for military interoperability with the US, particularly for key equipment types such as maritime vessels and aircraft.<sup>21</sup> The US regularly declared its expectation that allies would maintain or improve interoperability, such as through seeking to procure US-manufactured military equipment.<sup>22</sup> Fuel interoperability was raised on occasion as an aspect of interoperability, such as in the Royal Australian Navy's efforts to ensure vessels could use US biofuel supply.<sup>23</sup> While fuel interoperability is not a prominent aspect of Australian interoperability efforts,<sup>24</sup> particularly due to the low priority afforded to logistics in Australia (identified in Chapter Two), ensuring that fuel supply can be received from the US is necessary for Defence, and is important for fuel supply in contemporary operations in the Middle East.<sup>25</sup> The procurement of US equipment, such as the Joint Strike Fighter, reinforced interoperability between the two military forces, including for fuel.

Third, the US and Australia both require fuel to be available for military operations conducted across vast distances. For the US, this is a fundamental requirement of being a global superpower, and great effort is devoted to ensure fuel can be received by the US military anywhere on earth. This responsibility primarily resides with the Defense Logistics

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<sup>19</sup> Department of Defence, *Australian Defence* (White Paper, Commonwealth of Australia, 1976), 11.

<sup>20</sup> Douglas Gillison, *Royal Australian Air Force 1939-1942* (The Griffin Press, Adelaide, 1962), 183.

<sup>21</sup> Department of Defence, *2016 Defence White Paper*, 19, 35.

<sup>22</sup> United States Department of Defense, *National Defense Strategy of The United States of America: Sharpening the American Military's Competitive Edge* (Unclassified Summary, Secretary of Defense, 2018), 9.

<sup>23</sup> Department of Defence, *Senate Standing Committee on Foreign Affairs, Defence and Trade Inquiry into the Implications of Climate Change for Australia's National Security: Department of Defence Written Submission* (Commonwealth of Australia, August 2017), 13.

<sup>24</sup> Interview with Mr Dennis Richardson, Secretary of the Department of Defence (2012-2017) and Australian Ambassador to the United States (2005-2010), conducted on 15 April 2019.

<sup>25</sup> Interview with Mr Craig McConachy, Australian Fuel Contract Manager – Middle East and North Africa Region (2019), conducted on 13 February 2019.



Agency-Energy.<sup>26</sup> For declared Australian defence policy, fuel supply is required over vast distances across northern Australia (to be examined in Chapter Six), and has also been required in regions such as the Middle East where Australia supported US military operations. Neither country faces a foreseeable conventional military threat to its homeland, so the assumption for military fuel sustainability is that it needs to support expeditionary operations. Apart from some challenges during the major conflicts of World Wars One and Two (identified in Chapter Two), both countries have experienced reliable fuel provision during all military operations since that time,<sup>27</sup> a reason why transformation of military fuel sustainability is not necessarily considered to be a high priority in either nation.

Fourth, military exceptionalism is an influential factor relating to military fuel sustainability in Australia and the US. The prioritisation of fuel for military operations had previously occurred in both nations during World War Two, and there is an expectation that resources such as fuel will be prioritised for military use should the need arise. The establishment of the Naval Oil Shale Reserves was an example of US prioritisation of fuel for military use during World Wars One and Two.<sup>28</sup> Given this approach to national prioritisation of fuel for military use, it could reasonably be expected that both nations would structure their force with confidence that uninterrupted fuel supply could be guaranteed in the event of major or existential conflict. A former Australian Secretary of Defence acknowledged that strategic circumstances could change quickly, but was confident that Australia and its allies could build up fuel reserves for military purposes quite rapidly if the need presented.<sup>29</sup>

Finally, the literature review in Chapter Two revealed military fuel sustainability trends that are consistent across Australia and the US. In particular, the *conflation* of national and

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<sup>26</sup> United States Defense Logistics Agency, *Strategic Plan 2018-2026* (Department of Defense, Virginia, 2018), 2.

<sup>27</sup> Daniel Yergin, *The Prize: The Epic Quest for Oil, Money and Power* (Free Press, New York, 1991), 171-178, highlighted that the US military reached the limit of available oil supply in 1917 after entering World War One, with 50,000 gasoline vehicles taken to France.

<sup>28</sup> United States Department of Energy, *Naval Petroleum and Oil Shale Reserves: Ninety Years Ensuring the National Security*, [website], <[https://www.energy.gov/sites/prod/files/NPR\\_90\\_years\\_tri-fold.pdf](https://www.energy.gov/sites/prod/files/NPR_90_years_tri-fold.pdf)>, accessed 1 April 2019.

<sup>29</sup> Interview with Mr Dennis Richardson, Secretary of the Department of Defence (2012-2017) and Australian Ambassador to the United States (2005-2010), conducted on 15 April 2019.

military fuel issues, and the *politicisation* of military fuel sustainability, are trends common to both Australia and the US, and this case study will examine these two trends in more detail. The *isolation* of military fuel sustainability consideration from defence policy, the third literature trend identified in Chapter Two, is largely an aspect of Australian defence policy, and as such will not be discussed in this chapter.

The major differences between the two nations relating to military fuel sustainability will also be contrasted. The US military remains self-sufficient to allow it to deploy globally – ‘agile global mobility forces’<sup>30</sup> – acknowledging that fuel is often procured locally where this is efficient and of low risk. Conversely, the Australian military is heavily reliant on the US for fuel supply in the Middle East, and would be for many future contingencies. Further, the US suffered many casualties through resupplying fuel to tactical forces in military operations in Afghanistan and Iraq, whereas in the same operations, Australia did not. This factor is an important influence on the military forces from both nations as they develop force structures and future plans.

Given the significant amount of US policy and doctrine which is publicly available on US military fuel sustainability, comparisons associated with each of the above factors can be made. The policy and doctrinal basis for US military fuel sustainability will now be discussed, as the foundation from which further assessments can be reached.

### **Military fuel sustainability basis in United States policy and doctrine**

The basis and assumptions relating to US military fuel sustainability are in large part available in the public domain. Mandatory reporting to Congress, and the periodic publication of fuel doctrine and fuel-related US DoD directives, established the knowledge and beliefs associated with US military fuel sustainability for this thesis. Direction from the US Joint Chiefs of Staff was that any action inconsistent with published fuel doctrine would only occur ‘when, in the judgement of the commander, exceptional circumstances dictate’,<sup>31</sup> meaning that there was likely to be a high degree of consistency with doctrine, and less likelihood of a non-doctrinal posture for military fuel sustainability being

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<sup>30</sup> President of the United States, *National Security Strategy of the United States of America* (The White House, December 2017), 29.

<sup>31</sup> United States Department of Defense, *Joint Publication 4-03: Joint Bulk Petroleum and Water Doctrine* (Joint Chiefs of Staff, Validated 30 November 2017, Published 11 January 2016), i.

established outside the publicly available information. Further, information presented to Congress could largely be expected to be accurate and timely, and was therefore considered to be mostly reliable. With less doctrine and fewer formal statements about military fuel sustainability, greater triangulation (through interviews, reviews of primary defence policy documents and secondary commentary, and the Chapter Six case study) was required in the Australian context to ensure validity of the research results. The most senior Royal Australian Air Force logistics officer argued that this public scrutiny was a 'smart' US approach, as the US was better prepared to grapple with challenging fuel issues openly and without 'burying them away';<sup>32</sup> this may be indicative of a broader debate about doctrinal differences between Australia and the US rather than an issue specific to fuel, but the relative transparency of the approach in the US is still relevant to fuel.

Although substantial information can be derived from primary US document analysis, the US publicly released information on military fuel sustainability contains significant repetition, and might give the appearance of greater action being taken on specific issues and initiatives than is actually the case. It would be understandable to mistakenly reach a conclusion that more actions were being taken by the US to improve military fuel sustainability. For example, the US DoD often referred (in publicly-released documentation) to an initiative to retrofit hybrid electric propulsion systems on US warships. Secretary Mabus stated in 2009 that these propulsion systems were being placed on 12 US warships;<sup>33</sup> a 2012 Operational Energy Strategy highlighted the cost savings made from fitting one vessel;<sup>34</sup> hybrid electric propulsion development was highlighted as a major US Navy initiative for 2013;<sup>35</sup> there was a subsequently declared plan to retrofit the propulsion system to all 34 Arleigh Burke destroyers;<sup>36</sup> the Fiscal Year 2016 Operational Energy Annual Report indicated that the US Navy was 'on schedule' to

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<sup>32</sup> Interview with Air Commodore Martin Smith, Director General Logistics-Air Force (2019), conducted on 1 April 2019.

<sup>33</sup> Ray Mabus, *Speech* (Naval Energy Forum, McLean, Virginia, 14 October 2009).

<sup>34</sup> United States Department of Defense, *Energy for the Warfighter: Operational Energy Strategy* (Office of the Assistant Secretary of Defense for Operational Energy, Plans and Programs, Washington, D.C., 2012), 9.

<sup>35</sup> Moshe Schwartz, Katherine Blakely and Ronald O'Rourke, *Department of Defense Energy Initiatives: Background and Issues for Congress* (Congressional Research Service, 10 December 2012), 19.

<sup>36</sup> Tyler Rogoway, 'Navy Ditches Its Plan To Upgrade 34 Destroyers With Hybrid Electric Drives', *The Drive*, [website], (14 March 2018), <<https://www.thedrive.com/the-war-zone/19237/navy-ditches-its-plan-to-upgrade-34-destroyers-with-hybrid-electric-drives>>, accessed 20 April 2019.

retrofit hybrid electric propulsion to three of its warships in 2017;<sup>37</sup> and the Fiscal Year 2017 Operational Energy Annual Report highlighted that the ‘first installation’ of a hybrid electric propulsion system for ‘initial fielding testing on one DDG-51 (warship) began in late 2017’.<sup>38</sup> This initiative was extensively discussed over almost a decade, but did not progress past a limited trial, and was officially cancelled in 2018 with the US Navy declaring the initiative was not a priority.<sup>39</sup> This example also highlighted an expansive military fuel sustainability objective (with under-developed technology) outlined by Secretary Mabus that, over time, was considerably reduced in scope and priority.

At the Congressional level, the scrutiny applied to US military fuel sustainability resulted in the mandatory production of annual ‘operational energy’ reporting by the US DoD. Much of this reporting was released in the public domain, providing greater transparency than in Australia. The Fiscal Year 2012 Operational Energy Annual Report signified the commencement of a legislated requirement to publicly report in detail on the status of operational energy within the US DoD.<sup>40</sup> Within this operational energy reporting, further US DoD reporting obligations emerged, such as an annual update on alternative energy progression in the US DoD. Further, periodic investigations by the independent, Congressionally-appointed Government Accountability Office delved into aspects of military fuel sustainability, such as alternative fuel investments.<sup>41</sup>

The scale of the US military effort devoted to military fuel sustainability management and reporting was much larger than was allocated in Australia due to the resources available in the US and the low priority of military fuel sustainability in Australia. Indeed, regular reporting to Parliament in the Australian context was limited to short non-structured updates in Defence Annual Reports,<sup>42</sup> because fuel was not a priority issue for successive Australian governments or Defence.<sup>43</sup> The resources allocated to managing fuel

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<sup>37</sup> United States Department of Defense, *Fiscal Year 2016 Operational Energy Annual Report* (Office of the Under Secretary of Defense for Acquisition and Sustainment, 9-45A5F2C, 2017), 21.

<sup>38</sup> United States Department of Defense, *Fiscal Year 2017 Operational Energy Annual Report*, 13.

<sup>39</sup> Rogoway, ‘Navy Ditches Its Plan To Upgrade 34 Destroyers With Hybrid Electric Drives’.

<sup>40</sup> United States Department of Defense, *Fiscal Year 2012 Operational Energy Annual Report* (C-584E097, September 2013), 2.

<sup>41</sup> United States Government Accountability Office, *Defence Energy: Observations on DoD’s Investments in Alternative Fuels*.

<sup>42</sup> Department of Defence, *Annual Report 17-18* (Commonwealth of Australia, 2018), 26.

<sup>43</sup> Interview with Mr Dennis Richardson, Secretary of the Department of Defence (2012-2017) and Australian Ambassador to the United States (2005-2010), conducted on 15 April 2019.

sustainability in the US was a factor in the considerable amount of publicly available information about organisations such as the Defense Logistics Agency-Energy, an 1160 person-strong organisation which acted as the coordinating authority for all fuel supply in the US DoD,<sup>44</sup> in comparison to the small Australian workforce in the Strategic Fuel Branch.<sup>45</sup>

There are a number of reasons for the public transparency and the political scrutiny associated with US military fuel sustainability. The requirement for US Senate confirmation of the nominee for the Assistant Secretary of Defense for Operational Energy, Plans and Programs brings a degree of political scrutiny to the military fuel sustainability actions of the US DoD.<sup>46</sup> Some of the scrutiny simply relates to ensuring effective and efficient procurement and consumption of fuel<sup>47</sup> - a factor not so relevant to Australia because fuel is often supplied by the US on military operations. In part, political scrutiny is based on a concern about political and geological constraints on energy supply to the US,<sup>48</sup> and this chapter will consider issues such as *conflation* of national energy issues with military fuel sustainability, identified in Chapter Two as a trend in the literature (a concern also not as relevant to Australia operating as a junior partner in US-led expeditionary operations). The scrutiny is also partly due to a number of Senators, Representatives (and even Presidents) who view military fuel sustainability through a lens of broader environmental sustainability or climate change,<sup>49</sup> a topic of immense public interest. This raised the profile of US military fuel sustainability higher than other aspects of military logistics.

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<sup>44</sup> United States Defense Logistics Agency-Energy, *Fiscal Year 2018 Fact Book* (Virginia, 2018), 26.

<sup>45</sup> Interview with Air Commodore Stephen Winterton, Director General Fuel Services (2018-2019), conducted on 15 February 2019.

<sup>46</sup> For example, see Sharon Burke, *Statement* (Subcommittee on Readiness and Management Support, United States Senate Armed Services Committee, 2 April 2014).

<sup>47</sup> United States Government Accountability Office, *Bulk Fuel: Actions Needed to Improve DoD's Fuel Consumption Budget Data* (September 2016).

<sup>48</sup> United States Department of Defense, *2016 Operational Energy Strategy* (Office of the Assistant Secretary of Defense for Energy, Installations and Environment, Washington, D.C., 2016), 3, acknowledged energy as a 'potential vulnerability'.

<sup>49</sup> United States Department of Defense, *2014 Climate Change Adaptation Roadmap* (Office of the Assistant Secretary of Defense (Energy, Installations and Environment), Virginia, 2014), 1, acknowledged that the military's strategies relating to climate change mitigation were 'mainly through changes in our energy use'.

There are also a considerable number of US DoD directives and fuel doctrine publications in the public domain. For example, the 2017 US DoD Directive 5101.08E designated the Director, Defense Logistics Agency as the 'Executive Agent for Bulk Petroleum' and outlined their responsibilities.<sup>50</sup> Joint Publication 4-03: Joint Bulk Petroleum and Water Doctrine, issued by the Joint Chiefs of Staff, was consistently referred to as the primary reference for subordinate Services and other agencies who held fuel responsibilities. Its doctrinal 'parent' is Joint Publication 4-0: Logistics – similar to Australia, fuel is firmly situated as a subordinate element to military logistics, but aspects of military fuel sustainability (such as the perceived political risks of assured supply) made it of deeper declared interest to some political leaders and other commentators. Joint Publication 4-03 assigned the Defense Logistics Agency-Energy primary responsibility for bulk petroleum supply and distribution (amongst other responsibilities such as procurement). Within a tactical area, many fuel responsibilities reside with Joint or Single Service logistics units,<sup>51</sup> a similar arrangement to that in Australia (identified in Chapter Four) where the Joint Logistics Command procures bulk fuel – mostly from the US when operating in coalition, rather than through sourcing it more independently – which is then tactically managed by each of the Services.<sup>52</sup>

Fuel doctrine from each of the US single Services displayed similar nuances to Australia, albeit on a different scale. For example, similar to Royal Australian Air Force doctrine, to be discussed in Chapter Six, fuel references in US Air Force doctrine were inevitably dominated by air-to-air refuelling rather than the provision of bulk fuel to an airbase. Some interview participants believed that Air Forces mostly saw fuel as a risk 'in the air' (that is, as a tactical problem), rather than in the bulk supply to airbases, resulting in the air-to-air refuelling focus.<sup>53</sup> The US Air Force doctrine accepted that fuel 'is usually a major limiting factor and therefore should be the primary focus.'<sup>54</sup> The predominance of air-to-

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<sup>50</sup> United States Department of Defense, *DoD Directive 5101.08E: DoD Executive Agent (DoD EA) for Bulk Petroleum* (Office of the Under Secretary of Defense for Acquisition and Sustainment, 19 September 2017), 1-5.

<sup>51</sup> United States Department of Defense, *Joint Publication 4-03: Joint Bulk Petroleum and Water Doctrine*, II-1.

<sup>52</sup> Interview with Air Commodore Stephen Winterton, Director General Fuel Services (2018-2019), conducted on 15 February 2019.

<sup>53</sup> Interview with Air Commodore Martin Smith, Director General Logistics-Air Force (2019), conducted on 1 April 2019.

<sup>54</sup> United States Air Force, *Air Force Doctrine Document 4-0, Combat Support* (Center for Doctrine Development and Education, 28 July 2011), III-15.

air refuelling references in US Air Force doctrine was partly based on an accepted division of responsibility within the US DoD, between the Defense Logistics Agency-Energy and the Services. The Defense Logistics Agency-Energy maintains responsibility for sourcing and transporting bulk fuel, while the Services ‘purchase’ the required fuel from them.<sup>55</sup> However, other US Air Force doctrine stated that the US Air Force could be designated as the lead to provide ‘common support’ such as bulk fuel to a particular operation.<sup>56</sup> Although generally similar, US Navy fuel and logistics doctrine had a more strategic focus than Royal Australian Navy doctrine, with greater emphasis on linking the US industrial base to expeditionary military operations,<sup>57</sup> consistent with the US status as a superpower with global interests and the higher likelihood of the US being involved in a conflict where national support may be activated. The close military interoperability desired between Australia and the US is readily apparent through analysis of fuel doctrine,<sup>58</sup> noting that Australia is often not responsible for independently sourcing fuel when operating in US-led coalitions.

Knowledge derived from US military fuel sustainability policy and doctrine was enhanced by other discrete documents released by the US DoD. The Congressional Research Service provided Congress with information briefs on equipment such as US Navy oil tankers<sup>59</sup> and US Air Force air-to-air refuelling aircraft.<sup>60</sup> Defense Logistics Agency-Energy periodically released ‘Fact Books’, mostly to offer positive information on that organisation’s performance, but containing data not found elsewhere.<sup>61</sup> This publicly available information offered accurate macro-level data – for example, Defence Logistics Agency-Energy confirmed such information as total departmental fuel consumption and expenditure figures.<sup>62</sup> However, as Chapter Six will identify in the Australian context, consumption figures for specific operations or equipment are often not publicly available,

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<sup>55</sup> United States Department of Defense, *Fiscal Year 2016 Operational Energy Annual Report*, 25.

<sup>56</sup> United States Air Force, *Air Force Doctrine Document 4-0, Combat Support*, 13.

<sup>57</sup> United States Navy, *Naval Doctrine Publication 4: Naval Logistics* (Office of the Chief of Naval Operations, Washington, D.C., 10 January 1995), 7.

<sup>58</sup> Air Power Development Centre, *The Air Power Manual* (Sixth Edition, Australian Air Publication AAP 1000-D, Commonwealth of Australia, September 2013), 115.

<sup>59</sup> Ronald O’Rourke, *Navy John Lewis (TAO-205) Class Oiler Shipbuilding Program: Background and Issues for Congress* (Congressional Research Service, 22 October 2018).

<sup>60</sup> Christopher Bolkcom, *Air Force Aerial Refuelling* (Congressional Research Service, RS20941, 20 March 2007).

<sup>61</sup> United States Defense Logistics Agency-Energy, *Fiscal Year 2018 Fact Book*, 4-5.

<sup>62</sup> Ibid.

for reasons of operational security, information security and commercial-in-confidence.<sup>63</sup> It is also possible that inadequate data collection limited the information that was able to be presented.<sup>64</sup>

This high security for specific tactical information, but lower security for more strategic and generalised information, probably reflects US experience in the Middle East, where the US suffered a large number of casualties through fuel resupply operations, and operational security proved to be particularly important (to be discussed further in this chapter). More strategic issues, such as concerns about hostile political actions to deny petroleum supply to the US from a particular country, were raised in policy but this chapter will further examine whether these concerns greatly influenced US military fuel sustainability.

Joint Publication 4-03 was premised on the fact that supply and storage of fuel for military use was a greater challenge (particularly in terms of quantities required) than other classes of logistics,<sup>65</sup> with security of fuel a key factor. Assurance of fuel supply in the US context will now be considered.

### **Assured fuel supply**

Chapter Two identified the *conflation* of national energy and military fuel sustainability issues, and the *politicisation* of military fuel sustainability that was seldom identified, as two of the three main trends in the literature. The approach by US policymakers towards an assured fuel supply for military operations demonstrated both aspects as factors that influenced military fuel sustainability (or the perceptions towards statements about military fuel sustainability).

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<sup>63</sup> Ibid, 23.

<sup>64</sup> Corrie Poland, 'How the Air Force got smarter about its aviation fuel use in 2018', *U.S. Air Force*, [website], (12 December 2018), <<https://www.af.mil/News/Article-Display/Article/1711969/how-the-air-force-got-smarter-about-its-aviation-fuel-use-in-2018/>>, accessed 10 April 2019.

<sup>65</sup> United States Department of Defense, *Joint Publication 4-03: Joint Bulk Petroleum and Water Doctrine*, ix.



Moran and Russell posited that fuel security was an issue that inspired anxiety even if not warranted.<sup>66</sup> Indeed, exaggerated security concerns were argued to be broadly prevalent in the US, more than just specifically relating to energy security.

Although not an uncontested position, historical concepts and terminology in the US such as 'Domino Theory', 'Rogue States' and 'Islamofacism' were considered to have emerged from exaggerated concern, and were used to justify policy.<sup>67</sup> Debrix and Lacy argued that there was an inclination for political elites to divert anxiety towards popular concerns.<sup>68</sup> Holmes declared fear in security policy to be 'elemental, encoded in our DNA', and that fear within policymaking was important and did not allow 'wishful thinking' to prevail.<sup>69</sup> Some US political leaders were accused of using fear to justify energy protectionism.<sup>70</sup> There were similarities between Australian and US political leaders in their portrayal of risk to justify defence policy decisions, with numerous commentators arguing that Australian political leaders demonstrated an exaggerated sense of concern when developing defence policy, identifying imprecise threats to justify military actions and structure.<sup>71</sup> This sense of exaggerated concern was also argued to be prevalent in non-Western nations,<sup>72</sup> and although some policymakers held genuine concerns, presenting exaggerated fear was considered a common political tactic.

Aspects of the US approach to military fuel sustainability are consistent with a broader sense of exaggerated concern in policy, and this was reflected in US commentary. For example, a description of an 'age of terrorism' is an example of exaggerated fear justifying

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<sup>66</sup> Daniel Moran and James Russell (eds.), *Energy Security and Global Politics: The Militarization of Resource Management* (Routledge, United States, 2009), 2-4.

<sup>67</sup> Stephen Walt, "Scary Monsters": A Halloween Tribute List', also identified 'Bogeymen from Latin America' and 'Monolithic Communism' as other examples of exaggerated fear.

<sup>68</sup> Francois Debrix and Mark Lacy (eds.), *The Geopolitics of American Insecurity: Terror, Power and Foreign Policy* (Routledge, New York, USA, 2009), 2.

<sup>69</sup> James Holmes, 'U.S. Foreign Policy: Driven by Fear?', *The Diplomat*, [website], (20 November 2012), <<https://thediplomat.com/2012/11/u-s-foreign-policy-driven-by-fear/>>, accessed 20 March 2019.

<sup>70</sup> Jeffrey Green, 'Defense Energy Markets Should Brace for Shortages of Key Materials', *National Defense Magazine*, 94/671 (October 2009), 16.

<sup>71</sup> For example, . Anthony Burke, *Fear of Security: Australia's Invasion Anxiety* (Cambridge University Press, Melbourne, 2008), 1.

<sup>72</sup> Alex Bellamy and Bryn Hughes, 'Emancipation and Force: The Role(s) of the Military in South East Asia', in Anthony Burke and Matthew McDonald (eds.), *Critical Security in the Asia-Pacific* (Manchester University Press, UK, 2007), 45-46, highlighted that most countries in Australia's region demonstrated similar fears.

greater military fuel sustainability improvement,<sup>73</sup> and concern about the ‘irony of fuelling our defense establishment from a system that threatens our national security’ was raised.<sup>74</sup> The same emotive language in relation to military fuel sustainability was also apparent in the 1970s,<sup>75</sup> indicative of the enduring concern in US policymaking, and arguably of the impact of the 1973 Organisation of Petroleum Exporting Countries 1973 oil embargo that was considered to be influential on the subsequent US approach to energy and security.<sup>76</sup>

At the tactical level, US experience in the Middle East since 2001 demonstrated that concern about physical security for fuel supply in conflict zones was entirely warranted, with estimates of ‘18,700 casualties (or 52 per cent) of the approximately 36,000 total US casualties’ from Middle East operations occurring during fuel and water supply convoys.<sup>77</sup> The relative lack of public information released by the US on fuel consumption for specific operations or equipment partly reflected a need for operational security, such as to avoid signalling the specific fuel supply requirements that would be needed for a particular base. This number of casualties did not dissuade US military commanders from continuing to conduct fuel resupply operations, because they had no choice.<sup>78</sup> Although there was some historical experience of the significant tactical vulnerabilities associated with supplying fuel for military operations in Afghanistan,<sup>79</sup> tactical fuel supply concerns became prevalent in US policy, doctrine and politics in the 2000s after a period of conflict in the Middle East. The terrorist attack on the United States Ship (USS) Cole in 2001 further demonstrated US tactical vulnerabilities resulting from fuel requirements, in this case in the maritime domain. As a result, US military documents regularly referred to ways to mitigate tactical risk in fuel supply. For example, the 2009 Army Energy Security

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<sup>73</sup> Donald Fournier and Eileen Westervelt, *Energy Trends and their Implications for US Army Installations* (Energy Research and Development Center, USA, September 2005), iv.

<sup>74</sup> Warner and Singer, *Fuelling the Balance: A Defense Energy Strategy Primer*, 1.

<sup>75</sup> For example, Joseph Breen, ‘Energy, America, and the Military: Can we get there from here?’, *Air University Review* (November-December 1980), presented recommendations for the US DoD, with the ‘immediate’ option being the necessity to reduce the reliance on foreign oil.

<sup>76</sup> Jennifer Hunt, *Presentation* (Australian Defence Force Rapid Force Projection Conference, Canberra, 9 April 2019).

<sup>77</sup> Juan Vitali, Joseph Lamothe, Charles Toomey, Jr., Virgil Peoples and Kerry McCabe, *Mobile Nuclear Power Plants for Ground Operations* (United States Army, Deputy Chief of Staff G-4, 2018), iii-iv.

<sup>78</sup> David Petraeus, *Supporting the Mission with Operational Energy* (Memorandum to US forces in Afghanistan, 7 June 2011), 1-2.

<sup>79</sup> Charles Russo, *Soviet Logistics in the Afghanistan War* (United States Army War College, Pennsylvania, 1991), 12, highlighted the security vulnerabilities of Soviet fuel transportation in Afghanistan.

Implementation Strategy was framed around the vulnerability of fuel convoys, with the 'potential to jeopardize mission success'.<sup>80</sup>

Fuel supply convoy casualties from operations in the Middle East remain firmly ingrained in the US military consciousness. A 2018 US Army study into dispersed nuclear power options for tactical soldiers was justified by the 'cost in terms of lives and dollars' of fuel convoys.<sup>81</sup> Other proposals were based on similar concerns, such as one soldier being killed every 24 fuel convoys in the Middle East,<sup>82</sup> demonstrating that tactical fuel supply was an issue of consequence for the US. The 2016 Operational Energy Strategy assessed the risk to fuel convoys would 'remain part of the operational environment',<sup>83</sup> a salient lesson for Australian independent operations if independent operations were a high priority, but less relevant if the primary expectation was as a provider of expeditionary military forces to US-led operations.

Given the fact that US land forces suffered so many casualties in the Middle East through fuel supply convoys, tactical fuel supply concerns tended to be framed in a land context. Chapter Six will highlight that air force fuel consumption is an order of magnitude higher than land force fuel consumption,<sup>84</sup> a critical factor for Australia if an independent high intensity air combat mission was an anticipated mission. The US military is a product of its operational experience, and so the land experience in the Middle East tends to dominate policy. However, the latent potential for enormous fuel security challenges for US Air Force operations remains, and the almost exclusive focus of US (and Australian) Air Force doctrine on air-to-air refuelling as the primary fuel concern almost certainly understates the future risk of bulk fuel supply to a forward base.<sup>85</sup> This is demonstrative of the lower priority of military logistics (identified in Chapters Two and Four) and of an expectation

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<sup>80</sup> United States Army, *Army Energy Security Implementation Strategy* (Army Senior Energy Council and Office of the Deputy Assistant Secretary of the Army for Energy and Partnerships, Washington, D.C., 13 January 2009), 1.

<sup>81</sup> Vitali, Lamothe, Toomey, Jr., Peoples and McCabe, *Mobile Nuclear Power Plants for Ground Operations*, iii-iv.

<sup>82</sup> Arūnas Molis, *Provision of Resources for Military Operations: Key Challenges and Solutions* (North Atlantic Treaty Organization, Energy Security Center of Excellence, Lithuania, 2012), 1.

<sup>83</sup> United States Department of Defense, *2016 Operational Energy Strategy*, 9.

<sup>84</sup> Senate Standing Committee on Foreign Affairs, *Defence and Trade, Defence Submission to Joint Standing Committee on Foreign Affairs, Defence and Trade Inquiry into the Defence Annual Report 2007-08* (Canberra, 2009), 10.

<sup>85</sup> United States Air Force, *Air Force Doctrine Document 4-0, Combat Support*, III-15.

that fuel will just be provided to the military for its exceptional role when required. These issues will be examined further in Chapter Six.

The challenges associated with tactical fuel supply in the Middle East and elsewhere were sometimes politicised. For example, When the Giffords-Udall Department of Defense Energy Security Act of 2010<sup>86</sup> was introduced into Congress, the vulnerability of fuel supply convoys in the Middle East was invoked.<sup>87</sup> In this Act – which was not legislated because it lacked sufficient support – were measures that would seek to reduce domestic US military energy consumption (mostly in facilities), a separate matter to tactical fuel consumption and fuel convoys. With no prospect that this Act could improve tactical fuel assurance, the reference to military casualties demonstrated both conflation of national energy issues and military fuel sustainability, and an opportunistic argument that sought to relate casualties in the Middle East to domestic energy security issues. The large number of environmental-related Acts that were either sponsored or co-sponsored by Representative Giffords indicated the lens through which the Defense Energy Security Act of 2010 was at least partially viewed.<sup>88</sup> In another example during a presentation to the Armed Services Committee, a former Assistant Secretary of Defense for Operational Energy linked issues such as climate change in the Arctic regions to assured military fuel supply and tactical consumption.<sup>89</sup>

As part of a case study examining the independent forward deployment of combat aircraft as a long-standing declared contingency, Chapter Six will consider the Australian approach to tactical fuel supply security. This case study will outline sharp differences between Australia and the US. Although there is a similar paucity of information on tactical fuel consumption for specific operations and equipment, tactical fuel supply security was rarely reflected in Australian doctrine or in other estimations of the security that would need to be provided, particularly across the vast supply lines that any forward Australian deployment would entail. This reflects the fact that fuel supply for Australian military

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<sup>86</sup> United States Congress, *Department of Defense Energy Security Act of 2010* (Bill, House of Representatives, H.R. 5280, 12 May 2010), 1.

<sup>87</sup> Office of Congresswoman Gabrielle Giffords, *The Giffords-Udall Department of Defense Energy Security Act* (Executive Summary, United States, 2010), 1.

<sup>88</sup> United States Congress, *Legislation Sponsored or Cosponsored by Gabrielle Giffords*, [website], (2013), <<https://www.congress.gov/member/gabrielle-giffords/G000554>>, accessed 10 March 2019.

<sup>89</sup> Burke, *Statement*, 4-5.

operations since 1999 has never posed a particular challenge,<sup>90</sup> and in the unlikely event that it did pose a concern in the future, legislation and policy mechanisms are in place to support the exceptional military role.<sup>91</sup> Australia was able to effectively use US or contracted fuel supply for operations in the Middle East, but Chapter Six will assess whether assuring tactical fuel supply for independent domestic or nearer region operations is an entirely different proposition that Defence is not structured to manage. The US case study demonstrates that tactical fuel supply security is a very important and enduring consideration if a nation wants to conduct independent military operations.

Tactical fuel supply security in the Middle East, and in particular the vulnerability of land based fuel supply convoys to enemy attack, was a significant military lesson for the US that was reflected in US policy and doctrine, although less in Air Force doctrine despite the significant fuel consumption by aircraft. However, the legitimate US concern about tactical enemy actions against fuel supply convoys was a separate issue to more strategic aspects of national energy assurance, with less empirical evidence available about the risk of political or geological constraints on national fuel and energy consumption. The conflation of national and tactical issues was regularly observed in commentary and in policy, and this will now be discussed.

#### *Conflation of national energy issues and military fuel sustainability*

Chapter Two highlighted the significant amount of commentary in the US about the factors that potentially jeopardised an assured national energy supply, with these factors often directly transferred to analysis of the US military.<sup>92</sup> Chapter Two argued that although there are points where national and military interests relating to energy and fuel intersect, there are significant differences. In particular, the concept of military exceptionalism and the prioritisation of national resources for military purposes should the need arise was rarely identified in the literature, but is a central factor when considering assurance of fuel supply.

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<sup>90</sup> A representative from the Australian Institute of Petroleum made this point at a Defence Fuel Management Seminar, held at the Royal Military College, Canberra on 24 August 2010.

<sup>91</sup> Commonwealth of Australia, *Liquid Fuel Emergency Act* (Canberra, 1984), Part 1 Section 6.

<sup>92</sup> Daniel Yergin, *The Prize: The Epic Quest for Oil, Money and Power*, 781. Kip Nygren, Darrell Massie and Paul Kern, *Army Energy Strategy for the End of Cheap Oil* (United States Military Academy, New York, 2006).

Similar to Australia, the US DoD maintains a doctrinal basis for mobilisation, to prioritise national resources for the military if the need ever arose. US mobilisation doctrine outlined the political and legislative options available to mobilise the nation in the event of a major conflict or national emergency; the need to expand national industry; and, the potential for fuel shortfalls as a result of mobilisation and the use of civilian and commercial assets for military purposes.<sup>93</sup> Chapter Four outlined Australian mobilisation considerations associated with the 1984 Liquid Fuel Emergency Act and how this may be a mechanism for fuel prioritisation for Defence should the need arise; this will be considered in the Chapter Six case study on the forward deployment of combat aircraft. While both the US and Australian mobilisation mechanisms for fuel are largely untested, they are established and could be enacted.

Without identifying that there is a mechanism for mobilisation and the nature of military exceptionalism, the conflation of national energy and military fuel sustainment concerns often led to overly pessimistic assessments, similar to the pessimism associated with broader national security risks identified earlier in this chapter. In most cases, although the term 'energy security' was regularly used, commentators and some political leaders were mostly concerned about security of petroleum supply.<sup>94</sup> National energy security concerns were directly reflected in higher level military policy statements, and also in lower level primary documents such as technical military assessments.<sup>95</sup>

Pessimism about assured fuel supply for military purposes mostly manifested in two ways. First, mostly prevalent in commentary rather than in US policy, there was pessimism about geological factors, specifically the impact of the possible passing of maximum global oil production (often referred to by commentators as Peak Oil). This was a common topic in US military fuel sustainability discourse, but was not a concern that gained traction with

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<sup>93</sup> United States Department of Defense, *Joint Publication 4-05: Joint Mobilization Planning* (Joint Chiefs of Staff, 23 October 2018), xii, IV-14.

<sup>94</sup> For example, see Gregory Lengyel, *Department of Defense Energy Strategy: Teaching an Old Dog New Tricks* (Walker Paper No. 10, Air University Press, Maxwell Air Force Base, Alabama, January 2008), 5.

<sup>95</sup> United States Air Force Science Advisory Board, *Report on Technology Options for Improved Air Vehicle Fuel Efficiency* (Washington, D.C., May 2006), 49, argued, 'uncertainties in the future availability and economics of crude-oil based jet fuels pose a particular challenge to the Air Force.' Shawn Walsh, *Oil Vulnerabilities and United States Strategy* (United States Army War College, Philadelphia, United States, 2007), 3, was concerned about the potential unavailability of oil from countries such as Iran and Venezuela.

policymakers.<sup>96</sup> Conversely, correspondence received from a military logistics planner in The Pentagon emphasised the optimism in the US DoD associated with the transition of the US to become a net oil exporter in the early 2020s and the US confidence in ongoing national supply.<sup>97</sup> Even if policymakers wanted to take action based on unfavourable geological assessments of global oil availability, the significant variation in the range of predictions<sup>98</sup> would make it very difficult.

The term Peak Oil was not commonly used in US policy documents, and concerns about geological limitations affecting military operations also eased in commentary after shale oil began widespread production in the US. The many commentators who argued that the US DoD was likely to be affected by geologically-limited fuel supply within short timeframes<sup>99</sup> proved not to be influential in changing policy or practice. For example, Hornitschek acknowledged the lack of a professional consensus, but dedicated a large part of his thesis on military energy issues to analysis of Peak Oil, and presented an unrealistically heightened view of the threat the military faced that was not shared by policymakers.<sup>100</sup>

Associated with the geological concerns, but again not yet influential on US DoD policy, a growing body of literature discussed the link between climate change and military fuel sustainability.<sup>101</sup> Whilst this literature was prevalent in the US, there was emerging Australian commentary on 'climate securitisation' discussed in Chapter Four. Some Australian commentators argued that Australian policymakers should follow the US lead

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<sup>96</sup> Correspondence with Mr Carl Stephens, Study Director, Logistics Directorate, Capabilities and Analysis Division, The Pentagon, received on 8 April 2019.

<sup>97</sup> Ibid.

<sup>98</sup> For example, Robert Hirsch, *Peaking of World Oil Production: Impacts, Mitigation, and Risk Management* (Report for the United States Department of Energy, February 2005), 5, identified arguments that production may have already peaked or would soon, whereas Department of Resources, Energy and Tourism, *National Energy Security Assessment 2011* (Commonwealth of Australia, 2011), 20, summarised views that production would not peak before 2035.

<sup>99</sup> For example, Daniel Davis, 'Running on Empty', *Armed Forces Journal* [website], (May 2008), <<http://armedforcesjournal.com/running-on-empty/>>, accessed 20 April 2019, argued that the US was on the 'precipice of a radical shift' due to Peak Oil, and therefore radical actions such as reducing the size of the military should be considered.

<sup>100</sup> For example, Hornitschek, *War Without Oil: A Catalyst for True Transformation*, 9-10.

<sup>101</sup> Sharon Burke, 'Ensuring Resiliency of Military Installations and Operations in Response to Climate Changes', *New America*, [website], (13 March 2019), <<https://www.newamerica.org/resource-security/phase-zero-blog/ensuring-resiliency-military-installations-and-operations-response-climate-changes/>>, accessed 20 April 2019. This former Assistant Secretary of Defense argued, 'the Department has not made much progress in implementing the Directive' relating to climate change adaptation and resilience at bases and in operations.

and take ‘actionable, practical measures (to address) the vulnerability of (military) assets to climate change’.<sup>102</sup> Such commentary typically made the reasonable argument that military conflict may arise from a changing climate and that policymakers should consider contingencies related to climate change, but overstated the requirement for the Australian military to make major changes to force structure and reduce fuel consumption. Chapter Four identified that such overstatement occurred because a number of commentators viewed military fuel sustainability primarily through an environmental sustainability lens. A Centre for Policy Development report indicated that by following what was said to be significant US action to change its force structure as a result of climate change risk mitigation, there would be ‘minimum opportunity cost’.<sup>103</sup> This report (similar to other commentary) overstated the actions taken by US policymakers to reduce greenhouse gas emissions or improve tactical fuel efficiency.

Second, there was concern about ‘hostile’ nations withholding crude oil supply from the US as a foreign policy action. The potential for hostile political intervention was prominent in commentary in the West,<sup>104</sup> and was more influential in US policy than the geological basis for potential concern. There is particular US focus on the risk of assured fuel supplies for the military in the lead up to a conflict.<sup>105</sup> ‘Energy security’ as a national issue was consistently outlined in high level policy, like the 2017 National Security Strategy highlighting the need to achieve energy security from ‘cyber and physical threats’,<sup>106</sup> with a similar objective articulated by President Obama in the 2015 National Security Strategy.<sup>107</sup> Energy security was similarly outlined as a concern in Australian policy.<sup>108</sup>

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<sup>102</sup> Centre for Policy Development, *The Longest Conflict: Australia’s Climate Security Challenge* (Report, 2015), 27.

<sup>103</sup> Ibid, 33-34.

<sup>104</sup> For example, Royal United Services Institute for Defence Studies, *Oil – Strategic Importance, and Future Supplies* (Whitehall, London, 21 March 1973), 3-4, identified that oil did not receive the attention from military strategists that it deserved, and that military oil reserves and nuclear capacity should be increased – arguments still seen in contemporary debate.

<sup>105</sup> Interview with Mr Daniel Fenton, US Special Operations Command (Defense Logistics Agency-Energy Liaison Officer), conducted on 9 May 2019.

<sup>106</sup> President of the United States, *National Security Strategy of the United States of America*, 23.

<sup>107</sup> President of the United States, *National Security Strategy of the United States of America* (The White House, February 2015), Introduction.

<sup>108</sup> For example, Department of Defence, *Defending Australia in the Asia Pacific Century: Force 2030* (Defence White Paper, Commonwealth of Australia, 2009), 43.



The US military often declared similar concerns to those raised in National Security Strategies. For example, a Chairman of the Joint Chiefs of Staff made questionable linkages between military fuel sustainability and minimising the (national) US dependence on 'overseas energy sources that fuel regimes that do not always share our interests and values'.<sup>109</sup> When outlining risks to US military fuel sustainability, the US Defense Science Board<sup>110</sup> declared, 'much of the global petroleum endowment resides in countries that are not friendly to the US, or exhibit political values antithetic to our own'.<sup>111</sup> The US DoD, and some commentators, argued that this political problem was exacerbated by inaccurate, commercially sensitive and deliberately distorted estimates of crude oil reserves.<sup>112</sup> Concern about assured fuel supply was declared to be a factor that led to the initiation of some tactical efficiency programs within the US DoD, such as the Integrated High Performance Turbine Engine Technology, the Advanced Computer Flight Plan Program, and the Navy Fuel Cell Program, although expenditure reduction was also an influential factor in many cases,<sup>113</sup> to be considered later in this chapter.

Such linkages did not represent the full story. A group of retired star ranked officers questionably deduced that the legitimate need for military fuel sustainability required the 'enormous military presence (in) the Middle East since the 1980s'.<sup>114</sup> The military presence in the Middle East was a foreign policy action with far broader considerations than military fuel sustainability, aimed at achieving a nation-wide effect and not military fuel supply assurance. Their deduction that the US DoD would suffer the same problems the broader society would face during an energy shock was simplistic and potentially inaccurate.

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<sup>109</sup> Geoff Dabelko, 'Admiral Mullen and the 'Strategic Imperative' of Energy Security', *New Security Beat*, [website], (13 October 2010), <<http://www.newsecuritybeat.org/2010/10/admiral-mullen-and-strategic-imperative.html>>, accessed 12 April 2019.

<sup>110</sup> The Defence Science Board was a scientific entity, with individuals operating on a limited tenure, whose charter was to 'examine and advise on matters relating to the DoD's scientific and technical enterprise.' The charter is at United States Defense Science Board, *Charter* (Department of Defense, 13 February 2018).

<sup>111</sup> United States Defense Science Board, *More Fight, Less Fuel* (Washington, D.C., February 2008), 11.

<sup>112</sup> Ibid; Oystein Noreng, *Crude Power: Politics and the Oil Market* (I.B. Taurus Publishers, London, 2006), 107.

<sup>113</sup> United States Air Force Science Advisory Board, *Report on Technology Options for Improved Air Vehicle Fuel Efficiency*, 35-45.

<sup>114</sup> The CNA Corporation, *National Security and the Threat of Climate Change* (Virginia, United States, 2007), 6-7.

The concentration of crude oil in politically volatile areas could be a national risk for the US, although this risk has proved to be manageable in recent decades, and the major increase in US domestic oil production in the past decade offers some confidence to US military planners.<sup>115</sup> In the event of a fuel shortfall occurring at the same time as a major military commitment, there is still insufficient basis to determine that military operations would be constrained or would be unsuccessful, for the following reasons.

First, Chapter Four identified measures that could be taken to ensure prioritised fuel provision to Australian military forces in the event of a national fuel supply contraction when there was a concurrent and essential military requirement.<sup>116</sup> The US DoD have more effective measures in place, including priority access to a finite but large fuel supply through the maintenance of the Strategic Petroleum Reserve, established in several US sites in 1975 to reduce economic or security risks associated with fluctuations in US oil supply or cost.<sup>117</sup> Although not solely for military purposes, and despite periodic concerns about the size and the cost of the Strategic Petroleum Reserve,<sup>118</sup> it would offer a buffer should there be a military requirement coinciding with a disruption to the supply of petroleum.

Second, with an exceptional role of great consequence, and consuming only around 1.5 per cent of national fuel supply,<sup>119</sup> the US DoD would remain a high priority for allocation of fuel if there was ever a supply constraint. National mobilisation measures, identified earlier in this chapter and to be discussed in the Australian context in Chapter Six, exist in plan, and previously ensured the maintenance of military power during World Wars One and Two. In recent conflicts short of national mobilisation, there was no evidence of

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<sup>115</sup> Correspondence with Mr Carl Stephens, Study Director, Logistics Directorate, Capabilities and Analysis Division, The Pentagon, received on 8 April 2019.

<sup>116</sup> Commonwealth of Australia, *Liquid Fuel Emergency Act* (Canberra, 1984), Part I, Section 6.

<sup>117</sup> United States National Commission on Energy Policy, *Oil Shockwave: Oil Crisis Executive Simulation* (Simulation Report and Summary of Findings, Washington, D.C., 23 June 2005), 11, argued that the Strategic Petroleum Reserve offered some protection, although it was difficult to know the optimum time to use the Reserve.

<sup>118</sup> United States Energy Information Administration, *Recent legislation mandates additional sales of U.S. Strategic Petroleum Reserve crude oil* [website], (21 February 2018),

<<https://www.eia.gov/todayinenergy/detail.php?id=35032#>>, accessed 1 April 2019.

<sup>119</sup> United States Department of Defense, *Fiscal Year 2012 Operational Energy Annual Report*, 2.

pressure on the US DoD to reduce operational fuel consumption or expenditure.<sup>120</sup> Indeed, the approach of senior US military planners appeared to be based on confidence derived from the US becoming 'a net oil exporter by 2021...overtaking Russia'.<sup>121</sup> The underlying assumption in the US and Australia remained that fuel would be prioritised for military use should it be required – an indication of the level of exceptionalism applied to military forces.

Third, military technology has improved over time, and major conflicts spurred rapid innovation. Chapter Two outlined the rapid military fuel technology development across air, land and sea forces during twentieth century conflict.<sup>122</sup> Recent conflicts in the Middle East have also led to considerable US investment and further improvements in fuel technology.<sup>123</sup> Military conflict consistently motivated significant investment in technology, to achieve a decisive military advantage. Through procurement of US equipment and maintaining interoperability standards,<sup>124</sup> the Australian military also kept pace with new fuel technology. For example, the US DoD development effort in the use of biofuel was able to be leveraged by Defence,<sup>125</sup> with the Australian response to defer independent research to allow the US to progress the concept.<sup>126</sup>

Fourth, the development of fracking technology in the US significantly changed the national debate about assured crude oil supply.<sup>127</sup> As large scale fracking was established, the US became a net energy exporter. In his 2014 State of the Union address, President

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<sup>120</sup> Interview with Chief Warrant Officer Joel Lane, US Central Command J4 Fuels Officer, conducted on 13 March 2019; Interview with Mr Edwin Cruz, Defence Logistics Agency-Energy Middle East Liaison Officer, conducted on 15 March 2019.

<sup>121</sup> Correspondence with Mr Carl Stephens, Study Director, Logistics Directorate, Capabilities and Analysis Division, The Pentagon, received on 8 April 2019.

<sup>122</sup> David Mellor, *The Role of Science and Industry* (Australia in the War of 1939-1945, The Griffin Press, Adelaide, 1958), 212.

<sup>123</sup> United States Department of Defense, *Fiscal Year 2017 Operational Energy Annual Report*, 18-20.

<sup>124</sup> Paul Dibb and Geoffrey Barker, 'Iron Colonels Fight the Invisible Hand', *Australian*, [website], (27 February 2010), <<https://www.theaustralian.com.au/national-affairs/defence/iron-colonels-fight-the-invisible-hand/news-story/cee26fba685bc72c22c2b8bad166214a>>, accessed 1 April 2019, identified a preference for senior Australian military officers to 'default reflexively to a preference for foreign military sales from the US'.

<sup>125</sup> Interview with Dr Paul Rawson, Defence Science and Technology Group Aerospace Division, conducted on 21 March 2019.

<sup>126</sup> Several Australian presenters highlighted the need for fuel interoperability with the US DoD at the 2010 Defence Fuel Seminar, held at the Royal Military College, Duntroon, on 24 August 2010.

<sup>127</sup> Kris Michaud, Joe Buccino and Stephen Chenelle, 'The Impact of Domestic Shale Oil Production on U.S. Military Strategy and its Implications for U.S.-China Maritime Partnership', *Small Wars Journal*, [website], (2014), <<https://smallwarsjournal.com/jrnl/art/the-impact-of-domestic-shale-oil-production-on-us-military-strategy-and-its-implications-fo>>, accessed 20 April 2019.

Obama emphasised that ‘more oil (was) produced at home than we buy from the rest of the world – the first time that’s happened in nearly twenty years’. He stated, ‘America is closer to energy independence than we’ve been in decades’, and, ‘It’s not just oil and natural gas that’s booming; we’re becoming a global leader in solar, too’.<sup>128</sup> The indigenous oil resources that could potentially be made available to the US military further indicates the lower risk to US military operations from a shortage of oil.

Finally, the comparative access to fuel (by the US, when compared to an enemy force) is relevant. The globalised nature of the energy market means that a fuel supply shortfall in the US would almost certainly also have some effect on all combatants if there was a major conflict. Indeed, given all the fuel supply options (some of which are highlighted above) available to the US, it is conceivable that a global fuel supply shortfall could militarily be of comparative benefit to the US. Further, Chapter Two highlighted that the US became highly adept at targeting enemy fuel supplies during the twentieth century. This common US military tactic came to be considered a legitimate military action and a strategic necessity, with important historical examples in World War One<sup>129</sup> and World War Two.<sup>130</sup> Effective US targeting of enemy fuel supplies could also offer a comparative advantage.

These factors demonstrate that although there is certainly overlap with national energy security, US military fuel sustainability has different risks, and the failure of many commentators to identify military exceptionalism and the prioritisation of fuel for military use when required misrepresented the factors affecting military fuel sustainability. As a close ally of the US, and with an historical reliance on the US for fuel supply during military operations, the Australian military would also be likely to benefit from the relative US advantages in military fuel sustainability, a factor not commonly presented in the Australian military fuel sustainability literature.

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<sup>128</sup> Brad Plumer, ‘Obama’s 2014 State of the Union address’, *Washington Post*, [website], (28 January 2014), <<http://www.washingtonpost.com/blogs/wonkblog/wp/2014/01/28/read-obamas-2014-state-of-the-union-address/>>, accessed 10 December 2018.

<sup>129</sup> Alan Stephens and Brendan O’Loghlin, *The Decisive Factor: Air Power Doctrine by Air Vice Marshall H.N. Wrigley* (Australian Government Publishing Service, Canberra, 1990), 22.

<sup>130</sup> George Hermon Gill, *Royal Australian Navy 1942-1945* (The Griffin Press, Adelaide, 1968), 414; Robert Zubrin, *Energy Victory: Winning the War on Terror by Breaking Free of Oil* (Prometheus Books, New York, 2009), 232.

Ultimately, concern about hostile political decisions (relating to fuel) is a relevant but minor pressure on military fuel sustainability. The influence is not as significant as the commentary would suggest or would advocate. The US still seeks the most capable military equipment, regardless of the fuel consumption, and this equipment is underwritten by historically reliable fuel supply. There is insufficient basis for national energy concerns to be fully extrapolated as military fuel sustainability concerns. Further, national efforts to mitigate any perceived risk from hostile foreign political decisions relating to fuel supply often waned over time. For example, in response to the 1973 oil embargo, US political leaders sought to substitute foreign sources of oil for domestic supplies, such as through President Nixon's 'Project Independence' and through other measures initiated by Presidents Ford and Carter.<sup>131</sup> However, the US quickly reverted to the cheapest international supply, as implementing measures to provide greater assurance to national and military fuel supply has been expensive. These measures also waned when there was an absence of an existential military threat.

Having found that concern about military fuel supply shortages was overstated, the actions taken by policymakers to influence US military fuel sustainability will now be considered in order to determine whether the US DoD has sought to significantly transform its capability.

### **Actions to influence United States Department of Defense fuel sustainability**

Australian commentators regularly and emphatically argued that Australia should follow the 'successful strategies' to improve military fuel sustainability that the US had 'already created and are implementing',<sup>132</sup> some of which were highlighted in Chapter Two. For example, one group of commentators (including a former Australian Chief of Defence Force) was 'troubled' by an 'unprepared and uninformed defence force' while the US Navy was taking steps to 'deal with climate change' by 'reducing petroleum use',<sup>133</sup> a misleading

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<sup>131</sup> Charles Homans, 'Energy Independence: A Short History', *Foreign Policy*, [website], (3 January 2012), <<http://foreignpolicy.com/2012/01/03/energy-independence-a-short-history/>>, accessed 10 January 2019.

<sup>132</sup> Centre for Policy Development, *The Longest Conflict: Australia's Climate Security Challenge*, 13, 24.

<sup>133</sup> Climate Council, *Be Prepared: Climate Change, Security and Australia's Defence Force* (Canberra, 2015), 68.

claim based on US DoD figures.<sup>134</sup> Thomas argued that there was a ‘stark contrast’ between the actions to reduce military energy consumption in the US and in Australia.<sup>135</sup> The argument that the US was particularly active in reducing tactical fuel consumption was also presented to forums such as Australian Senate committees.<sup>136</sup> However, evidence to be presented here indicates that US actions to influence military fuel sustainability were overstated.

Arguments such as those by Admiral Barrie demonstrated a misunderstanding or misrepresentation of the extent of the US actions taken to change tactical force structure and reduce tactical fuel consumption, and failed to identify the *politicisation* that was associated with US military fuel sustainability, identified in the Chapter Two literature review. In particular, this section will argue that the actions taken by the US to change tactical fuel consumption were incremental, and were regularly conflated with other domestic actions. With significant US influence on Australian military force structure through Australian procurement of US equipment and a long-standing undertaking to meet US interoperability standards, the actions taken by the US to influence military fuel sustainability are a factor influencing Australian military fuel sustainability. It is therefore important to understand the extent of the recent military fuel sustainability actions that have been taken by the US DoD, and the Australian literature provided an inaccurate or partial view of the US DoD actions.

Some actions to improve military fuel sustainability were periodically taken by US policymakers, but they regularly over-emphasised what was achieved. US security policy since the Trump Administration came to power made it clear that military fuel sustainability and fuel technology were areas that would be progressed, but not with any higher priority than other areas of the military.

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<sup>134</sup> United States Department of Defense, *Fiscal Year 2015 Operational Energy Annual Report* (Office of the Under Secretary of Defense for Acquisition and Sustainment, B-2BEE8A1, August 2016), 16.

<sup>135</sup> Michael Thomas, *The Securitization of Climate Change: Australian and United States’ Military Responses (2003-2013)* (University of New South Wales, Springer International Publishing, 2017), 13.

<sup>136</sup> The Senate Foreign Affairs, Defence and Trade References Committee, *Implications of climate change for Australia’s national security* (Commonwealth of Australia, May 2018), 60-61.

*Recent policy – Trump Administration*

I think a bit of the steam has come out of the momentum (relating to biofuel development for the US DoD) with the change of Administration...There is no viable (US) domestic biofuel industry in the quantities that are required...it does not have great momentum at the moment.<sup>137</sup>

The above quote was a 2018 observation made by a previous Australian Vice Chief of Defence Force, Vice Admiral Ray Griggs, relating to the US focus on military fuel sustainability and the progression towards implementing alternative fuels into tactical equipment. This view differed from some of the more optimistic and expansive commentary relating to US progression in military fuel sustainability, outlined in Chapter Two, but reflected how senior Australian military commanders, who closely observed US military development, viewed the issue.

Declared strategic policy during the Trump Administration was a more accurate reflection of the actions that had been taken over time to influence military fuel sustainability, although there was certainly a major change in rhetoric. There was only tangential reference to military fuel sustainability in US strategic policy since 2017. The 2018 National Defense Strategy was silent on the issue of military fuel sustainability, with the strategy emphasising great power competition to 'prioritize what is important'.<sup>138</sup> The 2017 National Security Strategy discussed fuel and energy solely in terms of maintaining US 'energy dominance'.<sup>139</sup> The seven defence priorities specified by the Trump Administration to the Defense Science Board included no reference to military fuel sustainability, despite military fuel sustainability being a previous priority for the Board and a topic that was extensively addressed by the Board over time.<sup>140</sup> President Trump also sought on multiple occasions to cease funding to the Advanced Research Projects

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<sup>137</sup> Former Australian Vice Chief of the Defence Force speaking at Joint Standing Committee on Foreign Affairs, Defence and Trade, *Proof Committee Hansard: Department of Defence annual report 2016-17* (Commonwealth of Australia, Canberra, 4 May 2018), 37-38.

<sup>138</sup> United States Department of Defense, *National Defense Strategy of The United States of America: Sharpening the American Military's Competitive Edge*, 1.

<sup>139</sup> President of the United States, *National Security Strategy of the United States of America*, 18.

<sup>140</sup> United States Defense Science Board, *Seven Defense Priorities for the New Administration* (December 2016), 2.

Agency – Energy (ARPA-E),<sup>141</sup> an agency that has supported US DoD fuel technology development in the past. However, ARPA-E existed during the Obama Administration on impermanent sources of funding for an extended period,<sup>142</sup> and was never particularly well-funded anyway,<sup>143</sup> indicating that the political preparedness to fund this agency was historically quite low.

Speaking directly to the issue of military fuel sustainability, a Fiscal Year 2017 ‘Operational Energy Annual Report’ – mandated by Congress to be produced annually by the US DoD – noted the ‘significant changes in Department priorities’. This report highlighted the US DoD operational energy priority to establish ‘energy resilient capabilities’ that ‘increase the range, reach, time on station, and performance of combat forces’.<sup>144</sup> The declared emphasis had shifted, but the long-standing high prioritisation of equipment such as air-to-air refuelling aircraft and Navy oil tankers indicated that such objectives were not at odds with previous approaches to military fuel sustainability.

The contrast in strategic documentation in relation to fuel written by the US Navy, between Secretary Mabus (who departed as Secretary of the Navy in 2016) and Secretary Spencer (a President Trump appointee), is particularly stark. Secretary Mabus was an outspoken supporter of using alternative fuels in maritime platforms, who strongly emphasised military fuel sustainability in his declared policies and priorities,<sup>145</sup> and he was viewed by senior military commanders in Australia as the ‘driving force’ behind efforts to change US military fuel sustainability.<sup>146</sup> The new Secretary’s ‘Mission, Vision and Priorities’ did not mention fuel, and was focused entirely on readiness and modernisation

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<sup>141</sup> Megan Geuss, ‘Trump really wants to kill ARPA-E; federal agency says that’s folly’, *Ars Technica*, [website], (14 March 2018), <<https://arstechnica.com/tech-policy/2018/03/why-shouldnt-trump-kill-advanced-energy-funding-arpa-e-makes-its-case/>>, accessed 1 April 2019.

<sup>142</sup> Eric Toone, *Overview of ARPA-E: A New Paradigm in Energy Research* (Presentation, Role of Information Sciences and Engineering in Sustainability Workshop, United States, 3 February 2011), Slides 2 and 6.

<sup>143</sup> Geuss, ‘Trump really wants to kill ARPA-E; federal agency says that’s folly’.

<sup>144</sup> United States Department of Defense, *Fiscal Year 2017 Operational Energy Annual Report*, 2.

<sup>145</sup> For example, see Ray Mabus, ‘Time for advocates of energy alternatives to take to the air’, *Defense News* [website], (1 February 2019), <<https://www.defensenews.com/opinion/commentary/2019/02/01/time-for-advocates-of-energy-alternatives-to-take-to-the-air/>>, accessed 10 March 2019.

<sup>146</sup> Interview with Vice Admiral Ray Griggs, Vice Chief of Defence Force (2014-2018) and Chief of Navy (2011-2014), conducted on 18 April 2019.



– priorities that could have explicitly included fuel sustainability issues, but did not.<sup>147</sup> The 2018 Department of Navy ‘Business Operations Plan’ focused on increased lethality and readiness, and made no reference to military fuel sustainability or previous Navy plans, including in the section titled ‘Accomplishments from Past 18 Months’.<sup>148</sup> The 2018 ‘Operational Energy Annual Report’ did not mention the Navy’s previous unmet objectives to increase quantities of tactical biofuel consumption, and significantly reduced any expectation of progression in this area. The report stated, ‘The Navy continues to evaluate the technical feasibility of cost-effective alternatives for diversifying its energy supply’.<sup>149</sup> The 2018 report contained a small, Congress-mandated section on ‘Alternative Fuels Initiatives’, whereas the 2016 ‘Operational Energy Annual Report’ contained a far more extensive summary and tabulated data relating to alternative fuels initiatives.<sup>150</sup>

Indeed, there has been an emergence of primary documentation which is critical of Secretary Mabus’ efforts to increase the quantity of biofuel in the fuel mix consumed by the Navy, and more broadly questions the extent to which US DoD efforts to implement renewable energy in domestic bases has occurred. A Government Accountability Office report from 2016 surveyed 17 renewable energy projects in domestic bases and found that only two projects could allow continued base operations in the event of a grid outage.<sup>151</sup> A separate Government Accountability Office report found that the US DoD had purchased ‘small quantities of alternative fuels...for testing and demonstration purposes’. Although the US DoD was mandated by law to only purchase alternative fuels if they were cost effective, an eight year period saw two million gallons of alternative fuel purchased at a cost of approximately 30 US dollars per gallon, compared to the remainder of the US DoD fuel requirements being purchased at approximately three US dollars per gallon (2014 figures).<sup>152</sup>

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<sup>147</sup> Richard Spencer, *Department of the Navy Mission, Vision and Priorities* (Memorandum, Secretary of the Navy, 29 August 2017), 1-2.

<sup>148</sup> United States Department of the Navy, *Business Operation Plan* (Fiscal Years 2019-2021, Version 1.3, October 2018), 61.

<sup>149</sup> United States Department of Defense, *Fiscal Year 2017 Operational Energy Annual Report*, 14.

<sup>150</sup> United States Department of Defense, *Fiscal Year 2015 Operational Energy Annual Report*, 11-12, 54-55.

<sup>151</sup> United States Government Accountability Office, *DoD Renewable Energy Projects: Improved Guidance Needed for Analyzing and Documenting Costs and Benefits* (GAO-16-487, Report to Congressional Committees, September 2016), Highlights.

<sup>152</sup> United States Government Accountability Office, *Defense Energy: Observations on DoD’s Investments in Alternative Fuels*, 13.

The issue of military fuel sustainability has received no public attention from President Trump, whereas President Obama previously engaged in this issue on a regular basis.<sup>153</sup> A White House correspondent wrote a 2017 article surmising that the Trump Administration may continue the 'green projects' in the US DoD,<sup>154</sup> but in a 2019 interview, the correspondent indicated that 'the issue just had not resurfaced' in the intervening period.<sup>155</sup>

Australian military commanders recently characterised the US approach to military fuel sustainability, including in areas such as biofuel development, in a far more moderate way than other Australian commentators who overstated the US actions that had occurred. For example, in a 2018 Joint Standing Committee, the Chief of Air Force explained that there had been 'discussion...for several years now' on the US Air Force introduction of biofuel. Defence was 'seeing where our major partners go'. Vice Admiral Griggs explained that Defence had done some 'foundational work' to certify equipment using biofuels, and he used an example of an Australian Seahawk helicopter flight during a major US exercise five years before the Joint Standing Committee meeting to emphasise his point.<sup>156</sup> Given the high priority in Australian defence policy to maintain interoperability with the US, these assessments from senior Australian military commanders should be considered a more accurate view of US military fuel sustainability prioritisation than much of the Australian commentary.

The Obama Administration set some notable goals for military fuel sustainability at the tactical level, particularly relating to the use of biofuels.<sup>157</sup> However, given the substantial challenges associated with major fuel objectives, the inauguration of the Trump Administration (which had little inclination to prioritise Obama-era military fuel sustainability objectives) resulted in minimal progression outside establishing the technical feasibility of certain actions such as biofuel introduction. Importantly, it would

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<sup>153</sup> Miles, 'Obama praises DoD's energy leadership, stewardship'; Plumer, 'Obama's 2014 State of the Union address'.

<sup>154</sup> Fred Lucas, 'Most of Obama's Green Policies Persist at Department of Defence', *The Daily Signal*, [website], (14 July 2017), <<https://www.dailysignal.com/2017/07/14/obamas-green-policies-persist-department-defense/>>, accessed 10 March 2019.

<sup>155</sup> Interview with Fred Lucas, The Daily Signal White House Correspondent, conducted on 17 March 2019.

<sup>156</sup> Joint Standing Committee on Foreign Affairs, Defence and Trade, *Proof Committee Hansard: Department of Defence annual report 2016-17*, 37-38.

<sup>157</sup> Schwartz, Blakely and O'Rourke, *Department of Defense Energy Initiatives: Background and Issues for Congress*, 18.

also not be accurate to categorise the pre-Trump era as one of major US military fuel sustainability change, and this will now be considered further.

#### *Pre-Trump Administration military fuel sustainability*

Legislation and policy that could improve US military energy efficiency and reduce expenditure in domestic bases has been periodically enacted since the 1970s. Legislation was mostly not specific to the military and was often related to broader economic or environmental outcomes.<sup>158</sup> A long-term observer of the US approach to fuel and energy argued that the 1973 Organisation of Petroleum Exporting Countries oil embargo compelled the US to determinedly seek to secure sources of energy since that time, and it permeated all aspects of policymaking.<sup>159</sup> For example, the US DoD established some initiatives in the 1970s to reduce energy usage and expenditure in domestic military facilities, such as the construction of a Naval Air Weapons Station powered by geothermal energy.<sup>160</sup> However, sustained US DoD effort did not occur, with few negative repercussions as a result. Consequently, there was minimal direct political interest in US military fuel sustainability at the beginning of the twenty-first century, particularly with no ongoing major US military combat operations, and there was little need to address any real or perceived problem.<sup>161</sup>

In 2001 (prior to the September 11 World Trade Center terrorist attack), a Defense Science Board Task Force, advising the Secretary of Defense, produced a lengthy study into US military fuel consumption, primarily seeking expenditure reduction opportunities. The Defense Science Board identified many problems with the political approach to US military fuel sustainability, and amongst other findings and recommendations, found that the military did not approach fuel as a significant issue requiring leadership or improvement.<sup>162</sup> In highlighting the Defence Science Board report in the US Congress,

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<sup>158</sup> Anthony Andrews, *Department of Defense Facilities Energy Conservation Policies and Spending* (United States Congressional Research Service, Washington, 19 February 2009), Summary Page.

<sup>159</sup> Hunt, *Presentation*.

<sup>160</sup> Sohbet Karbuz, *Navy Energy Vision*, [Weblog], (14 November 2010), <<http://karbuz.blogspot.com/2010/11/navy-energy-vision.html>>, accessed 1 April 2019.

<sup>161</sup> Defense Science Board, *More Capable Warfighting Through Reduced Fuel Burden*, ES1.

<sup>162</sup> The key findings of the Defence Science Board (Defense Science Board, *More Capable Warfighting Through Reduced Fuel Burden*, ES1) were: there were war-fighting, logistics and cost benefits to make weapon systems more fuel efficient, but the US DoD did not emphasise these in acquisition; the US DoD did not identify the full cost of delivering fuel to customers, thereby distorting platform choices; fuel

Representative Cliff Stearns illustrated the prevailing orthodoxy, arguing that the US military should seek to reduce costs wherever possible, but should not ‘sacrifice performance requirements just to save a few gallons of fuel. I doubt that any Member would propose such action.’<sup>163</sup>

In the same year, a US Congressional hearing examined lessons from the attack on the United States Ship (USS) Cole, with some lessons relating to military fuel supply, including a concern that a reduction in fleet oil tankers, and the consequent necessity to refuel in Yemen, was a contributing factor to the incident.<sup>164</sup>

The context outlined in the 2001 Defense Science Board report and the USS Cole investigation was different to Australian circumstances. Specifically, the US documents clearly highlighted that the US military must be able to independently respond to a wide range of circumstances, anywhere in the world.<sup>165</sup> Such self-sufficient global reach was not declared in Australian defence policy, although the Chapter Six case study will specifically consider whether Defence could independently achieve a nearer region contingency outlined in successive White Papers, and whether the US concern about the vulnerability of its ‘logistics tail’ and fuel supply was replicated in Australia for independent nearer region contingencies,<sup>166</sup> where vast supply lines would present challenges.

Neither the 2001 Defense Science Board report nor the USS Cole investigation resulted in substantive actions to improve US military fuel sustainability. However, these reports were quickly followed by more expansive interest in military fuel sustainability from a range of commentators, and the Defence Science Board report was regularly referred to in US DoD policy and technical documentation.<sup>167</sup>

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efficiency and waste were not rewarded or punished; and, Services did not ‘war-game’ fuel requirements, assuming fuel availability.

<sup>163</sup> United States Congress, *Congressional Record – House* (Washington, D.C., 30 July 2001), H4783.

<sup>164</sup> United States House Armed Services Committee, *The Investigation into the Attack on the USS Cole* (Report, Washington, D.C., May 2001), 15-16.

<sup>165</sup> United States Defense Science Board, *More Capable Warfighting Through Reduced Fuel Burden*, ES1.

<sup>166</sup> Department of Defence, *2016 Defence White Paper*, 72, 101.

<sup>167</sup> The Defense Science Board report was referred to in many subsequent policy and technical documents, including United States Air Force Science Advisory Board, *Report on Technology Options for Improved Air Vehicle Fuel Efficiency*, 15; United States Army, *Power and Energy Strategy White Paper* (Research,

Despite piecemeal actions, the rhetoric of claimed military fuel sustainability improvement was high. Claims that the US DoD had begun to 'systematically address the need to decrease the amount of energy used in tactical weapon systems'<sup>168</sup> did not stand up to scrutiny. In 2005, Warner and Singer more accurately argued that the US DoD focused on the 'low-hanging fruit' to reduce fuel intensity,<sup>169</sup> and tactical measures initiated by the US DoD had limited effect. *Politicisation* was a factor influencing military fuel sustainability, as being seen to achieve energy savings trumped the progression of substantial reforms.

Several examples highlight this fact. The 2007 Defense Authorization Act compelled the Navy to examine powering surface combatant vessels with nuclear energy, with an optimistic outlook for success,<sup>170</sup> but the Act was non-binding, and Navy established that the 'break even' point for conversion was with oil at 180 dollars per barrel for some vessels, and therefore not worth the effort.<sup>171</sup> The US Air Force regularly declared its leadership in the development of synthetic fuel for aircraft, with Air Force Secretary Wynne declaring in 2007 that the US Air Force was 'taking a leadership role in testing and certifying the use of synthetic fuel in aircraft'.<sup>172</sup> The US Air Force conducted some successful development and accreditation work, such as accrediting the C-17 to use synthetic fuel,<sup>173</sup> but the use of synthetic fuel in aircraft operations was not common practice. Other initiatives, such as those identified by the US Air Force Advisory Board in 2006 (including integrated vehicle health monitoring and increased use of simulation),<sup>174</sup> were rapidly implemented but minor changes. The US DoD move towards a 'single

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Development and Engineering Command, 1 April 2010), B-4; United States Defense Science Board, *More Fight, Less Fuel*, 23.

<sup>168</sup> Kristine Blackwell, *Department of Defense and Energy Independence: Optimism Meets Reality* (United States Air University, Maxwell Air Force Base, Alabama, April 2007), 1.

<sup>169</sup> Warner and Singer, *Fuelling the Balance: A Defense Energy Strategy Primer*, 4.

<sup>170</sup> United States Congressional Research Service, *Energy Independence and Security Act of 2007: A Summary of Major Provisions* (Washington, D.C., 21 December 2007), section 128.

<sup>171</sup> Jeffrey Eggers, 'The Fuel Gauge of National Security', *Armed Forces Journal* [website], (May 2008), <<http://armedforcesjournal.com/the-fuel-gauge-of-national-security/>>, accessed 15 April 2019.

<sup>172</sup> Roger Drinnon, 'C-17 uses synthetic fuel blend on transcontinental flight', *United States Air Force News*, [website], (18 December 2007), <<https://www.amc.af.mil/News/Article-Display/Article/147789/c-17-uses-synthetic-fuel-blend-on-transcontinental-flight/>>, accessed 20 January 2019.

<sup>173</sup> Grace Jean, 'Air Force Tells Biofuels Industry to 'Bring It'', *National Defense Magazine*, [website], (January 2011),

<<https://web.archive.org/web/20110404081634/http://www.nationaldefensemagazine.org/archive/2011/January/Pages/AirForceTellsBiofuelsIndustrytoBringIt.aspx>>, accessed 15 April 2019.

<sup>174</sup> United States Air Force Science Advisory Board, *Report on Technology Options for Improved Air Vehicle Fuel Efficiency*, 35-37.

battlefield fuel' (an effort to decrease the number of specialist fuels required for different military equipment), which commenced more than a decade ago, was an ambitious goal with some consolidation achieved, but the US DoD remained unable to implement a single fuel.<sup>175</sup> Fuel efficiency measures relating to the Joint Strike Fighter stalled.<sup>176</sup>

Inevitably, with few policymakers advocating for the proposed transformational change, and with higher competing priorities, the US DoD did not implement the Defense Science Board recommendations from 2001.<sup>177</sup> Chapter Two highlighted that technology and policy often evolved from military necessity, but with no such imperative since World War Two, US policymakers did not demand significant improvement to military fuel sustainability. Without the direct involvement of political leaders, fuel was a peripheral matter in relation to broader defense priorities and urgent operational contingencies that arose.

#### *Fuel during the Obama Administration*

While some interest was being generated in military fuel sustainability in the 2000s, actions were mostly limited. A 2011 Defense Science Board report summed up, stating, 'multiple DoD offices are addressing...energy issues with a wide range of perspectives and with limited unifying guidance. This fragmented approach is inadequate to the need,'<sup>178</sup> although this report was released shortly after the establishment of the Office of Operational Energy Plans and Programs in 2010 (an organisational change which achieved greater fuel-related coordination).

A more sustained, incremental approach was present in the 2010s. The Congressional Research Service summarised some of the US DoD fuel initiatives from the early 2010s,<sup>179</sup>

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<sup>175</sup> United States Defense Science Board, *More Capable Warfighting Through Reduced Fuel Burden*, 5.

<sup>176</sup> Stephen Trimble, 'USAF: Advent Upgrade 'Feasible' for F-35 Engine', *FlightGlobal*, [website], (21 October 2009), <<https://www.flightglobal.com/news/articles/usaf-advent-upgrade-feasible-for-f-35-engine-333770/>>, accessed 15 April 2019.

<sup>177</sup> Sandra Erwin, 'Defense Energy-Efficiency Efforts Hurt by Slow Pace of Reform', *National Defense Magazine*, [website], (July 2011), <<http://www.nationaldefensemagazine.org/articles/2011/7/19/defense-energyefficiency-efforts-hurt-by-slow-pace-of-reform>>, accessed 10 April 2019.

<sup>178</sup> United States Defense Science Board, *Trends and Implications of Climate Change for National and International Security* (Under Secretary of Defense for Acquisition, Technology and Logistics, Washington, D.C., 4 October 2011), 90.

<sup>179</sup> Schwartz, Blakely and O'Rourke, *Department of Defense Energy Initiatives: Background and Issues for Congress*, 14-21.

and more recent fuel initiatives were outlined in a Fiscal Year 2017 'Operational Energy Annual Report'.<sup>180</sup> There were a number of important initiatives, and as was highlighted earlier in this chapter, considerable public reporting on fuel and energy was undertaken. However, operational demands remained dominant, with US forces consuming 2.8 billion gallons (10.6 billion litres) of fuel in Afghanistan between Financial Year 2008 and Financial Year 2016, at a cost of 13 billion US dollars (2018 figures).<sup>181</sup>

The US DoD invested in improvements to military fuel sustainability for tactical elements, commensurate with investments to improve other (non-energy related) aspects of military technology. In Fiscal Year 2016, 1.8 billion US dollars was invested in 'operational energy initiatives', with the planned forward investment into fuel technology research, known as the Future Years Defense Program (over a five year period), estimated at 11.2 billion US dollars. The vast majority of that investment was directed at efforts to reduce tactical fuel demand through technology and equipment improvements, and investment comprised initiatives from each Service, the Defense Logistics Agency and the Office of the Secretary of Defense.<sup>182</sup> With annual Congressional oversight, investment programs represented a sustained effort by the US DoD to incrementally progress fuel technology for tactical purposes.

The 2015 creation of an Assistant Secretary of Defense for Energy, Installations, and Environment through the National Defense Authorization Act for Fiscal Year 2015 was an important organisational change,<sup>183</sup> with the consolidation of issues relating to deployed fuel and domestic energy consumption under a single Assistant Secretary of Defense. Some policymakers believed that this consolidation was important to achieve energy- and fuel-related improvements across the entire US DoD.<sup>184</sup>

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<sup>180</sup> United States Department of Defense, *Fiscal Year 2017 Operational Energy Annual Report*, 5-17.

<sup>181</sup> Special Inspector General for Afghanistan Reconstruction, *Management and Oversight of Fuel in Afghanistan: DoD is Taking Steps to Improve Accountability, but Additional Actions Are Needed* (SIGAR 18-41-IP Evaluation Report, April 2018), Summary.

<sup>182</sup> United States Department of Defense, *Fiscal Year 2016 Operational Energy Budget Certification Report* (Assistant Secretary of Defense for Energy, Installations, and Environment, C-2724CC9, July 2016), 3.

<sup>183</sup> United States Congress, *Carl Levin and Howard P. 'Buck' McKeon National Defense Authorization Act for Fiscal Year 2015* (Rules Committee Print 113-58, House Amendment to the Text of S. 1847, 2 December 2014), 423-424.

<sup>184</sup> United States Senate Committee on Armed Services, *Advance Questions for General Joseph F. Dunford, Jr., USMC, Nominee for the Position of Chairman of the Joint Chiefs of Staff* (Washington, D.C., 9 July 2017), 70.

However, the actions taken during the Obama Administration period could not be described as transformational, and larger initiatives proved to be challenging. The US approach to military fuel sustainability was characterised by attempts to retrofit fuel efficiency or alternative fuel measures into existing military equipment (rather than adopting them at the commencement of a procurement process), and the actions were often overstated and some were quietly discontinued. For example, a US Navy biofuels initiative was outlined in 2012, with an aim to reduce fuel consumption afloat by 15 per cent by 2020.<sup>185</sup> That objective was absent from any recent primary documentation, although the objective was claimed to be a success by Secretary Mabus in 2016.<sup>186</sup> Highlighting internal pressures, in an interview with a former Acting Under Secretary of the US Navy, Mr Tom Hicks argued that there was a lot of internal resistance within the Office of the Secretary of Defense to the US Navy renewable energy initiatives, but he believed that the Navy efforts to increase biofuel consumption were ‘ultimately right’, given that the costs of biofuels came down over time.<sup>187</sup>

‘Operational energy’ consumption figures showed that all Services reduced fuel consumption as combat operations in the Middle East were reduced, particularly from Fiscal Year 2012 to Fiscal Year 2013. However, fuel consumption has been steady since that reduction. In Fiscal Year 2012, Navy fuel consumption was 31.5 million barrels. Since the end of major US combat operations in the Middle East, Navy fuel consumption was 28.4 million barrels in 2013, 28.2 million barrels in 2014, 28.5 million barrels in 2015, and 28.5 million barrels in 2016 – inconsequential change over the course of four years,<sup>188</sup> and notable given that the primary goal of the Operational Energy Plans and Programs office in the US DoD was to reduce the demand for energy to ‘assure reliable supplies of energy for 21<sup>st</sup> century military operations.’<sup>189</sup> The consistent fuel demand is an indication of the extreme challenges associated with reducing fuel consumption when other more

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<sup>185</sup> Schwartz, Blakely and O’Rourke, *Department of Defense Energy Initiatives: Background and Issues for Congress*, 18.

<sup>186</sup> David Alexander, ‘“Great Green Fleet” using biofuels deployed by U.S. Navy’, *Reuters*, [website], (21 January 2016), <<https://www.reuters.com/article/us-usa-defense-greenfleet/great-green-fleet-using-biofuels-deployed-by-u-s-navy-idUSKCN0UY2U4>>, accessed 10 March 2019.

<sup>187</sup> Interview with Mr Tom Hicks, Acting Under Secretary of the United States Navy (2014-2017), Deputy Assistant Secretary of the United States Navy for Energy (2010-2013), conducted on 19 April 2019.

<sup>188</sup> United States Department of Defense, *Fiscal Year 2017 Operational Energy Annual Report*, 5-17.

<sup>189</sup> For example, see Burke, *Statement*, 1.



important considerations – such as maintaining readiness in the most capable military force – are prioritised.

The Fiscal Year 2017 Operational Energy Annual Report made clear that part of the Navy's biofuels initiative, funding for three commercial biofuels facilities in the US, was an earlier decision that was being enacted due to contractual arrangements that were established in 2014.<sup>190</sup> Some Republican Party representatives indicated that they would have sought to cancel this and other 'Obama-era initiatives that put a social agenda ahead of military readiness' if it were not for the contractual imperative,<sup>191</sup> demonstrating some of the challenges associated with implementing alternative fuel investments over time.

The progression of some of the initiatives presented to US Congress in the Fiscal Year 2017 Operational Energy Annual Report were doubtful. For example, a 2017 US Central Command initiative was the provision of an 'operational energy' advisor to US Central Command to 'champion operational energy' and 'increase reach and resilience of forces'.<sup>192</sup> However, a 2019 interview with the senior US Central Command fuel advisor indicated that awareness of fuel initiatives in US Central Command, and the overall importance of fuel at senior levels, was low. Concepts 'trickled down to the tactical level unknowingly to the individual soldier', with 'very little interest in fuel at Central Command'.<sup>193</sup> With this observation from the senior fuel expert in US Central Command, it was difficult to reconcile the claimed success of the declared initiative. It is almost certain that senior military commanders in US Central Command would be appraised of any major concern with fuel (as would be the case in other US geographical Commands)<sup>194</sup>, but the interview with the US Central Command fuels advisor suggested that the initiative presented to US Congress was not achieved.

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<sup>190</sup> United States Department of Defense, *Fiscal Year 2017 Operational Energy Annual Report*, 21.

<sup>191</sup> Travis Tritten, 'The Pentagon is quietly moving forward on biofuel deals. Republicans want to stop it', *Washington Examiner*, [website], (13 March 2018), <<https://www.washingtonexaminer.com/the-pentagon-is-quietly-moving-forward-on-biofuels-deals-republicans-want-to-stop-it>>, accessed 13 March 2019.

<sup>192</sup> United States Department of Defense, *Fiscal Year 2017 Operational Energy Annual Report*, 16-17.

<sup>193</sup> Interview with Chief Warrant Officer Joel Lane, US Central Command J4 Fuels Officer, conducted on 13 March 2019.

<sup>194</sup> Interview with Mr Daniel Fenton, US Special Operations Command (Defense Logistics Agency-Energy Liaison Officer), conducted on 9 May 2019.

In general terms, the period of the Obama Administration saw many modest US tactical fuel initiatives undertaken, such as efforts to reduce fuel demand from ships, aircraft and land forces, and a notable investment in fuel research. The retrofitting of a Navy warship with hybrid electric drives to extend its range and time between refuelling was a good example of a trial being commenced,<sup>195</sup> but with many challenges that prevented wider organisational up-take.<sup>196</sup> The Fiscal Year 2016 Operational Energy Annual Report stated, 'Consistent with prior years, DoD's Fiscal Year 2016 alternative fuels (research) investments...predominantly supported the qualification and certification of fuels',<sup>197</sup> another important, incremental objective allowing potential future fuel diversification that did not influence overall tactical consumption.

Such examples demonstrated the importance of ongoing fuel technology development to the US military, but there was no evidence of transformational change, even during what was a peak period for military fuel initiatives during Mabus' tenure as Secretary of Navy. Reflecting this continuity, the US DoD estimated that the 'level of energy use (across the US DoD) has been steady since Fiscal Year 2013', reflecting a consistent operational tempo,<sup>198</sup> but demonstrating that efforts to reduce military fuel demand were particularly difficult and were not achieved on an organisational scale despite the establishment of an Assistant Secretary of Defense position with a primary role to reduce tactical fuel demand.<sup>199</sup> Further, in an interview with a US Special Operations Command senior fuel specialist, Mr Daniel Fenton indicated that he had seen no major changes to the US approach to fuel over the period between the Obama and the Trump Administrations.<sup>200</sup> The argument commonly made by Australian commentators that the US had taken extensive military fuel sustainability measures, and that Defence should consequently do the same, should therefore be questioned.

Many fuel efficiency measures were progressed and were successful, however they were incremental initiatives. For example, reducing the amount of excess fuel carried on US Air

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<sup>195</sup> United States Department of Defense, *Fiscal Year 2016 Operational Energy Annual Report*, 21.

<sup>196</sup> Daniel Orchard-Hays and Laura King, 'Realize the Great Green Fleet', *Proceedings* (August 2017).

<sup>197</sup> United States Department of Defense, *Fiscal Year 2016 Operational Energy Annual Report*, 21.

<sup>198</sup> United States Department of Defense, *Fiscal Year 2017 Operational Energy Annual Report*, 21.

<sup>199</sup> For example, see Burke, *Statement*, 1.

<sup>200</sup> Interview with Mr Daniel Fenton, US Special Operations Command (Defense Logistics Agency-Energy Liaison Officer), conducted on 9 May 2019.

Force training missions, and conducting air-to-air refuelling at faster airspeeds, were important incremental improvements to reduce fuel usage and expenditure at specific times,<sup>201</sup> but were not fundamental changes, and fuel consumption rates and future estimates for the US DoD remained consistently above 85 million barrels per year.<sup>202</sup> Some of the initiatives were planned but not implemented. For example, the Army considered procurement of a 'Hybrid Humvee' for almost a decade, but the Joint Light Tactical Vehicle project, despite hybrid power options being widely publicised,<sup>203</sup> resulted in the 2015 agreement to procure a diesel-powered vehicle due to performance requirements.<sup>204</sup> This vehicle did achieve a level of fuel efficiency that exceeded some US DoD expectations<sup>205</sup> but was not a fundamental change to military fuel sustainability.

Some of the fuel initiatives explored during the 2010s were focused on urgent operational improvements, and these initiatives were well publicised, but overall fuel consumption did not change (or, it even increased). For example, General Petraeus sought technology to reduce fuel consumption to mitigate the severe threat to fuel convoys in Afghanistan,<sup>206</sup> however, other measures undertaken in Afghanistan, such as the armouring of Humvees to offer blast protection against improvised explosive devices, had the opposite effect, adding weight to the vehicles and significantly increasing fuel consumption.<sup>207</sup> The decision to increase route security for fuel and logistics convoys similarly resulted in more fuel consumption.<sup>208</sup> Ultimately, a large and technologically

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<sup>201</sup> United States Department of Defense, *Fiscal Year 2017 Operational Energy Annual Report*, 9-10.

<sup>202</sup> Ibid.

<sup>203</sup> Andrew Tarantola, 'The FED Hybrid Humvee Will Save the US Army Millions at the Pump', *Gizmodo*, [website], (30 December 2011), <<http://gizmodo.com/5869171/the-fed-humvee-is-going-to-save-the-army-millions-at-the-pump>>, accessed 1 March 2019; Lombardi, 'Hybrid Humvee Coming Up Over the Horizon'.

<sup>204</sup> Defense Update, Army, *USMC Set the JLTV in Motion* [website], (2008), <[https://web.archive.org/web/20080509080944/http://defense-update.com/features/du-1-08/jltv\\_in\\_motion.htm](https://web.archive.org/web/20080509080944/http://defense-update.com/features/du-1-08/jltv_in_motion.htm)>, accessed 10 April 2019.

<sup>205</sup> Inspector General United States Department of Defense, *Army and Marine Corps Joint Light Tactical Vehicle* (DODIG-2018-113, May 2018), i.

<sup>206</sup> Sandra Erwin, 'Pentagon Unveils Campaign Plan to Reduce Fuel Use', *National Defense Magazine*, [website], (June 2011), <<http://www.nationaldefensemagazine.org/articles/2011/6/14/pentagon-unveils-campaign-plan-to-reduce-fuel-use>>, accessed 15 April 2019, highlighted the desire of General David Petraeus to reduce fuel consumption in Afghanistan, as a measure to reduce the threat to convoys.

<sup>207</sup> Erwin, 'Pentagon's Influence in Green Energy Innovation Overestimated, Study Says', stated that a ten per cent increase in vehicle weight resulted in seven per cent more fuel consumption. The armour changed the weight of some Humvees from 2.5 tonnes to 4.5 tonnes.

<sup>208</sup> Warner and Singer, *Fuelling the Balance: A Defense Energy Strategy Primer*, 2; Scott Rew, 'Protecting Our Logistics Assets: A Look To The (Near) Future', *Army Logistician*, 41/3 (May-June 2009), 35-36.

sophisticated military commitment required a large fuel supply.<sup>209</sup> The theft of at least 154.4 million US dollars of US fuel in Afghanistan over a ten-year period, with detection only occurring ‘long after the theft began’, demonstrated that the US DoD viewed fuel in Afghanistan as a necessary expense and was careless in its oversight of fuel.<sup>210</sup>

The ‘Great Green Fleet’ was a Mabus-era initiative, which was comprehensively promoted in the public domain. At the launch of the fleet in 2016, Secretary Mabus claimed that the Navy was ‘greener’, with a ‘smaller carbon footprint’, and the fleet was an example of renewable energy usage resulting in ‘a strategic advantage’ for the Navy.<sup>211</sup> Given that much of the fleet was operating on a blend of only ten per cent biofuels and 90 per cent standard marine diesel – a fact not outlined in the speech – and the aircraft carrier was still powered by nuclear fuel, these were overstated claims.

The trend of commentators and others, who viewed military fuel sustainability through an environmental lens with less concern about military performance, was identified in the Australian context in Chapter Four, and this trend is evident in the US. The ‘Great Green Fleet’ initiative was reported widely and favourably by environmental groups, skewing the understanding of what the fleet entailed. For example, one organisation claimed that admirals ‘solve intractable problems that stymie the rest of us’, referring to issues of Peak Oil, foreign-sourced oil and climate change.<sup>212</sup> Another described the fleet as evidence of ‘the movement by the US Navy and other services to replace petroleum with renewable and non-polluting biofuels’, identifying the problem of others trying to ‘derail biofuels for the US military...and the rest of industrial America’.<sup>213</sup> The US DoD may be considered by some to be a legitimate entity to improve national environmental outcomes, and small US DoD initiatives were publicly over-emphasised by some commentators to encourage broader national environmental effort.

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<sup>209</sup> Special Inspector General for Afghanistan Reconstruction, *Management and Oversight of Fuel in Afghanistan: DoD is Taking Steps to Improve Accountability, but Additional Actions Are Needed*, Summary.

<sup>210</sup> Ibid.

<sup>211</sup> Ray Mabus, *Speech* (Deployment of the Great Green Fleet, Naval Air Station North Island, San Diego, 20 January 2016).

<sup>212</sup> Julia Whitty, ‘My Heart-Stopping Ride Aboard the Navy’s Great Green Fleet’, *Mother Jones*, [website], (March/April 2013), <<https://www.motherjones.com/environment/2013/02/navy-climate-change-great-green-fleet/>>, accessed 20 March 2019.

<sup>213</sup> *Our Environment Online*, ‘Rough Waters for the Great Green Fleet’, [website], (June 2012), <<http://www.ourevironment.info/rimpac.html>>, accessed 20 March 2019.

The US approach to air-to-air refuelling aircraft and Navy oil tankers was indicative of organisational consistency in military fuel sustainability, rather than transformational change.

Chapter Four argued that air-to-air refuelling is closely associated with the force projection of military power. The 44 billion US dollar military procurement of the US Air Force's latest air-to-air refuelling capability, the KC-46 Pegasus, was considered an essential measure and one of the US Air Force's top three procurement priorities over the course of the 2010s.<sup>214</sup> The US DoD media release outlining the requirement for the aircraft fleet stated, the 'aerial tanker is essential to all Air Force and Joint global operations', and described the aircraft fleet as 'Air Force's number one acquisition priority'.<sup>215</sup> The tanker fleet was described as 'the very fiber that holds our Air Force's unique global capabilities together', and senior US Air Force officers argued that 550 to 650 air-to-air refuelling aircraft may be needed within the US DoD.<sup>216</sup> US doctrine firmly positioned air-to-air refuelling as critical to allow air assets to reach an operational area with less reliance on forward bases, and to reduce the US DoD's requirement to focus on 'defensive' aspects.<sup>217</sup> Chapter Four highlighted the perceived importance of air-to-air refuelling in the Australian context, and Chapter Six will examine aspects of air-to-air refuelling in a nearer region case study.

Similarly, US Navy oil tankers are considered a high priority procurement for the US Navy. At a cost of over one billion US dollars (2019 figures) per vessel, the planned fleet of 20 John Lewis Class Oiler Tankers (T-AO 205) is a significant investment.<sup>218</sup> Like the air-to-air refuelling aircraft, maritime oil tankers improve US Navy force projection and time in forward deployed areas, reducing the complexities of refuelling in (potentially) hostile ports and regions. The oil tankers are 'critical to the Navy's ability to project warfighting

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<sup>214</sup> James Martin, *Department of Defense Press Briefing on the Financial Year 2017 Air Force Budget Request*, [website], (9 February 2016), <<https://dod.defense.gov/News/Transcripts/Transcript-View/Article/654828/departments-of-defense-press-briefing-by-maj-gen-martin-brig-gen-fienga-and-depu/>>, accessed 8 April 2019.

<sup>215</sup> United States Department of Defense, *Air Force Posts Requests for Proposals for Tankers*, [website], (30 January 2007), <http://archive.defense.gov/Releases/Release.aspx?ReleaseID=10463>>, accessed 15 March 2019.

<sup>216</sup> Bolkcom, *Air Force Aerial Refuelling*, 1.

<sup>217</sup> United States Department of Defense, *Joint Publication 3-17: Air Mobility Operations* (Joint Chiefs of Staff, 5 February 2019), VI-1.

<sup>218</sup> O'Rourke, *Navy John Lewis (TAO-205) Class Oiler Shipbuilding Program: Background and Issues for Congress*, Summary.

power', and ensure that maritime refuelling can be conducted 'independent of any restrictions (from) a foreign country'.<sup>219</sup> The submission to the US Congress outlining the importance of the oil tanker program did not highlight any considerations regarding alternative energy requirements such as biodiesel supply, another indication that performance was the dominant consideration.<sup>220</sup>

Reinforcing the centrality of oil tankers to US force projection, an official investigation into the October 2000 bombing of the United States Ship (USS) Cole in Yemen highlighted that although there was no single reason why the attack was effective, a previous reduction in US Navy operational assets including fleet oil tankers was considered to be important. As the USS Cole was conducting a 'single ship transit', no refuelling assets could be positioned to provide a refuelling service, and the USS Cole was forced to rely upon 'non-organic support' for fuel (that is, fuel from a foreign nation).<sup>221</sup> The US ability to maintain a high degree of self-sufficiency for maritime fuel resupply was a significant difference from the Australian approach, which often relied on US support for tactical maritime fuel provision.<sup>222</sup>

There was no opposition in the US about the need for air-to-air refuelling aircraft or oil tankers to be procured, and there was no change to this political and military view through the Obama and Trump Administrations. US global force projection depended upon these platforms, and they have been central to US military doctrine for many decades.<sup>223</sup> However, the comparison between these force projection platforms, and US DoD measures to reduce fuel consumption or diversify fuel supplies, is worth making. In the case of air-to-air refuelling aircraft and fleet oil tankers, the US Congress and US DoD investment of tens of billions of dollars over the life of the platforms, plus more for fuel costs, reinforces military fuel sustainability continuity for many decades.<sup>224</sup> US DoD fuel

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<sup>219</sup> Ronald O'Rourke, *Navy TAO(X) Oiler Shipbuilding Program: Background and Issues for Congress* (Congressional Research Service, Washington, D.C., 6 February 2015), 6.

<sup>220</sup> Ibid.

<sup>221</sup> United States House Armed Services Committee, *The Investigation into the Attack on the USS Cole*, 15-16.

<sup>222</sup> *Naval Today*, 'HMAS Newcastle Holds Two RAS Operations', [website], (21 August 2003), <<http://navaltoday.com/2013/08/21/hmas-newcastle-makes-two-ras-operations/>>, accessed 10 April 2019.

<sup>223</sup> United States Navy, *Naval Doctrine Publication 4: Naval Logistics*, 14-15.

<sup>224</sup> O'Rourke, *Navy John Lewis (TAO-205) Class Oiler Shipbuilding Program: Background and Issues for Congress*, Summary.

efficiency initiatives such as those outlined in annual fuel reporting to Congress were notable, but they were incremental, and of marginal importance when compared to major capital acquisition such as the air-to-air refuelling aircraft and oil tankers. The US DoD was not expected to halt or change its force projection programs just to reduce fuel consumption, given the exceptional mission it may be directed to undertake.

In summary, there was incremental improvement to US military fuel sustainability across a number of decades. The change in rhetoric since the Trump Administration came to power has been pronounced, but is still a reflection of the incremental actions that have occurred to improve or change military fuel sustainability during previous Administrations. There has been no change to US military fuel consumption since the end of major combat operations in the Middle East, and there is a forecast of increasing consumption as new equipment is introduced, despite measures such as the establishment of an Assistant Secretary of Defense to reduce tactical fuel consumption across the organisation. Commentators who argued that Australian policymakers should follow the US lead in reducing tactical fuel consumption, or changing tactical force structure to allow adaptation to climate security concerns, either misrepresented or misunderstood the extent of the measures that were undertaken by the US. For important procurement decisions relating to both US and Australian national security, particularly involving the operational fuel consumption that comprised 75 per cent of US DoD energy usage, military capability remains the fundamental consideration. Most US changes to energy consumption were focused on domestic, non-tactical facilities. Chapter Two highlighted that growth in fuel consumption was accepted when there was improvement to the performance of military equipment during major twentieth-century conflict, with sufficient fuel expected to be made available to allow operation of the most technologically sophisticated military equipment.

The key difference between Australia and the US is that the US DoD continued to pursue measures and equipment (such as air-to-air refuelling aircraft and Navy oil tankers) to allow it to be militarily self-sustainable in a large conflict, recognising broad US strategic interests. In contrast, Australian policymakers have not sought military self-sufficiency, and maintained an expectation of US logistical support for these contingencies, to be

examined further in Chapter Six. The cost of energy remains a factor in the US, and this will now be examined.

### **Cost as an influence on United States military fuel sustainability**

US DoD fuel and energy costs are regularly reported to US Congress, and there is an ongoing tension between annual energy expenditure, proposals to reduce this expenditure, and the implementation of legislation to increase the proportion of renewable energy consumption in domestic facilities. While this thesis is specifically focused on fuel, it is important to highlight specific US domestic actions to demonstrate where the weight of US action relating to energy expenditure has been. US domestic energy actions are also important because they are often conflated with tactical fuel consumption actions, creating a perception that more tactical actions are being taken.

US political interest in military fuel and energy costs was most significant when the price of crude oil was heightened concurrently with major combat operations being undertaken. Concern was less evident when crude oil prices were steady, or when there were fewer military operational commitments. Concerns about fuel prices were reflected in US DoD documents. The Defense Science Board observed in 2008, 'DoD actions taken were stimulated by high oil prices',<sup>225</sup> and this was reiterated in later Defense Science Board analysis.<sup>226</sup> The Army's 2009 'Energy Security Implementation Strategy' was prefaced by, and mostly focused on, discussion about the flawed 'assumption that low cost energy would be readily available'.<sup>227</sup> The 'key point' of the DoD Energy Manager's Handbook was that energy conservation delivered 'a wide range of benefits, including dollar savings.'<sup>228</sup> The 2012 'Operational Energy Strategy' situated the cost of fuel as a key

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<sup>225</sup> United States Defense Science Board, *More Fight, Less Fuel*, 23.

<sup>226</sup> The Pew Project, *Reenergizing America's Defense: How the Armed Forces are Stepping Forward to Combat Climate Change and Improve the US Energy Posture* (The Pew Charitable Trusts, Washington and Philadelphia, 2010), 9-11.

<sup>227</sup> United States Army, *Army Energy Security Implementation Strategy*, i.

<sup>228</sup> United States Department of Defense, *Energy Managers Handbook* (Washington, D.C., 25 August 2005), 1.



reason to improve military fuel sustainability.<sup>229</sup> Former Defense Secretary Carter considered energy cost savings as a key accomplishment during his tenure.<sup>230</sup>

A relative lull in concern about fuel consumption expenditure after 2016 in declared policy was coincidental with a lull in global oil prices and a reduction in operational tempo in the Middle East.<sup>231</sup> Similarly, there was little concern in US DoD policy about fuel prices prior to the mid-2000s, evidenced by the lack of response to the 2001 Defense Science Board report, highlighted earlier in this chapter.

Legislation to achieve energy efficiency on domestic US military bases has been regularly developed since the mid-2000s, and often introduced into Congress.<sup>232</sup> Furthermore, US Administrations sought at various times to implement Executive (non-legislative) policy to compel or encourage departments to improve energy efficiency, again focused domestically. Other policies sought energy efficiencies across all US federal departments.<sup>233</sup>

Thomas summarised a number of US DoD initiatives to reduce domestic energy consumption, of which there were many. Although Thomas considered it ‘unarguable’ that there was recognition within the US military that climate change and energy consumption was now ‘mainstreaming’ and had ‘stimulated action’,<sup>234</sup> none of the initiatives would be described as transformational, nor were any major initiatives successfully targeted at tactical units.

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<sup>229</sup> United States Department of Defense, *Energy for the Warfighter: Operational Energy Strategy*, Introduction.

<sup>230</sup> Ashton Carter, *Department of Defense Accomplishments (2009-2016)* (Cabinet Exit Memo, 5 January 2017), 18.

<sup>231</sup> Macrotrends, *Crude Oil Prices – 70 Year Historical Chart*, [website], (2019), <<https://www.macrotrends.net/1369/crude-oil-price-history-chart>>, accessed 10 April 2019.

<sup>232</sup> Also known as the Clean Energy Act 2007. The key aspects of the legislation were summarised in United States Congressional Research Service, *Energy Independence and Security Act of 2007: A Summary of Major Provisions*, 5-8.

<sup>233</sup> Philip Grone, *Federal Leadership in High Performance and Sustainable Buildings* (Memorandum of Understanding, Washington, D.C., 2005), 1. Only a commitment to ‘federal leadership’ in sustainable building design was made.

<sup>234</sup> Michael Thomas, ‘The Securitisation of Climate Change: a military perspective’, *Australian Defence Force Journal*, 192 (2013), 12-14.

Many of the US energy initiatives focused on increasing the proportion of renewable energy in domestic use,<sup>235</sup> as pressure began to be applied to achieve higher percentages directed in Executive Order 13693 (which directed, in 2015, all federal departments to achieve 25 per cent renewable energy consumption by 2025). This required significant US DoD action, although it was not a US DoD initiative, and there were indications that the US DoD had made sound progress in achieving directed renewable energy targets.<sup>236</sup> Such gains only came about after significant investments in renewable energy generation.<sup>237</sup>

Even within the domestic environment, the exceptional nature of the military mission resulted in examples of some different treatment applied to the US DoD by Congress and US Administrations, when compared to other government departments. This was consistent with observations about Australia from Chapter Four. The US DoD was the sole beneficiary of certain exemptions from efficiency measures. For example, President Clinton's Executive Order 13123 of 1999 compelled departments to achieve energy efficiency goals, with stringent rules placed on exemptions, but with the caveat that 'the DoD is subject to this order to the extent that it does not impair or adversely affect military operations and training',<sup>238</sup> evidence that the US military was considered to have an exceptional role (beyond the military commitments to overseas operations) and was not facing a major military threat. The US DoD was not penalised for failing to meet other legislated energy requirements.<sup>239</sup> Agreed inter-departmental measures were applied to domestic bases, such as metering and efficient siting of buildings, although whilst the US DoD participated in the setting of federal energy consumption objectives, it was often not obliged to act.<sup>240</sup>

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<sup>235</sup> Warner and Singer, *Fuelling the Balance: A Defense Energy Strategy Primer*, 3; The Pew Project, *Reenergizing America's Defense: How the Armed Forces are Stepping Forward to Combat Climate Change and Improve the US Energy Posture*, 13; Ray Davidson, 'The Marine Corps Energy Strategy: Impacting our Operational Effectiveness', *Marine Corps Gazette*, 94/7 (July 2010), 38, highlighted the US Marine Corps goal of 'net zero energy consumption at domestic bases'.

<sup>236</sup> United States Department of Defense, *Annual Energy Management and Resilience (AEMR) Report: Fiscal Year 2016* (Office of the Assistant Secretary of Defense for Energy, Installations, and Environment, July 2017), 31.

<sup>237</sup> Andrews, *Department of Defense Facilities Energy Conservation Policies and Spending*, Summary Page.

<sup>238</sup> The White House Office of the Press Secretary, *Executive Order 13123 – Greening the Government Through Efficient Energy Management* (Washington, D.C., 3 June 1999).

<sup>239</sup> United States Army, *Power and Energy Strategy White Paper*, 6, highlighted that the US DoD did not meet federal targets in financial year 2009.

<sup>240</sup> Grone, *Federal Leadership in High Performance and Sustainable Buildings*.

In summary, periodic efforts to achieve cost savings and to increase the percentage of renewable energy consumption in domestic facilities have been made. This was mostly in response to political direction. However, no cost constraints were placed on operational fuel consumption. This chapter will now examine the ‘fully burdened cost of fuel’ – a concept that had the potential to allow greater scrutiny of fuel costs when delivered to forward deployed elements, but which was also not fully implemented.

### *The fully burdened cost of fuel*

A 2001 Defense Science Board report proposed that the US DoD use an estimate it labelled the ‘fully burdened cost of fuel’ (FBCF) when assessing alternative options for major capital procurements or other concepts. The FBCF was said to encompass the ‘true costs’ of delivering fuel to tactical forces and not just the nominal price. The FBCF was thought to be a more accurate measure of fuel costs, as it would include the costs of the extensive structures that each Service and the Defense Logistics Agency-Energy must put in place to support fuel delivery, ranging from fuel trucks to Navy oil tankers to air-to-air refuelling aircraft;<sup>241</sup> minor costs when operating domestically, but potentially large costs when deployed offshore. Air-to-air refuelling was estimated to raise the cost of fuel by up to 20 times the market price,<sup>242</sup> noting that this at least partly became a sunk cost once the air-to-air refuelling aircraft were purchased. The FBCF was thought to offer a better understanding of the risks and costs associated with fuel security and deployment.<sup>243</sup>

The Defense Science Board recommendation gained wider exposure during the Iraq conflict, where it was estimated that in some cases, a gallon (approximately 3.78 litres) of fuel delivered to forward troops could cost 400 US dollars (2009 figures),<sup>244</sup> compared to the average price of gasoline at the same time of less than three dollars per gallon. A purely quantitative assessment of the FBCF does not consider the lives lost in supplying fuel, an impossible to quantify but important factor for the US DoD given the earlier estimates of US casualties.<sup>245</sup> Australia did not face the same significant costs (in resources

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<sup>241</sup> United States Defense Science Board, *More Capable Warfighting Through Reduced Fuel Burden*, ES-3.

<sup>242</sup> Ibid, 19.

<sup>243</sup> Ibid, 15.

<sup>244</sup> Ray Mabus, *Speech* (Naval Energy Forum, McLean, Virginia, 14 October 2009).

<sup>245</sup> The CNA Military Advisory Board, *Advanced Energy and US National Security*, 38.

and in lives lost) in the Middle East since 2001, given the fuel supply was provided by the US or by commercial entities.

A 2007 policy memo stated, 'It is (DoD) policy to include the fully burdened cost of delivered energy in trade-off analyses conducted for all tactical systems...consistent with mission requirements and cost effectiveness.'<sup>246</sup> Going further, the Duncan-Hunter National Defense Authorization Act for Fiscal Year 2009 legislated the US DoD requirement to include the FBCF in 'the life-cycle cost analysis for new capabilities'.<sup>247</sup> However, despite annual US DoD fuel expenditure rising above 20 billion dollars (2010 figures),<sup>248</sup> and despite the legislative requirement to use the FBCF to compare different equipment types prior to procurement, the Defense Science Board recommendation to apply the FBCF in planning was not broadly implemented by the US DoD,<sup>249</sup> and aspects of the FBCF were hidden in broader US operational costs – for example, the cost of air-to-air refuelling was not included in the estimates of fuel costs over a ten year period in Afghanistan.

With some exceptions,<sup>250</sup> there was an absence of FBCF terminology from within key US DoD fuel publications, such as the Fiscal Years 2016 and 2017 Operational Energy Annual Reports and the 2016 Operational Energy Strategy.<sup>251</sup> Publicly-released US DoD policy even criticised the concept; for example, the 2012 Operational Energy Strategy acknowledged the 'profound implications' that force structure and posture had on fuel demand, arguing that the FBCF was of limited use because new equipment has long procurement times and decisions had already been made to procure equipment that would result in an increase in fuel consumption.<sup>252</sup> The term was absent from the primary

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<sup>246</sup> Under Secretary of Defense (Acquisition, Technology and Logistics), *Fully burdened cost of fuel pilot program*, 1-2.

<sup>247</sup> United States Government, *Duncan Hunter National Defense Authorization Act for Fiscal Year 2009* (Public Law 110-417, 14 October 2008), 4420.

<sup>248</sup> The Pew Project, *Reenergizing America's Defense: How the Armed Forces are Stepping Forward to Combat Climate Change and Improve the US Energy Posture*, 9.

<sup>249</sup> Erwin, 'Pentagon's Influence in Green Energy Innovation Overestimated, Study Says', stated that no information on FBCF costs had been made public.

<sup>250</sup> United States Army, *Army Energy Security Implementation Strategy*, 10-11, used the term 'Fully Burdened Cost of Energy', in non-binding terms for capability development, and discussed the use of an 'energy security premium', an incremental cost above commodity consumption, to assure critical activities.

<sup>251</sup> Department of Defense, *Fiscal Year 2017 Operational Energy Annual Report*.

<sup>252</sup> United States Department of Defense, *Energy for the Warfighter: Operational Energy Strategy*, Introduction.

US fuel doctrine publication, although the need to reduce the cost of fuel was highlighted several times.<sup>253</sup> A 2012 summary of US DoD 'energy initiatives' to Congress outlined some frustration with the 'widely repeated' FBCF figures quoted in the 2001 Defense Science Board report.<sup>254</sup>

In a more recent interview with a representative of the Defense Logistics Agency-Energy, Mr Edwin Cruz indicated that the FBCF 'is still being studied by different organisations',<sup>255</sup> despite the fact that the concept was first proposed almost two decades earlier and legislated 12 years earlier.

Implementation of the FBCF concept proved difficult in the US DoD, despite policy and legislation being enacted. This chapter contends that the limited price sensitivity associated with fuel consumption on military operations, and the view that the exceptional military role should be resourced as a priority and provided with the most capable equipment no matter the fuel bill, are two primary reasons why the FBCF failed to gain organisational traction.

Air-to-air refuelling aircraft present a relevant example. FBCF calculations identify air-to-air refuelling as one of the most expensive ways to provide fuel to a tactical unit.<sup>256</sup> However, air-to-air refuelling was considered one of the fundamental requirements for the projection of air power, with no question that air-to-air refuelling was central to US force projection.<sup>257</sup> FBCF analyses (also sometimes referred to as fully burdened cost of energy analyses) have used short combat scenarios to identify comparative costs associated with different air-to-air refuelling aircraft. FBCF analyses were not used to determine whether air-to-air refuelling aircraft were a cheaper or more expensive option

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<sup>253</sup> United States Department of Defense, *Joint Publication 4-03: Joint Bulk Petroleum and Water Doctrine*, II-1.

<sup>254</sup> Schwartz, Blakely and O'Rourke, *Department of Defense Energy Initiatives: Background and Issues for Congress*, 6.

<sup>255</sup> Interview with Mr Edwin Cruz, Defence Logistics Agency-Energy Middle East Liaison Officer, conducted on 15 March 2019.

<sup>256</sup> United States Department of Defense, *Energy for the Warfighter: Operational Energy Strategy*, 18.

<sup>257</sup> Bolkcom, *Air Force Aerial Refuelling*, 1.

than other refuelling options,<sup>258</sup> which was the original intent of the Defense Science Board recommendation in 2001. The 2001 Defence Science Board report stated,

(Air-to-air refuelling) tanker procurement costs should be included in cases where the choice involves buying new tanker assets versus re-engining receiver aircraft to gain greater fuel efficiency and thus reduce tanker requirements...improving the efficiency of receivers is the equivalent of acquiring additional tanker capacity, without incurring the operations and support costs.<sup>259</sup>

A calculation comparing different air-to-air refuelling aircraft would only ever result in a marginal assessment of fuel costs, and therefore be hardly worth the effort. If the FBCF costs were calculated as the Defence Science Board intended, the question of whether an air-to-air refuelling aircraft would be required in large numbers would be asked. However, policymakers were consistently clear about the requirement for the air-to-air refuelling aircraft, a platform needed for an exceptional military role, regardless of the fuel costs.

Further, FBCF calculations would also provide more scrutiny of fuel data, when in some cases such scrutiny may not be desired. For example, a 2018 audit showed a distinct lack of accountability for fuel in Afghanistan. In challenging circumstances, the theft of fuel in Afghanistan was commonplace,<sup>260</sup> although more detailed scrutiny of this fuel data (or resultant actions to ensure greater fuel accountability) could present other problems, such as making it more difficult for Afghanistan's security forces to receive fuel for essential military operations. A 2016 Government Accountability Office report argued that the US DoD should do more to improve the accuracy of fuel consumption information.<sup>261</sup> The vast quantities of fuel and large number of different contracts dealt with by organisations such as the Defence Logistics Agency-Energy meant that accuracy was an

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<sup>258</sup> United States Department of Defense, 'Fully Burdened Cost of Energy – A Computational Framework for Acquisition Tradespace Analyses', *Defense Acquisition University*, [website], <<https://www.dau.mil/policy/PolicyDocuments/the695TAB%20A%20-%20FBCE%20Framework.pdf>>, accessed 10 April 2019.

<sup>259</sup> United States Department of Defense, *Energy for the Warfighter: Operational Energy Strategy*, 18.

<sup>260</sup> Special Inspector General for Afghanistan Reconstruction, *Management and Oversight of Fuel in Afghanistan: DoD is Taking Steps to Improve Accountability, but Additional Actions Are Needed*, Summary.

<sup>261</sup> United States Government Accountability Office, *Bulk Fuel: Actions Needed to Improve DoD's Fuel Consumption Budget Data*, Highlights.

ongoing challenge,<sup>262</sup> with a lack of ‘end-to-end energy visibility’ of supply chains.<sup>263</sup> Given the level of public scrutiny of military fuel sustainability, particularly since 2012, the lack of accuracy in fuel consumption figures – from an organisation (the US DoD) that is well-versed in data collection – is consistent with a view that fuel is a necessary cost of undertaking the exceptional military role, and accuracy of reporting is less important than ensuring sufficient fuel for military operations.

Some argued that crude oil price volatility was of concern during tactical operations,<sup>264</sup> including the Defense Science Board itself;<sup>265</sup> other US policy documents (generally when crude oil prices were high);<sup>266</sup> and some Australian commentators.<sup>267</sup> Fuel price volatility can affect annual budgets. However, FBCF calculations demonstrate that crude oil price fluctuations have far less effect when all FBCF costs are considered. For example, assuming the Defense Science Board estimate of 400 US dollars per gallon for certain scenarios is accurate, a one dollar change to the price of a gallon of fuel – a significant change – would only affect the FBCF estimate by 0.025 per cent, because most of the costs are associated with factors such as the delivery platforms rather than the fuel. For air-to-air refuelling, estimated to cost up to 20 times the basic price of fuel, a one dollar per gallon change would not affect the estimate by more than two per cent.

The reality is that US policymakers have been prepared to pay for fuel into operational areas like the Middle East, regardless of price fluctuations, and this research observed no fuel price sensitivity. US policymakers were also consistently prepared to pay for the most capable military equipment, regardless of fuel consumption. Some of the methods for reducing the cost associated with price fluctuations – such as reducing tactical consumption – were unacceptable to US policymakers.

FBCF calculations further demonstrate that *conflation* of national and military fuel issues could skew the understanding of the two related but separate issues. Small fuel price rises

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<sup>262</sup> Department of Defense, *Fiscal Year 2017 Operational Energy Annual Report*, 18-20.

<sup>263</sup> United States Department of Defense, *Fiscal Year 2016 Operational Energy Annual Report*, 9.

<sup>264</sup> Meg Slattery, ‘Energy Security in the United States Department of Defense: How and why the U.S. Army and Navy are reducing their reliance on fossil fuels and the electrical grid, and what it could mean for the rest of us’, *Senior Capstone Projects* (Paper 408, Vassar College, 2015), 13.

<sup>265</sup> United States Defense Science Board, *More Capable Warfighting Through Reduced Fuel Burden*, 1; United States Defense Science Board, *More Fight, Less Fuel*, 14.

<sup>266</sup> United States Department of Defense, *Fiscal Year 2012 Operational Energy Annual Report*, 11.

<sup>267</sup> Cameron Leckie, ‘Peak Oil and the Australian Army’, *Australian Army Journal* (Summer 2007), 23-25.

can have a significant national and political effect. However, in a tactical context, the FBCF calculations demonstrated that significant fuel price changes can be negligible in the military context, because of the much larger costs associated with securing and distributing the fuel to tactical units.

The declared concerns about price volatility during tactical operations<sup>268</sup> distract from the key fact that the FBCF highlights – the equipment and support required to distribute fuel to tactical users is vastly more expensive, and more relevant to expenditure, than fluctuating crude oil prices. Fluctuating fuel prices may be more relevant to less demanding domestic tasks, where the costs of fuel delivery closely resemble the fully burdened costs.

The mere fact that the FBCF was developed indicates that fuel is a logistical commodity of greater importance or interest than other logistical commodities. Fuel is the only logistical commodity that the Defence Science Board analysed from a ‘fully burdened cost’ perspective, and is the only fully burdened cost that attracted legislative efforts. Most (if not all) other logistical commodities face similar costs associated with forward deployment into conflict zones. For example, a fully burdened cost of rations would comprise costs relating to security and distribution (similar to those proposed by the Defence Science Board for the FBCF), increasing the cost of those rations well beyond the point of purchase price. Similar to fuel, demand for rations is inelastic, with no clear substitute and little variation in demand despite the price, because military personnel need to eat. Rations, like fuel, are essential for the accomplishment of a military mission.

The fact that rations are not considered as a fully burdened cost, but fuel is at least partially implemented in force design planning, is partly due to the relative magnitude of the fuel supply challenge. For example, the Defence Science Board identified that fuel subsumed ‘over 70 per cent of the tonnage required to position today’s US Army into battle’.<sup>269</sup> Further, the evidence presented in this chapter highlights a sense of exaggerated concern associated with foreign fuel supply, and the Defense Science Board decision to consider fuel as a fully burdened cost was at least partly another mitigation

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<sup>268</sup> Such as Jerry Warner and Peter Singer, *Fuelling the Balance: A Defense Energy Strategy Primer*, 6.

<sup>269</sup> United States Defense Science Board, *More Capable Warfighting Through Reduced Fuel Burden*, ES-1.



measure that was proposed, but not implemented. The Defence Science Board highlighted its concern about the 'uncertainty' associated with 'state secrets' of oil producing countries as a basis for the study.<sup>270</sup> Exaggerated concern associated with a desire for assured fuel supply raised the profile of fuel, compared to other logistic commodities.

The FBCF is most relevant to a nation that must independently deploy military force in an expeditionary manner. The concept is therefore more relevant to the US than to Australia. Australia did not pay a FBCF in recent operations in the Middle East, because it received fuel supply from the US.<sup>271</sup> The concept of applying a fully burdened cost to fuel was not found in any Australian policy or doctrine during the research for this thesis; that is not to suggest that Australian policymakers should implement such a calculation as the US has done, but the need for US interoperability deeply pervades Australian policy across all areas. With the FBCF a widely discussed and legislated US requirement, its absence from Australian policy is consistent with an expectation that the fully burdened costs of an independent deployment would either be dealt with at the time of this (unlikely) scenario given the exceptional nature of the military mission, or that there is an expectation of receiving fuel from the US when supporting US military operations. The sensitivity of Australian military commanders to fuel price fluctuations as a predominant concern about fuel, outlined in Chapter Four, is also consistent with a force that does not have to independently pay the full cost of projecting and distributing fuel into an operational environment. Further, Chapter Six will examine Australia's approach to supply line security – a key cost contained within the FBCF. A lack of focus on supply line security would also be consistent with an expectation of supporting US operations rather than having to independently undertake this particularly challenging task – but such a task is central to key contingency scenarios such as the scenario explored in Chapter Six.

In summary, the lack of US commitment to understanding and implementing the FBCF, despite policy and legislative requirements to do so, is an indication that US policymakers seek the most capable military force, to conduct independent operations, regardless of

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<sup>270</sup> United States Defense Science Board, *More Fight, Less Fuel*, 11.

<sup>271</sup> Interview with Mr Craig McConachy, Australian Fuel Contract Manager – Middle East and North Africa Region (2019), conducted on 13 February 2019.

the cost. The FBCF is a useful framework to compare the costs of different means of supplying fuel to tactical units, but it is not used by the US in that manner – the US pre-determination that air-to-air refuelling is an essential component of US force projection means that considering its costs against other options (such as improving the fuel efficiency of receiving aircraft) is pointless. The US is prepared to pay a premium FBCF, because it needs to do so to deploy military force globally, and many of its FBCF costs are sunk costs once equipment such as air-to-air refuelling aircraft is procured. In comparison, the lack of reference to a concept such as the FBCF in Australian policy is consistent with an expectation of operating in support of a US mission, rather than having to pay for the FBCF during independent operations in the nearer region.

### **Reflections on Australian military fuel sustainability**

As the world's pre-eminent superpower able to militarily act independently when required, the US approach to military fuel sustainability has some unique features, when compared to any other military force. The scale of the indigenous fuel technology research and development effort, the size of the budget able to be applied to military fuel sustainability, and the global military posture, are all distinctive US aspects. Furthermore, there is a consistent sense of US military exceptionalism, and a belief that the military can make significant changes to its technology and structure when required or when advantageous.

Despite these differences, a number of aspects of this case study can be reflected upon to identify factors affecting Australian military fuel sustainability.

First, the US continues to improve aspects of its military fuel sustainability in an incremental manner, not in a transformational way. Despite significant publicity surrounding concepts such as the 'Great Green Fleet', overall US military fuel consumption is still considered to be on an upward trajectory as new, technologically sophisticated equipment is introduced.<sup>272</sup> The consistent argument made by commentators in Australia, that Defence should do more to improve its military fuel sustainability (and to improve sometimes related aspects such as its environmental performance) because the US is doing so is a major discrepancy in the literature – although in some ways the commentary

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<sup>272</sup> United States Department of Defense, *2016 Operational Energy Strategy*, 9.

reached an understandable conclusion (that the US is doing a great deal to influence military fuel sustainability), because there is a large amount of repetitive publicly available information and unquestioning support from US commentators which makes it appear as though US actions taken are more substantial than is in fact the case. Defence's progression in military fuel sustainability must be accurately contextualised with the actual US progression, when the two military forces are being compared. The US rhetoric often outpaced its actual military fuel sustainability development, demonstrating the *politicisation* often associated with this issue. The Trump Administration was mostly silent on military fuel sustainability, and an absence of overstated rhetoric (when contrasted with the Obama Administration) paints a more accurate picture of incremental improvement to military fuel sustainability in line with all other aspects of US military technology development.

Second, the significant cost of fuel for the US military resulted in no perceivable impact or restriction on fuel consumption during US military operations. This view is strengthened by the lack of US DoD undertaking to fully adopt the fully burdened cost of fuel (FBCF) into its procurement costs, equipment design and other estimates. When triangulated with Chapter Four, this is consistent with findings on operational costs for the Australian military, and speaks to the issue of military exceptionalism. Concern about fuel costs was also exaggerated when the Australian or the US military was asked to undertake a particular mission, as there was less price sensitivity associated with fuel for that mission because of an expectation of receiving the resources should they be required. Chapter Four highlighted that Australia policymakers viewed the cost of purchasing fuel in the Middle East as the price of being militarily committed in that region.

Third, security of tactical fuel supply operations remains firmly within the consciousness of the US military, after suffering heavy personnel and materiel losses in fuel convoys in Iraq and Afghanistan in the 2000s and early 2010s, and this is reflected in contemporary policy. Chapter Four raised doubts that Australian policymakers have a similar approach to fuel supply security,<sup>273</sup> a pre-requisite for independent military operations against a credible threat force, and Chapter Six will triangulate this information further using a case study more relevant to Australia than the strategic interests of its ally (in the Middle East).

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<sup>273</sup> Allan Hawke and Ric Smith, *Australian Defence Force Posture Review* (Canberra, 30 March 2012), 3.

If there is no such consciousness of tactical fuel supply security in Australia, given the successful reliance on US fuel supply during previous conflicts,<sup>274</sup> this would be consistent with an expectation that support to US missions is the most likely contingency that Defence would have to plan for in the future, and a view that there would be time to build up forces to allow independent operations should they be required. Placing fuel interoperability with US forces as a higher priority than providing for more independent operations is another indication.<sup>275</sup>

Fourth, semi-structured interviews revealed that the US has a heavy reliance on, and overall expectation of, using commercial providers to buy fuel and to transport that fuel to tactical forces. Defense Logistics Agency-Energy maintains a large global network to facilitate this, and the US military consumes enough fuel (and is prepared to pay a sufficient price) for commercial providers to consider this a viable arrangement. However, unlike Australia, the US maintains the tactical capabilities, such as fleet oil tankers, to allow independent supply in a high-threat military operation when required. As a superpower with broad geostrategic interests and a requirement for independent global military reach, the US consistently invested in tactical fuel provision capacity, to ensure no constraints on expeditionary military operations. Chapter Six will outline the significant current reliance on commercial fuel providers for supply to Australia's 'bare bases' in northern Australia, and the limited integral military fuel supply options available.

Fifth, an exaggerated sense of concern pervaded US discussions about energy, with the imprecise *conflation* of national energy issues with military fuel sustainability. Commentary on potential geological supply risks was not influential with policymakers. More influential was concern about political constraints on fuel, with the risk that a hostile political action would affect military fuel sustainability. However, this concern was also overstated, with periodic examples of the US DoD taking some measures to improve independent provision of fuel, but then over time reverting to more expedient options to procure fuel from the global market. Further, the concept of military exceptionalism is

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<sup>274</sup> Bob Breen, *Struggling for Self Reliance: Four Case Studies of Australian Regional Force Projection in the Late 1980s and the 1990s* (Strategic and Defence Studies Centre, Canberra Papers on Strategy and Defence, No. 171, ANU E Press, Canberra, 2008), 11, argued that Australia was dependent on allies for the first 100 years of its military history.

<sup>275</sup> Interview with Mr Andrew Gillespie, Defence Director of Strategic Fuel, conducted on 24 November 2010. Mr Gillespie identified that fuel interoperability with the US was one of his main priorities.

again relevant, as the military would be prioritised for national resources if there was a genuine military need. This sense of exaggerated concern may be reflected in the planned 2019 review of Australia's liquid fuel security, although based on the US approach, the likely outcome of the review will be limited change – a continuation of existing military fuel supply mechanisms because they are the cheapest and most expedient.

## **Conclusion**

This US military fuel sustainability case study is relevant to understanding the Australian context for a number of reasons. The close alliance over many decades; the Australian bipartisan demand for military interoperability with the US; the vast distance both nations are required to operate across; the view of military exceptionalism and prioritisation of resources for military purposes in both nations should the need arise; and, the commonalities in the literature identified in Chapter Two (relating to conflation of national and military fuel issues and failure to identify politicisation of military fuel sustainability) all make for an important comparison.

Further, clear differences between the nations, including the US requirement to independently project military force across the world, and the US consciousness associated with tactical supply line security emphasised during military operations in Iraq and Afghanistan, also allow for an important contrast between the military forces of these nations.

The US effort to improve military fuel sustainability, demonstrated through examples such as the hybrid electric propulsion progression in the US Navy and the overall maintenance of fuel consumption levels across the US DoD over time, was incremental rather than transformational. This finding from this chapter is inconsistent with much of the Australian commentary on military fuel sustainability, which argued that Defence should do more to improve military fuel sustainability because the US is doing so. If the world's military superpower is unable or unwilling to make significant improvements to military fuel sustainability, it is unreasonable to expect Australia to do so, particularly when a key aspect of Australia's defence policy is to maintain interoperability with the US.

The concept of military exceptionalism is prevalent in understanding US military fuel sustainability, as it is in understanding the Australian context. Legislative and policy mechanisms remain in place in the US, to allow for resource prioritisation to the military should it be required. With the US military consuming only around 1.5 per cent of national fuel supply, the regular conflation of national and military fuel issues, such as the transference of concern to the military about hostile policy actions resulting in fuel supply being withheld from the US, can be misleading; the options available to continue fuel supply for essential military operations, offers a level of assurance (of fuel supply) for the military higher than for other parts of society. Further, military exceptionalism could be seen in the limited emphasis placed on the fully burdened cost of fuel in US policy. While this concept was originally intended to compare different methods of fuel supply and efficiency measures, the US DoD use of the fully burdened cost of fuel to compare specific types of the same platform rather than shaping capability design or doctrine in a discretionary way is likely only ever to produce a marginal change.

The US DoD's extensive use of commercial fuel suppliers across the globe is considered to be fundamental to US operational support. However, the tactical fuel supply challenges from operations in Iraq and Afghanistan remain firmly in the US consciousness (and in policy), and the large number of platforms such as US Navy oil tankers and US Air Force air-to-air refuelling aircraft allow the US military to be self-sufficient for fuel supply when it needs to be, consistent with US global interests. The case study to be outlined in Chapter Six will demonstrate the Australian reliance on commercial suppliers to allow operations from northern Australian 'bare bases', and consider the lack of integral Defence platforms.

Chapter Six will now examine a second case study – that of an Australian contingency that is a declared priority, but does not involve operating alongside the US as a smaller partner – to further triangulate information on the factors influencing Australian military fuel sustainability since 1999.

## **CHAPTER SIX – MILITARY FUEL SUSTAINABILITY: AUSTRALIAN CASE STUDY**

### **Introduction**

Previous chapters sought to understand the factors affecting Australian military fuel sustainability since the International Force in East Timor (INTERFET), by triangulating data to address the research questions outlined in Chapter One. Through primary document analysis, semi-structured interviews, and a case study on military fuel sustainability in the United States (US) context, information from previous chapters will be triangulated with data obtained and outlined in this chapter. This chapter considers a second case study, relating to the ability of the Australian Department of Defence (herein titled 'Defence') to achieve a declared operational contingency that is considered a priority in declaratory Australian defence policy.

The 1999 INTERFET mission was a land-focused Australian-led operation. Military fuel supply for INTERFET was discussed in Chapter Two. A nearer region, non-contested deployment like INTERFET was not the most challenging operational contingency presented in Australian defence policy; indeed, logistical support for INTERFET was considered 'as easy as it gets'.<sup>1</sup> However, INTERFET was the closest historical mission to other more challenging operational scenarios outlined in Australian defence policy, and was acknowledged in the 2000 White Paper as 'the most demanding military operation by the Australian Defence Force in a generation'.<sup>2</sup>

Using an instrumental case study method to build on existing knowledge relating to a disjunction between declared policy and operational practice highlighted in Chapter Two, and supported by semi-structured interviews and primary document analysis, this chapter will examine a policy priority – the forward deployment into the nearer region or to a northern Australian 'bare base' of a combat aircraft Squadron, to conduct independent operations.<sup>3</sup> Although the Royal Australian Air Force (RAAF) has significantly greater fuel

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<sup>1</sup> Australian National Audit Office, *Management of Australian Defence Force Deployments to East Timor* (Audit Report No. 38, Commonwealth of Australia, 2001-02), 52.

<sup>2</sup> Department of Defence, *Defence 2000: Our Future Defence Force* (White Paper, Commonwealth of Australia, 2000), 6.

<sup>3</sup> Department of Defence, *2016 Defence White Paper* (White Paper, Commonwealth of Australia, 2016), 95.

supply requirements than land forces,<sup>4</sup> observed evidence from the INTERFET mission will be used to highlight specific shortfalls associated with more challenging declared contingencies.

Combat aircraft have formed the basis of Australian defence policy for at least five decades,<sup>5</sup> with platforms ranging from the F-111 to the current introduction of the F-35 Joint Strike Fighter. By choosing a case study central to Australian defence policy, this chapter seeks to mitigate the risk of ‘examplifying’ sometimes associated with case study research,<sup>6</sup> identified in Chapter Three. This case study will identify military fuel sustainability considerations for a forward deployed combat aircraft mission, to identify how prepared Defence is to conduct a declared contingency without US military support. Fuel is an essential requirement and a significant challenge for this contingency, although it is just one of many logistical and operational challenges associated with a forward deployment. This case study segregated military fuel sustainability from other issues that would be related to a forward combat aircraft deployment (such as security of a forward operating base), to examine it specifically in relation to this thesis, but acknowledges the many other related challenges that would be faced concurrently.

This chapter will contend that many of the measures necessary to achieve this declared mission are already established, such as highly capable combat aircraft units, bare bases, and national legislation and federal coordination associated with the prioritisation of fuel for military use. However, assured fuel supply is particularly problematic for a range of reasons, even if fuel was prioritised in Australia for military use. In particular, there are few structures in place to mitigate the risk of enemy action against military fuel supply lines, especially if the combat aircraft Squadron was forced to base from outside Australia and into the nearer region. When triangulated with findings from Chapters Four and Five, this chapter will consider whether the approach of policymakers towards military fuel sustainability is consistent with an identified policy-practice disjunction in Australian defence policy. Specifically, is military fuel sustainability insufficient to meet declared,

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<sup>4</sup> Senate Standing Committee on Foreign Affairs, Defence and Trade, *Defence Submission to Joint Standing Committee on Foreign Affairs, Defence and Trade Inquiry into the Defence Annual Report 2007-08* (Canberra, 2009), 10.

<sup>5</sup> Department of Defence, *Australian Defence* (White Paper, Commonwealth of Australia, 1976), 18.

<sup>6</sup> Barney G. Glaser and Anselm L. Strauss, *The Discovery of Grounded Theory: Strategies for Qualitative Research* (Aldine Transaction, New Brunswick and London, 1967, Reprinted 2006), 18.



high priority contingencies, but sufficient to support US-led missions where fuel was regularly and effectively supplied to Australian military units?

### **Defence readiness**

The concepts of readiness and preparedness, including aspects such as warning time and sustainability, have been central to Australian defence policy since the first White Paper was released in 1976,<sup>7</sup> and in previous classified Strategic Basis policy documents.<sup>8</sup> Australia largely follows the US in defining preparedness as a national matter, ensuring the nation could produce sufficient materiel and resources to support national military objectives. Readiness can be defined as ‘the ability of a military force to fight and meet the demands of assigned missions’.<sup>9</sup>

The 2013 White Paper discussed in detail the concept of ‘preparedness’ and the fact that not all military units would be immediately deployable, but could be organised when required. Betts, a foremost commentator on military readiness, supported the view that a country could be considered militarily ready if it could convert ‘potential capability into actual capability’ prior to it being required for conflict.<sup>10</sup> A similar explanation or focus was absent from the 2016 White Paper, but the 2016 White Paper gave no indication of a major increase or decrease to military preparedness, and therefore the underlying preparedness discussion in the 2013 White Paper remains valid.<sup>11</sup>

Military readiness is principally an affordability issue. Political leaders determine the level of acceptable strategic risk and the available expenditure. The level of readiness can vary across different parts of the force.<sup>12</sup> Further, readiness was often raised in Australian defence policy in general terms (and not specifically concerning any combat element).<sup>13</sup> Preparedness and readiness are issues that all nations with military forces consider, and

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<sup>7</sup> Department of Defence, *Australian Defence*, 5-6.

<sup>8</sup> Defence Committee, *The Strategic Basis of Australian Defence Policy October 1975* (Commonwealth of Australia, 1956), Paragraph 256.

<sup>9</sup> United States Department of Defense, *DoD Dictionary of Military and Associated Terms* (Joint Chiefs of Staff, February 2019), 196.

<sup>10</sup> Richard Betts, *Military Readiness: Concepts, Choices, Consequences* (Brookings Institution, Washington, D.C., 1995), 28.

<sup>11</sup> Department of Defence, *Defence White Paper 2013* (White Paper, Commonwealth of Australia, 2013), 43.

<sup>12</sup> Betts, *Military Readiness: Concepts, Choices, Consequences*, 33.

<sup>13</sup> Department of Defence, *Defence White Paper 2013*, 43.

it is a reasonable policy position for some military units to be held at a lower state of readiness to reduce unnecessary costs. For example, many countries including Australia maintain an Army reserve force with an ability to expand should a specific military need arise. Both the readiness of a combat aircraft Squadron, and the sustainability of that Squadron (particularly from a fuel consumption perspective) are relevant to this case study.

The concepts of warning time and expansion base in Australian defence policy have been extensively addressed in policy and commentary. The 1976 White Paper identified the significant challenges associated with maintaining platforms at low levels of readiness, and then expanding them once a threat is identified.<sup>14</sup> The 1994 White Paper acknowledged, 'lead times are longer for...technologically complex systems'.<sup>15</sup> Supporting the expanded use of warning time in contingency scenarios, Dibb and Brabin-Smith argued that elements which could be expanded quickly, such as the Army, should be reduced in size; however, elements which had 'long lead-times which are critical to a maritime strategy should continue to receive priority'.<sup>16</sup> Combat aircraft are a technologically sophisticated element that could not be quickly expanded in the event of a short notice threat, although aspects of supporting those aircraft, such as fuel supply and storage for airbases, may be developed faster.

The Australian application of military readiness was an efficient mechanism in the (predominantly) land force preparation for INTERFET. 1<sup>st</sup> Brigade land forces were directed to improve readiness levels, allowing sufficient capacity and redundancy for the large INTERFET deployment.<sup>17</sup> The 1994 White Paper argued, 'adaptability allows our force to be smaller now than we would need if we sought to maintain (capabilities for the) distant future',<sup>18</sup> and the successful increase in readiness to achieve INTERFET in some ways validated assumptions made across the White Papers.

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<sup>14</sup> Department of Defence, *Australian Defence*, 12.

<sup>15</sup> Department of Defence, *Defending Australia: Defence White Paper 1994* (Australian Government Publishing Service, Canberra, 1994), 33.

<sup>16</sup> Paul Dibb and Richard Brabin-Smith, 'Australian Defence: Challenges for the New Government, *Security Challenges*, 9/4 (2013), 63.

<sup>17</sup> Australian National Audit Office, *Management of Australian Defence Force Deployments to East Timor*, 28, 33.

<sup>18</sup> Department of Defence, *Defending Australia: Defence White Paper 1994*, 33.

Specific measures of readiness, such as ‘notice to move’ of combat aircraft or supporting fuel equipment, will not be discussed in this thesis due to their classification. Suffice to say, there was no indication in the 2013 or 2016 White Papers, or in any other policy documents, that Australia’s combat aircraft, one of the most expensive combat elements in the Defence inventory and central to defence policy,<sup>19</sup> were not at a high state of readiness to deploy. There is also no recent indication<sup>20</sup> that the fuel supply required for a combat aircraft deployment is not at a high state of readiness, given its readiness is so intimately linked to the operational performance of the combat aircraft Squadron. Defence doctrine explicitly incorporated ‘consumable resources’ including fuel as a key component of readiness.<sup>21</sup> In comparison, defence policy discussed the ability for other combat elements such as the Air Warfare Destroyer to ‘expand strategic strike capabilities if required’, indicating that the current combat aircraft fleet was a consistent and operationally effective platform and that there were other elements that would require more time to mobilise.<sup>22</sup>

The 2014 deployment of eight Super Hornet aircraft to Iraq is an indication that Australia’s combat aircraft are able to be quickly deployed under some circumstances, particularly with US logistical support, premised on equipment interoperability with the US. The Abbott Government announced the decision to deploy the Super Hornet aircraft in September 2014, and the aircraft were operational in Iraq the following month.<sup>23</sup> The 2009 White Paper emphasis on the procurement of the Super Hornet aircraft to ensure there was ‘no gap in our overall air combat capability’ further indicated a political desire to ensure the readiness of combat aircraft was sufficient and uninterrupted.<sup>24</sup>

Demonstrating the long term nature of this aspect of Australian defence policy, the emphasis on aircraft readiness also featured in previous decades. The 1994 White Paper,

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<sup>19</sup> Department of Defence, *2016 Defence White Paper*, 95.

<sup>20</sup> Previous White Papers articulated an acceptance of risk associated with generic logistic support, although not specifically in the context of fuel, or in the context of combat aircraft. For example, Department of Defence, *Defence 2000: Our Future Defence Force*, 47.

<sup>21</sup> Department of Defence, *ADDP 00.2 Preparedness and Mobilisation (Provisional)* (Executive Series, Commonwealth of Australia, 2004), paragraph 2.43.

<sup>22</sup> Department of Defence, *Defence White Paper 2013*, 77.

<sup>23</sup> ABC News, ‘Islamic State: Australia to deploy military force to UAE to prepare for international action against militants in Iraq’, [website], (14 September 2014), <<http://www.abc.net.au/news/2014-09-14/australia-to-deploy-military-force-to-uae/5742498>>, accessed 10 March 2019.

<sup>24</sup> Department of Defence, *Defending Australia in the Asia Pacific Century: Force 2030* (White Paper, Commonwealth of Australia, 2009), 79.

which focused on Australia's air and sea approaches as a priority, stated 'hostile motives and intentions can develop much more quickly than military capabilities can be built up', and this required the current force to be able to 'defeat those capabilities which could credibly be brought to bear against us in our sea and air approaches,' rather than accept that mobilisation would be necessary.<sup>25</sup>

Warning time is also an applicable concept for other mechanisms relevant to a combat aircraft forward deployment, such as national preparedness to provide sufficient fuel for military use. Indeed, the generation of national resources for military purposes was considered to be an important part of military mobilisation.<sup>26</sup> This research found no specific reference to the warning time that may be required to activate national legislation to prioritise fuel for military use, and enacting emergency legislation would be subject to the vagaries of politics. However, supporting primary documentation did highlight that all 'fundamental inputs to capability', such as fuel supply necessary to sustain combat operations, is a specific measure of the force's ability to conduct military operations and should be planned for.<sup>27</sup>

Chapter Two noted that Australian policymakers had been able to take a 'relaxed approach' to military readiness and national preparedness because there was no specific threat to Australia,<sup>28</sup> and this chapter will consider whether fuel sustainability for a declared contingency was treated in a 'relaxed' manner. A risk with warning time and low readiness levels is that equipment and supporting elements may be under-funded or benignly neglected due to competing political and budgetary pressures, or due to a short-term view of Australian defence policy.<sup>29</sup> A former Secretary of Defence stated that while mobilisation concepts had been informally discussed during his tenure, discussions were never 'serious, considered or sustained', because the likelihood of needing to mobilise

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<sup>25</sup> Department of Defence, *Defending Australia: Defence White Paper 1994*, 23.

<sup>26</sup> Department of Defence, *ADDP 00.2 Preparedness and Mobilisation (Provisional)*, paragraph 3.1.

<sup>27</sup> Department of Defence, *The Strategy Framework* (Defence Publishing Service, 2010), 32.

<sup>28</sup> Richard Brabin-Smith, 'Warning time', *The Strategist*, [website], (16 November 2017), <<https://www.aspistrategist.org.au/warning-time/>>, accessed 20 December 2018.

<sup>29</sup> Jim Molan, 'Why Our Defence Forces Face Terminal Decline', *Quadrant Online*, [website], (1 March 2013), <<https://quadrant.org.au/magazine/2013/03/why-our-defence-forces-face-terminal-decline/>>, accessed 7 January 2018; Mark Thomson, *The Cost of Defence* (Australian Strategic Policy Institute, Defence Budget Brief 2013-2014, Canberra, 2013), vi

within five to ten years was very low.<sup>30</sup> Warning time prediction was imprecise, particularly relating to fuel. Whereas defence policy was often specific about combat equipment levels – for example, the procurement of 72 Joint Strike Fighter aircraft<sup>31</sup> – the same level of specificity or minimum capability relating to fuel was never articulated, as outlined in Chapter Four. The rapid enhancement of military readiness and national preparedness will be further discussed in this chapter in the context of military fuel sustainability.

### **Credible contingencies – bare bases and nearer region aircraft deployments**

Australian policymakers prepare for and review a wide range of strategic risks. Often, this is done by developing classified and unclassified contingency scenarios, including Australian Capability Context Scenarios. These classified scenarios ‘reflect possible circumstances under which the future joint force might be deployed’.<sup>32</sup> Contingency scenarios supported the determination of policy and force design, with pre-prepared plans periodically reviewed and tested. Over time, these scenarios were often reflected in White Papers in less specific detail.

For many decades, Defence maintained combat aircraft, with a key role of ‘strategic strike’ against land and maritime targets. The F-111 aircraft formed the ‘core’ of Australia’s land strike capability outlined in the 1976 White Paper.<sup>33</sup> The current platform in this role is the F/A-18 Super Hornet, with the forthcoming introduction into service of the F-35 Joint Strike Fighter. Combat aircraft were described in the 2013 White Paper as the ‘principal ADF strike capability’ which could establish ‘control of sea and air approaches’.<sup>34</sup> Their ‘potency’ and ‘technologically advanced capability’ was reinforced in the 2016 White Paper.<sup>35</sup> Many other aircraft and supporting equipment were procured with a specific role to support the combat aircraft, further emphasising the centrality of combat aircraft to Australian defence policy. Such multi-billion dollar expenditure included the EA-18G Growler electronic attack aircraft, air-to-air refuelling aircraft, the Airborne Early Warning

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<sup>30</sup> Interview with Mr Dennis Richardson, Secretary of the Department of Defence (2012-2017) and Australian Ambassador to the United States (2005-2010), conducted on 15 April 2019.

<sup>31</sup> Department of Defence, *2016 Defence White Paper*, 95.

<sup>32</sup> Department of Defence, *The Strategy Framework*, 23.

<sup>33</sup> Department of Defence, *Australian Defence*, 18.

<sup>34</sup> Department of Defence, *Defence White Paper 2013*, 29, 77.

<sup>35</sup> Department of Defence, *2016 Defence White Paper*, 95.

and Control aircraft, the Mobile Regional Operations Centre to control airfields and provide threat warning, and the supporting pilot training system.<sup>36</sup>

Across multiple decades, combat aircraft were considered to be Australia's fundamental requirement in a range of declared strategic concepts, including an 'Australian maritime strategy',<sup>37</sup> and in defence of a 'sea-air gap'.<sup>38</sup> They were also regularly declared to be a capability that needed to function independently of US support. For example, the Hawke Government's 'Australia's Strategic Planning in the 1990s' emphasised a 'key priority' for self-reliance as maritime response and intercepting hostile forces in the air and sea approaches.<sup>39</sup> The 2013 'Air Power Manual' argued that a maritime strategy was an enduring strategic requirement, and this strategy was 'substantially underpinned' by the RAAF, which had the ability to respond to adversary actions 'as part of a joint force or as a single Service'.<sup>40</sup>

Having highlighted the long-standing view in declaratory policy that Australian air power must be able to be applied independently across a range of scenarios, and that combat aircraft have long been central components of Australian defence policy, this chapter will now turn to two likely options for combat aircraft deployment – into bare bases across northern Australia, and into the nearer region.

### *Bare bases*

Against the 1980s and 1990s backdrop of a Hawke Government declaring, 'there is now a realisation that Australia can ensure its own security' with a 'more independent approach',<sup>41</sup> the development of bare bases Learmonth, Curtin and Scherger in northern Australia was considered by some to be a recognition of strategic circumstances at the time.<sup>42</sup> Air power remained 'fundamentally dependent on the availability and capability

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<sup>36</sup> Department of Defence, *Defence Capability Plan 2012* (Public Version, 2012), 24-40.

<sup>37</sup> Joint Standing Committee on Foreign Affairs, Defence and Trade, *Australia's Maritime Strategy* (The Parliament of the Commonwealth of Australia, June 2004), 1, 85.

<sup>38</sup> Department of Defence, *Australia's Strategic Planning in the 1990s* (Commonwealth of Australia, 27 November 1989), 28, 31.

<sup>39</sup> *Ibid*, 28, 42.

<sup>40</sup> Air Power Development Centre, *The Air Power Manual* (Sixth Edition, Australian Air Publication AAP 1000-D, Commonwealth of Australia, September 2013), 23-24.

<sup>41</sup> Department of Defence, *Australia's Strategic Planning in the 1990s*, iv.

<sup>42</sup> Nathan Church, *The Australian Air Force in northern Australia* (Parliamentary Library Research Paper, Department of Parliamentary Services, 9 July 2015), Executive Summary.

of air bases', which included fuel supply,<sup>43</sup> and the northern bare bases were established to allow aircraft and supporting elements to surge forward from permanent bases in the south in the event of a crisis.<sup>44</sup>

The three existing RAAF bare bases are Learmonth, Curtin and Scherger. Their locations in northern Australia are shown in Figure 1. RAAF Base Tindal, approximately 300 kilometres south of Darwin, was also originally a bare base (constructed in 1942), but was developed into a permanent northern Australian operating base from 1989.<sup>45</sup> Each of the bare bases was remote from any major population centre – Learmonth 1600 kilometres from Perth, Curtin 1700 kilometres from Darwin, and Scherger 1300 kilometres from Townsville. Germane to this thesis, each base had a fuel storage capacity of around two million litres.<sup>46</sup>



Figure 1 – Map of Royal Australian Air Force bases in Australia<sup>47</sup>

<sup>43</sup> Royal Australian Air Force, *The Air Force Approach to Logistics* (Australian Air Publication AAP 1001.4, Commonwealth of Australia, 30 May 2012), 122.

<sup>44</sup> Jim Thomas, Zack Cooper and Iskander Rehman, *Gateway to the Indo-Pacific: Australian Defense Strategy and the Future of the Australia-US Alliance* (Center for Strategic and Budgetary Assessments, 2013), 18.

<sup>45</sup> Royal Australian Air Force, *Air Force Strategic Infrastructure Plan 2017-2027* (Commonwealth of Australia, 2017), 26.

<sup>46</sup> Interview with Air Commodore Martin Smith, Director General Logistics-Air Force (2019), conducted on 1 April 2019.

<sup>47</sup> Royal Australian Air Force, *Air Force Strategic Infrastructure Plan 2017-2027*, 12.

The historical strategic logic for Australia's bare bases was considered by some to be tenuous. Bare bases were once described as 'a product of entirely unrepresentative times', resulting more from scaled back Australian defence spending rather than a realistic military strategy; where 'a fiction had to be invented to provide a coherent supporting narrative'.<sup>48</sup> An early concept arising from strategic guidance after the 1987 White Paper saw a desired effect of two bare bases and two 'lesser 'point of entry' airfields' being established concurrently,<sup>49</sup> although resources never allowed this level of forward postured RAAF activity – estimates were consistently limited to the RAAF achieving a single bare base activation if given adequate time to prepare, because two bases would present particularly difficult concurrency pressures.<sup>50</sup> With sufficient warning time and if faced with a major or existential threat, it is likely that multiple bare bases could be simultaneously established.<sup>51</sup>

Nevertheless, any lack of strategic coherence did not stop successive Australian governments from investing time and modest resources into bare bases, and expanding the concept into additional bases. The establishment of Scherger in 1998 was described as 'completing' the chain of northern bases.<sup>52</sup> The 2016 White Paper situated bare bases within the 'Strategic Defence Objective 1', which related to deterrence and denial of threats to Australia, its national interests and its northern approaches. Accepting that the chances of a military attack on Australia were 'remote', 'Strategic Defence Objective 1' required an independent response to threats in Australia's air, sea and northern approaches. As a result, investment in national defence infrastructure in northern Australia, including the base bases, was described as a 'focus' of the 2016 White Paper, particularly to support Joint Strike Fighter operations.<sup>53</sup> This included some necessary

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<sup>48</sup> Andrew Davies, 'Northern Australia: how much defence is enough?', *The Strategist*, [website], 27 October 2014), <<https://www.aspistrategist.org.au/northern-australia-how-much-defence-is-enough/>>, accessed 1 January 2019.

<sup>49</sup> Graham O'Brien, *Always There: A History of Air Force Combat Support* (Commonwealth of Australia, 2009), 79.

<sup>50</sup> Interview with Air Commodore Philip Gordon, Director General Air – Headquarters Joint Operations Command (2017-2018), conducted on 12 March 2019.

<sup>51</sup> Interview with Air Commodore Scott Winchester, Commander Combat Support Group (2015-2016) and Chief of Staff, Headquarters Joint Operations Command (2017-2018), conducted on 19 March 2019.

<sup>52</sup> Department of Defence, *RAAF Scherger, Queensland* (Fact Sheet, Commonwealth of Australia, April 2016), 1.

<sup>53</sup> Department of Defence, *2016 Defence White Paper*, 72, 101.



investment in fuel infrastructure, such as to improve fuel quality (a problem associated with bare bases).<sup>54</sup>

Recent preparations for highly unlikely but declared contingencies were consistent with previous White Papers. The 2013 White Paper assessed that an upgrade of the bare bases to support 'protracted high tempo combat operations' was necessary.<sup>55</sup> The 1976 White Paper identified the bare base at Learmonth as necessary infrastructure for operations in Australia's maritime approaches,<sup>56</sup> and the 1987 White Paper forecast the construction of the second and third bare bases at Curtin and Scherger, with a view for these to be central to long range missions into Australia's northern approaches.<sup>57</sup>

The centrality of bare bases to Australian defence policy was regularly affirmed by political leaders in a bipartisan way. For example, in 2012 Defence Minister Smith stated that the bare bases were necessary for air combat and strike operations in Australia's northern approaches.<sup>58</sup> A Howard Government Minister affirmed in 1997 that Learmonth was 'vital to the air defence of north Western Australia' in gaining approval for major capital expenditure on the base.<sup>59</sup> In 1995, A Labor Government parliamentarian stated,

No one is asking why we are spending all this money and whether it can be justified. It is just accepted that we are spending ...183 million dollars putting a bare base runway off Weipa...which will be used during the Kangaroo exercise – 183 million dollars!...no one even queried it.<sup>60</sup>

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<sup>54</sup> Bob Richards and Ken Noye, *Defence Fuel Transformation Program* (Presentation to the Defence Fuel Symposium, Canberra, 2017), Slide 8.

<sup>55</sup> Department of Defence, *Defence White Paper 2013*, 50.

<sup>56</sup> Department of Defence, *Australian Defence*, 16-17.

<sup>57</sup> Department of Defence, *The Defence of Australia* (White Paper, Commonwealth of Australia, 1987), viii.

<sup>58</sup> Stephen Smith, *2013 Defence White Paper* (Paper presented to the Lowy Institute, Sydney, 9 August 2012), 18-20.

<sup>59</sup> House of Representatives, *Official Hansard* (Thirty-Eighth Parliament, First Session – Fifth Period, No. 216, Commonwealth of Australia, 2 October 1997), 9119.

<sup>60</sup> House of Representatives, *Official Hansard* (Thirty-Seventh Parliament, First Session – Eight Period, No. 205, Commonwealth of Australia, 22 November 1995), 3473.

In 1992, the Shadow Minister for Defence, Alexander Downer, welcomed the development of the Scherger bare base as ‘an important part of any northern defence strategy.’<sup>61</sup> Mr Dennis Richardson, a former Secretary of Defence, stated,

When considering every Minister for Defence I have worked with...none questioned the wisdom of the establishment of the bare bases. From a first principles perspective, having the bases is sensible.<sup>62</sup>

The RAAF provided supporting concepts and doctrine around the requirements for the bare bases, and the language used reinforced the operational nature of the bases. The current RAAF infrastructure plan stated, ‘Air Force requires ready access to secure airfields in its likely area of operations during contingencies (most likely in northern Australia)’.<sup>63</sup> The RAAF’s capstone doctrine described ‘small airbases’ – which explicitly included bare bases in Australia – as fundamental components of air power able to accommodate and operate a ‘small to moderate number of platforms’. This capstone doctrine referred consistently to the need for the (non-military) national support base to support the employment of air power,<sup>64</sup> and ‘assured logistical support’ including fuel was considered essential to sustain tempo and intensity during a campaign.<sup>65</sup>

The RAAF doctrine highlighted the challenges associated with the maintenance of the bare bases. Germane to military fuel sustainability and the challenges of supplying bare bases, a RAAF study stated, ‘The degradation of (combat aircraft) capability, even temporarily, could seriously reduce Australia’s ability to monitor and defend the air-sea gap to the north’, and, ‘the importance of uninterrupted use of these northern airfields’ plays a vital role in the defence of Australia; their unavailability could lead to RAAF capability being ‘degraded or lost completely’.<sup>66</sup> High level RAAF logistics doctrine further outlined the challenges of operating away from fixed bases within Australia, and the heavy reliance on

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<sup>61</sup> House of Representatives, *Official Hansard* (Thirty-Sixth Parliament, First Session – Sixth Period, No. 187, Commonwealth of Australia, 16 December 1992), 3795.

<sup>62</sup> Interview with Mr Dennis Richardson, Secretary of the Department of Defence (2012-2017) and Australian Ambassador to the United States (2005-2010), conducted on 15 April 2019.

<sup>63</sup> Royal Australian Air Force, *Strategic Infrastructure Plan 2017-2027*, 4.

<sup>64</sup> Air Power Development Centre, *The Air Power Manual*, 106.

<sup>65</sup> *Ibid*, 154.

<sup>66</sup> Sal Sidoti, *Airbase Operability: A Study in Airbase Survivability and Post-Attack Recovery* (2<sup>nd</sup> Edition, Aerospace Centre, RAAF Base Fairbairn, Commonwealth of Australia, 2001), 1-2.

Expeditionary Combat Support Squadrons;<sup>67</sup> of note, these Expeditionary Combat Support Squadrons had long been challenged by shortfalls in the number of fuel tanker drivers.<sup>68</sup> A previous Chief of Air Force explained that the bare bases must be defended by all 'non-aircrew' personnel, with no civilians able to be employed in those bases,<sup>69</sup> although this appeared improbable given the heavy reliance of the RAAF on the national support base, particularly for fuel supply functions. A senior RAAF operational planner indicated that logistics and fuel were the most significant limiting factors to sustained operations from bare bases, with each bare base different due to infrastructure, remoteness and local contractor options.<sup>70</sup>

At various times, the expense and effort to maintain the bare bases was questioned, particularly as other expensive procurement programs, supplying equipment which could see immediate operational use, came into service.<sup>71</sup> For example, the RAAF periodically considered whether to close Scherger, given the major logistical challenges associated with this base.<sup>72</sup> However, steady bare base investment continued, with the Turnbull Government indicating its intent to 'enhance the Defence investment...in national defence infrastructure (at) Tindal, Curtin, Scherger and Learmonth'.<sup>73</sup> Indeed, the RAAF recently reclassified Learmonth as a 'forward operating base' rather than a bare base,<sup>74</sup> given the frequency of its use for exercises and for non-combat operational activities such as the search for a missing Malaysian Airlines aircraft in 2017. Mr Richardson argued that adequate investment in the bare bases would see the bases kept 'ticking over' with a small number of caretakers, and allow for training and for Defence personnel to familiarise themselves with the bases should an activation be required, but 'no more than that'.<sup>75</sup> A

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<sup>67</sup> Royal Australian Air Force, *The Air Force Approach to Logistics*, 46.

<sup>68</sup> Interview with Air Commodore Scott Winchester, Commander Combat Support Group (2015-2016) and Chief of Staff, Headquarters Joint Operations Command (2017-2018), conducted on 19 March 2019.

<sup>69</sup> Air Marshal Les Fisher, 'The Royal Australian Air Force – Into the 21<sup>st</sup> Century', *Journal of the Royal United Services Institute of Australia* (17, November 1996), 52-53.

<sup>70</sup> Interview with Air Commodore Philip Gordon, Director General Air – Headquarters Joint Operations Command (2017-2018), conducted on 12 March 2019.

<sup>71</sup> Interview with Air Commodore Martin Smith, Director General Logistics-Air Force (2019), conducted on 1 April 2019.

<sup>72</sup> Royal Australian Air Force, *Air Force Strategic Infrastructure Plan 2017-2027*, 13.

<sup>73</sup> Senate, *Official Hansard* (Forty-Fifth Parliament, First Session – Fourth Period, No. 15, Commonwealth of Australia, 5 December 2017), 9709.

<sup>74</sup> Interview with Air Commodore Martin Smith, Director General Logistics-Air Force (2019), conducted on 1 April 2019.

<sup>75</sup> Interview with Mr Dennis Richardson, Secretary of the Department of Defence (2012-2017) and Australian Ambassador to the United States (2005-2010), conducted on 15 April 2019.

former Vice Chief of the Defence Force argued that fuel supply was still ‘the flaw in the bare base scenario’, given the remoteness of the bases, particularly in infrastructure such as pipelines,<sup>76</sup> demonstrating a view that larger baseline investment in the bare bases was still required to make the concept viable.

In summary, despite sometimes ambiguous rationale for their establishment, the bare bases maintained bipartisan support as a central element of declaratory Australian defence policy, and the RAAF established a significant doctrinal basis for their activation. The central nature of bare bases to declared defence policy was demonstrated through modest but consistent expenditure, with a view to activating these bases should an unexpected military contingency arise. As a declared central aspect to Australia’s military disposition and force structure, and given the significant investment in bare bases over time, the operation of combat aircraft from bare bases should therefore be considered a legitimate aspect to this case study that was not selectively chosen to confirm a pre-determined finding.

#### *Combat aircraft deployment into the nearer region*

There was also a strong basis in declared policy for an independent deployment of combat aircraft into the nearer region. The 2016 White Paper directed Defence to be able to ‘operate over long distances to conduct independent combat operations in our region’, and stated that air combat platforms would ‘provide our forces with greater flexibility in responding to threats independently or as part of coalition operations’. The emphasis on operating independently in the nearer region was accepted in the 2009 White Paper, noting the need to ‘ensure that we could lead military coalitions...in our immediate neighbourhood’, and ‘We need to maintain a strong capability to project military power from mounting bases and forward operating bases...from strategically significant offshore territories’.<sup>77</sup> Independent combat operations were emphasised in the 2000 White Paper, which stated, ‘the ADF, alone or with coalition partners, should be able to undertake significant operations within the region, particularly in our nearer region’.<sup>78</sup> The 2013 White Paper was not as direct about the requirement for Defence to conduct forward

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<sup>76</sup> Interview with Vice Admiral Ray Griggs, Vice Chief of Defence Force (2014-2018) and Chief of Navy (2011-2014), conducted on 18 April 2019.

<sup>77</sup> Department of Defence, *Defending Australia in the Asia Pacific Century: Force 2030*, 50-52.

<sup>78</sup> Department of Defence, *Defence 2000: Our Future Defence Force*, 30.

deployed combat operations. However, the centrality of its declared 'maritime strategy' and the need to 'deny adversary forces access to forward operating bases or the freedom to conduct strikes against Australia from beyond our maritime approaches' would demand a forward based combat element in a range of circumstances.<sup>79</sup>

RAAF doctrine reinforced the need to be able to conduct forward deployed, independent combat operations. However, it indirectly highlighted the far greater challenges associated with a deployment outside Australia, and the reduced ability to harness broader (often non-military) aspects of 'national air power'.<sup>80</sup> RAAF senior officers also regularly emphasised the ability to independently deploy combat aircraft. For example, a senior RAAF strategist wrote in 2014, 'the Joint Strike Fighter will be able to deploy without being tethered to US support'.<sup>81</sup> The senior RAAF planner in Headquarters Joint Operations Command argued that operations from a forward operating base had been regularly and successfully conducted, with all of the planning considerations for bare bases also relevant to an expeditionary airfield, but 'with less control over the start state and longer resupply lines'.<sup>82</sup>

Credible Australian defence policy commentary reinforced that the deployment of a combat force to a nearer region base was a reasonable contingency. Davies argued that Australian-based air power would only be relevant if 'the Indonesian archipelago (was) the absolute limit of (Australia's) geographical ambition'.<sup>83</sup> A Lowy Institute study presented numerous feasible contingency scenarios, such as a 'show of force' scenario, that would require the forward basing of combat aircraft. This included two scenarios with limited or no US involvement. These scenarios included an independent 'deterrence'

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<sup>79</sup> Department of Defence, *Defence White Paper 2013*, 29.

<sup>80</sup> Air Power Development Centre, *The Air Power Manual*, 28-32.

<sup>81</sup> Mick Ryan, 'Building on Beersheba', [weblog], (15 July 2014), <<https://web.archive.org/web/20150402160622/http://www.army.gov.au/Our-future/Blog/2014/July/Building-on-Beersheba>>, accessed 2 March 2019.

<sup>82</sup> Interview with Air Commodore Philip Gordon, Director General Air – Headquarters Joint Operations Command (2017-2018), conducted on 12 March 2019.

<sup>83</sup> Andrew Davies, *Let's Test that Idea: The Contestability of Advice in the Department of Defence* (Australian Strategic Policy Institute, No. 54, 22 January 2010), 2.

requirement with deployment of maritime vessels and combat aircraft, and a scenario requiring protection of maritime routes.<sup>84</sup>

The contingency of an independent offshore deployment of a combat element was therefore a consistently declared government position, and was assessed by others to be a feasible and necessary requirement. Based on the central and long-standing position of combat aircraft to declaratory Australian defence policy, and their significant role in combat operations, it is reasonable to conclude that the forward deployment of combat aircraft would be credible during an Australian combat operation in the nearer region. The fuel provision implications associated with combat aircraft operations are fundamental for this type of deployment. Forward deployment of combat aircraft outside Australia therefore forms part of this case study. This chapter will now consider the military fuel sustainability aspects of both bare base and offshore deployments for a combat aircraft Squadron.

### **Combat aircraft deployment and fuel sustainability**

Australian combat aircraft were regularly deployed to the Middle East over the past two decades, supporting US-led missions.<sup>85</sup> Chapters Four and Five highlighted that the supply of fuel to Australian military units in the Middle East was not demanding, as fuel supply from the US and from other contracted sources was very reliable and entailed little risk to Australian military elements in supplying the fuel to forward units (mostly based outside the combat zone),<sup>86</sup> despite the extreme risk that US military and contractors at times faced in supplying fuel to tactical units.<sup>87</sup> Chapter Five highlighted that fuel supply line security remains firmly within the consciousness of the US, given the heavy losses suffered by the US from the conduct of fuel resupply operations in the Middle East.<sup>88</sup>

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<sup>84</sup> Rory Medcalf and James Brown, *Defence Challenges 2035: Securing Australia's Lifelines* (Lowy Institute Publication, 10 November 2014).

<sup>85</sup> Department of Defence, *Defence Annual Report 2015-16* (Volume One: Performance, governance and accountability, Commonwealth of Australia, October 2016), 4.

<sup>86</sup> Interview with Mr Craig McConachy, Australian Fuel Contract Manager – Middle East and North Africa Region, conducted on 13 February 2019.

<sup>87</sup> Interview with Chief Warrant Officer Joel Lane, US Central Command J4 Fuels Officer, conducted on 13 March 2019.

<sup>88</sup> Juan Vitali, Joseph Lamothe, Charles Toomey, Jr., Virgil Peoples and Kerry McCabe, *Mobile Nuclear Power Plants for Ground Operations* (United States Army, Deputy Chief of Staff G-4, 2018), iii-iv.

The independent deployment into the nearer region, or to a bare base in northern Australia, to undertake combat aircraft operations, is a different proposition. There have been no deployments of this nature and scale in Australia's history. The closest larger operational deployment of Australian forces into the nearer region was INTERFET, a predominantly land-based mission.

There are many requirements associated with the sustainment of a deployed combat aircraft Squadron. For example, forward repair; engineering; communications facilities; recovery of downed aircraft and personnel; intelligence and surveillance; an operation and control element; and, airbase security are all significant requirements in their own right. High level RAAF logistics doctrine stated, 'such capacity is likely to be initially based on organic logistic capabilities' (that is, RAAF capabilities that are readily available from within the force).<sup>89</sup> Any of these single requirements would be challenging for Australia to independently sustain from current available resources, and such challenges would be magnified if these elements were all required concurrently to allow combat aircraft to function effectively. A 2013 US study noted that while 'Air Force units are generally regarded as self-deploying', that is only true 'with respect to the aircraft themselves.' Access to support services such as fuel at the deployment location is critical and far more resource intensive.<sup>90</sup>

In limiting this case study to military fuel sustainability, it is further acknowledged that within the concept of 'fuel supply', many different aspects would need to be considered in a forward deployment scenario. For example, Army logistics doctrine defined supply as 'procurement, provisioning, warehousing, returns, salvage, disposal and supply control activities'. All of these aspects of fuel supply would need to be taken into account.<sup>91</sup> Further, RAAF included other functions such as engineering and security in the supporting requirements for sustaining fuel supply to an airbase.<sup>92</sup> Finally, functions such as filtration, pumping and transferring fuel between facilities in the forward location would also need

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<sup>89</sup> Royal Australian Air Force, *The Air Force Approach to Logistics*, 6.

<sup>90</sup> Michael Lostumbo, Michael McNerney, Eric Peltz, Derek Eaton, David Frelinger, Victoria Greenfield, John Halliday, Patrick Mills, Bruce Nardulli, Stacie Pettyjohn, Jerry Sollinger and Stephen Worman, *Overseas Basing of U.S. Military Forces: An Assessment of Relative Costs and Strategic Benefits* (RAND Corporation, National Defense Research Institute, 2013), 40-41.

<sup>91</sup> Australian Army, *Land Warfare Doctrine 4-0 Logistics* (Commonwealth of Australia, 2018), 13.

<sup>92</sup> Royal Australian Air Force, *The Air Force Approach to Logistics*, 46-49.

to be planned. The concept of 'fuel supply' is therefore complicated and resource intensive in itself.

### *Fuel consumption for military operations*

Military fuel consumption figures are often not made public, and consumption figures across a range of different military activities, or planned consumption figures for different contingencies, are not publicly available.<sup>93</sup> Therefore, a number of fuel consumption examples are used to gauge the scale of consumption that would be necessary for this case study.

Different combat aircraft missions entailed different rates of fuel consumption, and such figures are not widely available in the public domain. In one credible RAAF assessment, it was estimated that operating a US Squadron of combat aircraft from a 'bare base' for only three weeks of high intensity conflict during the Gulf War required almost five million litres of fuel<sup>94</sup> (noting that the number of aircraft within US and Australian aircraft Squadrons is similar). Even more extreme is an estimate from an Exercise – Pitch Black – where one million litres of fuel was used in various 24 hour periods during large scale, coalition combat aircraft operations.<sup>95</sup> A senior RAAF logistics planner highlighted that a high intensity combat aircraft mission with coalition aircraft operating from Australia could require eight or ten million litres of fuel per day.<sup>96</sup> While other missions such as the 'deterrence' scenario presented in a Lowy Institute study may be less fuel intensive,<sup>97</sup> and while factors such as 'maximum on ground' throughput (the number of aircraft an airfield can support) will determine the capacity of an airfield,<sup>98</sup> the magnitude of fuel consumption for an Australian combat aircraft Squadron would remain very high. This aspect of sustainability, identified earlier in this chapter as a key component of readiness, would be particularly challenging to independently achieve. The introduction of the F-35

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<sup>93</sup> Ka Weng Kelvin Wong, *Future War Fighting Capability: An Energy Perspective* (The Australian National University, Canberra, November 2008), 2.

<sup>94</sup> Air Power Development Centre, 'Air Bases – Sustaining Air Power', *Pathfinder* (Air Power Development Centre Bulletin, 88, May 2008), 2.

<sup>95</sup> Interview with Air Commodore Scott Winchester, Commander Combat Support Group (2015-2016) and Chief of Staff, Headquarters Joint Operations Command (2017-2018), conducted on 19 March 2019.

<sup>96</sup> Interview with Air Commodore Martin Smith, Director General Logistics-Air Force (2019), conducted on 1 April 2019.

<sup>97</sup> Medcalf and Brown, *Defence Challenges 2035: Securing Australia's Lifelines*.

<sup>98</sup> Lostumbo, et al, *Overseas Basing of U.S. Military Forces: An Assessment of Relative Costs and Strategic Benefits*, 47.



Joint Strike Fighter will increase fuel consumption over existing aircraft by between 50 to 125 per cent,<sup>99</sup> so the fuel demands for this contingency would increase further, potentially to the point of doubling, in the near future.

The relative importance of fuel to each of the Services changed over time. Chapter Two highlighted the extensive fuel use of land forces undertaking military operations during conflicts such as World War Two, where fuel availability for land forces was considered a determining factor in the outcome of the conflict.

Compared to the estimate of fuel consumption by a single combat aircraft Squadron conducting combat operations during the first Gulf War for a three-week period,<sup>100</sup> empirical comparisons for land-based military operations were minimal, yet were challenging for Defence to achieve.

During INTERFET, it was estimated that the entire coalition consumed 30,000 litres of fuel per day.<sup>101</sup> An Australian National Audit Office report estimated that the first five months of Australian operations in East Timor resulted in the consumption of 2.79 million litres of jet fuel and 3.72 million litres of diesel.<sup>102</sup> This equated to 18,600 litres of aviation turbine fuel per day and 24,800 litres of diesel per day. Chapter Two highlighted the challenges associated with supplying and distributing the fuel for this operation, and while ultimately successful, fuel and broader logistical supply was tenuous.

Compared to the fuel consumption estimate of a single combat aircraft Squadron in a high intensity mission, the entire INTERFET force (including use of aviation turbine fuel and diesel fuel combined) required only (approximately) 18 per cent of the fuel estimated for the single combat aircraft Squadron to operate, in any given period.

In a more contemporary example, during a major land exercise in 2015, an Australian Army Brigade, reinforced by other supporting units, used approximately 1.2 million litres of fuel (which equated to approximately 40,000 litres per day) – almost half of which was consumed by Army aviation units. This was a high-intensity ‘peer adversary’ training

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<sup>99</sup> United States Air Force, *Energy Horizons: United States Air Force Energy S&T Vision 2011-2026* (AF/ST TR 11-01, 31 January 2012), 7.

<sup>100</sup> Air Power Development Centre, ‘Air Bases – Sustaining Air Power’, 2.

<sup>101</sup> John Crawford and Glyn Harper, *Operation East Timor: The New Zealand Defence Force in East Timor 1999-2001* (Reed Publishing, Auckland, 2001), 74.

<sup>102</sup> Australian National Audit Office, *Australian Defence Force Fuel Management* (Audit Report No. 44, 2001-02), 107.

exercise, with military equipment operating intensively over that period. In this Australian-based exercise, significant commercial reliance and pre-positioning of fuel was required to achieve the exercise objectives.<sup>103</sup> This consumption figure represented a similar percentage – around 17 per cent – of the fuel that a single combat aircraft Squadron would use in any given period.

In one of the largest examples of a land deployment, General Patton's Third Army (of approximately 230,000 soldiers, and consisting of many Airborne and Armoured Divisions), undertaking the highest intensity operations during World War Two, consumed approximately 1.3 million litres of petroleum per day.<sup>104</sup> Extrapolating these figures, the entire US Third Army consumed just five times the amount of fuel in a given period than the estimate for a single combat aircraft Squadron. Although the comparison spanned decades, the magnitude of the different land and air consumption can be clearly understood.

Further emphasising the relative consumption of fuel between the Services in the Australian context (and therefore the challenging nature of an independent combat aircraft deployment for Australia), despite the fact that the Army was the most heavily committed Service (in offshore military operations) in 2009, with small supporting efforts from the other Services, air and maritime fuel consumption was much higher than the Army's. For example, the six year average of operational fuel consumption, from financial year 2002-2003 to financial year 2007-2008, saw aviation use 204 million litres per year, compared to ground-based average usage of 27 million litres per year.<sup>105</sup>

The relative importance of fuel to the various Services was reinforced at a presentation from all Deputy Chiefs of Service in 2010. Only the Deputy Chief of the Air Force raised fuel provision as a critical strategic issue, and he raised the issue in the context of the growing costs of fuel procurement.<sup>106</sup> Chapter Five examined the 'fully burdened cost of fuel' in the US context, which highlighted that fuel prices were a small fraction of the cost

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<sup>103</sup> Interview with a senior Australian Army logistic planner, conducted on 1 September 2015.

<sup>104</sup> Daniel Grassi, 'Refuel on the Move: Resupplying Patton's Third Army', *Quartermaster Professional Bulletin* (Summer 1993).

<sup>105</sup> Senate Standing Committee on Foreign Affairs, *Defence and Trade, Defence Submission to Joint Standing Committee on Foreign Affairs, Defence and Trade Inquiry into the Defence Annual Report 2007-08*, 10.

<sup>106</sup> This was noted in 'key issues' presentations by Deputy Chiefs of each Service at the Australian Defence College in the period from 21 to 25 November 2010.

associated with forward deployment of the fuel to tactical units.<sup>107</sup> The Deputy Chief of the Air Force's concern about fuel prices as a critical strategic issue was a further indication of the long-standing assumption that the forward deployment costs of fuel had not been a significant Australian military planning consideration – as demonstrated during operations in the Middle East. If the Deputy Chief of the Air Force was concerned about independent deployment into the nearer region, he could reasonably have been expected to highlight concerns about a force structure that had insufficient fuel supply options, or security of supply lines to meet directed RAAF tasks. The identification of the end cost for fuel was an indication of his particular pressures at the time.

As technology evolved after World War Two, and as military fuel consumption rose during every major conflict,<sup>108</sup> fuel supply requirements became most significant for the RAAF, with the least consumption by the Army. The RAAF now accounts for over 50 per cent of Defence fuel expenditure, whereas Army now accounts for only five per cent.<sup>109</sup> Based on planned Integrated Investment Program procurements, the ongoing high fuel consumption of all combat aircraft and the increased fuel consumption of the Joint Strike Fighter compared to existing Australian combat aircraft, these percentages are unlikely to vary in the near future.

However, there appeared to be little Defence concern about the ability to deploy combat aircraft. A recent Chief of Air Force argued that the RAAF had 'never been better equipped...or better postured to deliver air and space power to Australia', and claimed that recent Australian combat aircraft operations in Iraq demonstrated that Australia could deliver a 'completely autonomous, balanced, force package' to future contingencies.<sup>110</sup> Such a perspective over-emphasised the combat component of the force, and under-emphasised the 'less glamorous, but far more important' aspects such as military logistics supplies.<sup>111</sup> This approach seemed to be reflected in the RAAF Plan Jericho public release (the contemporary RAAF modernisation plan), which did not

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<sup>107</sup> United States Defense Science Board, *More Capable Warfighting Through Reduced Fuel Burden* (Office of the Under Secretary of Defense for Acquisition, Technology and Logistics, Washington, D.C., January 2001), 15-16.

<sup>108</sup> Deloitte, *Energy Security: America's Best Defense* (United States, 2009), 3.

<sup>109</sup> Australian National Audit Office, *Australian Defence Force Fuel Management*, 11.

<sup>110</sup> Air Marshal Geoff Brown, *Speech to the Williams Foundation Dinner* (Canberra, 10 June 2015).

<sup>111</sup> John Hattendorf, 'What is a maritime strategy?', *Soundings* (Sea Power Centre – Australia, No. 1, October 2013), 8.

mention fuel or logistics as it described the RAAF's modernisation outlook and its need for 'extended reach'.<sup>112</sup> This chapter will argue that this assertion of independence by Air Marshal Brown was extremely tenuous for nearer region contingencies.

Defence had great difficulty supplying fuel to units for INTERFET, in an offshore operation 700 kilometres from Darwin that was logistically 'as easy as it gets'.<sup>113</sup> Indeed, with all of the resources available to the US Third Army during World War Two, supplying it with the necessary fuel was also a major feat. The magnitude of fuel required by a combat aircraft Squadron to conduct military operations in this case study contingency was much higher than INTERFET – and the likelihood of a combat aircraft Squadron being the only deployed unit undertaking Australian-led operations in this scenario would be extremely low, meaning the fuel demand would be significantly higher. This chapter will now consider some of the options available to Defence to supply the necessary fuel to a deployed combat aircraft Squadron.

#### *Supplying fuel to a combat aircraft Squadron*

Defence platforms potentially available to provide bulk fuel supply to tactical units are scarce. Chapter Four outlined the Defence priority for remediating strategic and domestic fuel sustainability concerns, with military commanders noting that tactical supply was of less risk than the governance and facility risks relating to fuel.<sup>114</sup> However, the almost complete lack of integral military options to supply bulk fuel to a combat aircraft Squadron is incongruous with the declaration that independent nearer region missions are of primary importance within Australian defence policy. The lack of military options is also incongruous with RAAF doctrine, which indicated that initial deployments would likely have to be undertaken from within integral Defence resources.<sup>115</sup> When Defence Minister Pyne announced the Defence Fuel Transformation Program, it was clear that improving

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<sup>112</sup> Royal Australian Air Force, *Jericho* (Commonwealth of Australia, 27 January 2015), 3.

<sup>113</sup> Australian National Audit Office, *Management of Australian Defence Force Deployments to East Timor*, 52.

<sup>114</sup> Interview with Major General David Mulhall, Commander Joint Logistics (2017-2019), conducted on 26 February 2019.

<sup>115</sup> Royal Australian Air Force, *The Air Force Approach to Logistics*, 6.

the resilience of the Defence Fuel Supply Chain was also not going to be based on a military solution, but rather on commercial industry.<sup>116</sup>

The only supporting logistic platform in service within Defence which might be able to supply fuel in sufficient quantity to a forward based combat aircraft Squadron is Her Majesty's Australian Ship (HMAS) Sirius, the Navy's bulk fuel supply tanker. HMAS Sirius was a commercial oil tanker that was purchased and modified by the Navy in 2004. If the entire aviation fuel capacity of HMAS Sirius was dedicated to supplying a combat aircraft Squadron, there may be sufficient fuel to allow the Squadron to conduct sustained operations. A Navy publication stated that the tanker could carry 5486 cubic metres (5.486 million litres) of 'aviation fuel for use by Royal Australian Navy helicopters',<sup>117</sup> a figure similar to the estimate of five million litres for three weeks of air combat operations identified earlier. The Commanding Officer of HMAS Sirius identified that it is possible that all fuel storage on the tanker – up to 29 million litres – could be filled with aviation fuel if this was the operational demand, although this configuration had not historically been tested,<sup>118</sup> and this amount of fuel is an order of magnitude greater than the fuel storage capacity of a bare base.

The primary purpose of HMAS Sirius is not to support a combat aircraft Squadron. The declared role of the vessel is 'significantly extending the Royal Australian Navy's operational reach and endurance at sea.' As a secondary role, it could 'also provide limited support to deployed Army and Air Force units',<sup>119</sup> although support to a different service was not known to have occurred in recent memory.<sup>120</sup> An Abbott Government Minister highlighted that HMAS Sirius did not even 'provide the full level of capability that the Navy needs'.<sup>121</sup> HMAS Sirius was not viewed as a Joint platform – the 2013 White Paper described the role of HMAS Sirius exclusively in Navy fleet support terms.<sup>122</sup> Providing fuel

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<sup>116</sup> Ewen Levick, 'Defence Fuel Transformation Program expanded', *Australian Defence Magazine*, [website], (14 September 2018), <<http://www.australiandefence.com.au/estate/defence-fuel-transformation-program-expanded>>, accessed 1 January 2019.

<sup>117</sup> Royal Australian Navy, *HMAS Sirius* (Ship Datasheet, Commonwealth of Australia, 2019), 1.

<sup>118</sup> Interview with Commander Melanie Verho, Commanding Officer HMAS Sirius (2019), conducted on 16 March 2019.

<sup>119</sup> Royal Australian Navy, *HMAS Sirius*, 1.

<sup>120</sup> Interview with Commander Melanie Verho, Commanding Officer HMAS Sirius (2019), conducted on 16 March 2019.

<sup>121</sup> Senate, *Official Hansard* (Forty Fourth Parliament, First Session – Seventh Period, Commonwealth of Australia, 13 August 2015), 5284.

<sup>122</sup> Department of Defence, *Defence White Paper 2013*, 85.

supply to a combat aircraft Squadron as a primary task over a period of time has never been tested.

Assigning HMAS Sirius to support a forward deployed combat aircraft Squadron would entail a significant opportunity cost. The remainder of the entire Royal Australian Navy fleet would be without its principle fuel supply vessel, which would be supporting a single unit from a different Service. This would significantly impact on the endurance of Navy vessels.<sup>123</sup>

The Navy maintains another supply vessel capable of providing fuel and conducting replenishment at sea, the aged HMAS Success. This vessel also has the ability to transport aviation fuel, although its capacity is up to 1.3 million litres,<sup>124</sup> approximately one quarter of HMAS Sirius' capacity. Similar to HMAS Sirius, HMAS Success had many other important logistical responsibilities supporting maritime elements, although if the combat aircraft mission was of strategic importance, it is possible that HMAS Success could also be used.

The opportunity cost is a significant consideration, because a forward-deployed combat aircraft Squadron is highly unlikely to be the only force element conducting independent Australian military operations. If a particular mission is of sufficient importance or faces sufficient threat to warrant this aircraft Squadron deployment, it is most likely that other combat elements from all three Services would be required, and the absence of HMAS Sirius would be acutely felt by the Navy. In a planned procurement of replacement US Navy oil tankers, a report to the US Congress specifically highlighted that 'an absence of fleet oilers would significantly complicate the (US) Navy's ability to operate at sea on a sustained basis in areas such as the Western Pacific or the Indian Ocean'<sup>125</sup> – Australia's defined primary operating environment. It is also likely that other nations would be involved in a coalition, and INTERFET demonstrated that the lead nation in a coalition task force is often expected to provide sufficient logistical and fuel supply for other nations.<sup>126</sup> Therefore, if HMAS Sirius was assigned primarily to supply aviation fuel to a combat

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<sup>123</sup> Royal Australian Navy, *Australian Maritime Logistics Doctrine* (First Edition, Commonwealth of Australia, 2016), 71.

<sup>124</sup> Royal Australian Navy, *HMAS Success (II)* (Ship Datasheet, Commonwealth of Australia, 2019), 1.

<sup>125</sup> United States Congressional Research Service, *Navy TAO(X) Oiler Shipbuilding Program: Background and Issues for Congress* (Washington, D.C., 6 February 2015), 2.

<sup>126</sup> Phil Gibbons, *The Urban Area During Stability Missions – Case Study: East Timor* (Joint Headquarters New Zealand, Presentation, 22 March 2000), 157.

aircraft Squadron, there are likely to be other force elements that would not receive integral fuel supply from Australian military platforms and would have to source it from elsewhere.

The issue of vessel availability also presented risk in this case study in the provision of Defence platforms to provide fuel supply to a deployed combat aircraft unit. In 2011, HMAS Sirius spent six months in planned maintenance, before immediately having to undergo another extended period of inactivity to rectify additional defects.<sup>127</sup> All maritime vessels have long periods of planned maintenance, with the risk of unavailability greater for single-type vessels such as HMAS Sirius. The Commanding Officer of HMAS Sirius indicated that it was possible to defer planned maintenance if an operationally urgent requirement emerged, but in some cases ‘the ship cannot just be put back together to deal with an emerging contingency’.<sup>128</sup> In 2016, Defence Minister Payne foreshadowed deteriorating availability for HMAS Sirius and HMAS Success, stating on Hansard,

So frequent are maintenance requirements for the two vessels, there are times when both Sirius and Success are undergoing repairs at the same time and Australia relies on the Royal New Zealand Navy’s HMNZS Endeavour. This is what is known as a capability gap.<sup>129</sup>

The unavailability of the oiler and resupply vessel was highlighted regularly in media reporting, including the previous reliance on the New Zealand vessel to support Royal Australian Navy training,<sup>130</sup> and the 2013 White Paper highlighted that a Spanish Navy vessel was ‘assisting Australia’s afloat support requirements while HMAS Success is in refit’.<sup>131</sup> Announcing an urgent tender for replacements to HMAS Sirius and HMAS Success

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<sup>127</sup> See *Daily Telegraph*, ‘Australian Navy struggles to sail the seven seas’, [website], 27 November 2011, <<http://www.news.com.au/national/australian-navy-struggles-to-sail-the-seven-seas/story-e6frfkvr-1226207090187>>, accessed 10 December 2018.

<sup>128</sup> Interview with Commander Melanie Verho, Commanding Officer HMAS Sirius (2019), conducted on 16 March 2019.

<sup>129</sup> Senate, *Official Hansard* (Forty Fourth Parliament, Second Session, Commonwealth of Australia, 15 March 2016), 1880.

<sup>130</sup> David Ellery, ‘Amphibious fleet a multi-million dollar shambles’, *Sydney Morning Herald*, [website], (9 April 2012), <<https://www.smh.com.au/national/amphibious-fleet-a-multimillion-dollar-shambles-20120408-1wjtq.html>>, accessed 1 March 2019.

<sup>131</sup> Department of Defence, *Defence White Paper 2013*, 85.

in 2014, Defence Minister Johnston stated, 'We have been left a mess. The HMAS Success should have been changed out long ago'.<sup>132</sup>

The declared 'capability gap' created by the regular unavailability of the supply vessels was considered important enough to seek to expedite their replacement. However, in response to criticism on the availability of the supply vessels (and other Navy problems) a spokesman for Defence Minister Smith stated, 'The navy meets its operational commitments be they in the Middle East, on border protection operations, in international engagement or in multilateral training exercises'.<sup>133</sup> This statement is indicative of a view presented throughout this thesis, of the most anticipated contingencies being those in support of the US, with current operations not presenting political or tactical risk. The regular unavailability of the Navy's single fuel supply vessel presented no risk and little planning complexity to the Australian military deployment under the US in the Middle East. This just required Australian equipment to meet US technical or procedural standards to receive fuel, which Australian maritime doctrine emphasised. For example, capstone Navy doctrine stated, 'Navy, in particular, is driven by the need to be interoperable within larger coalition naval forces where the provision of support is predicated' on interoperability standards set by others.<sup>134</sup> Future operational scenarios supporting the US Navy would be unlikely to see a role for HMAS Sirius, unless an Australian Government offered this type of platform, on Australia's terms, to the US for coalition operations.

Despite their age, their significant maintenance challenges (including the risk of losing 'Lloyd's register' status if maintenance is deferred<sup>135</sup>) and HMAS Sirius' design as a commercial vessel rather than a hardened military vessel, it is possible that either or both of HMAS Sirius and HMAS Success could be employed to support a combat aircraft Squadron in major combat operations. However, there are many limitations and opportunity costs, not least the effect on the operational endurance of the Royal

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<sup>132</sup> Lisa Cox, 'Australian ship builders thrown a lifeline and a warning from Defence Minister David Johnston', in *Sydney Morning Herald*, [website], 96 June 2014), <<https://www.smh.com.au/politics/federal/australian-ship-builders-thrown-a-lifeline-and-a-warning-from-defence-minister-david-johnston-20140606-39n07.html>>, accessed 1 March 2019.

<sup>133</sup> *Daily Telegraph*, 'Australian Navy struggles to sail the seven seas'.

<sup>134</sup> Royal Australian Navy, *Australian Maritime Logistics Doctrine*, 97.

<sup>135</sup> Interview with Commander Melanie Verho, Commanding Officer HMAS Sirius (2019), conducted on 16 March 2019.



Australian Navy. The employment of these platforms, particularly over a sustained operational period, would require good fortune and a probable willingness to forego some maintenance activities that would otherwise be undertaken.

Another military option to allow tactical fuel supply for the combat aircraft Squadron in this case study is the support provided by air-to-air refuelling aircraft. Defence operates seven KC-30A air-to-air refuelling aircraft, with a Turnbull Government plan to procure two additional air-to-air refuelling aircraft in the future.<sup>136</sup> Chapter Four identified air-to-air refuelling as an aspect of military fuel sustainability that was consistently identified in policy and funded through the Integrated Investment Program, because it is viewed as a military task that is central to the application of air power.<sup>137</sup>

Australian KC-30A airborne refuelling aircraft supported a Super Hornet deployment to Iraq in 2014. A 'typical mission' in Iraq, where there was no air-to-air threat and a very limited ground-to-air threat to combat aircraft, was described as eight to nine hours of the KC-30A repeatedly 'tanking' two Super Hornets to extend their mission.<sup>138</sup>

A key feature of air power is its impermanence. Even air-to-air refuelling could not free aircraft from needing to regularly return to an air base.<sup>139</sup> With the KC-30A refuelling capacity of 111 tonnes<sup>140</sup> (which converts to just over 300 cubic metres), this aircraft has been proven to effectively distribute fuel to aircraft in combat and extend flight time for a specific mission, but could only marginally add to bulk fuel supply capacity (one fully loaded KC-30A aircraft could add approximately one-twentieth of the aviation fuel supply compared to the declared aviation fuel capacity of HMAS Sirius), to be projected into the operational theatre, for sustained combat aircraft operations over time. Further, the KC-30A is optimised to provide support to combat aircraft during specific missions, rather than conducting more strategic fuel transport missions into an airbase. Including a KC-30A

<sup>136</sup> Department of Defence, *2016 Integrated Investment Program* (Commonwealth of Australia, 2016), 17.

<sup>137</sup> Department of Defence, *Defending Australia in the Asia-Pacific Century: Force 2030*, 122-4.

<sup>138</sup> Max Blenkin, 'Royal Australian Air Force takes fight to Islamic State jihadists in northern Iraq', *Sydney Morning Herald*, [website], (11 October 2014), <<https://www.smh.com.au/world/royal-australian-air-force-takes-fight-to-islamic-state-jihadists-in-northern-iraq-20141011-114kzs.html>>, accessed 10 March 2019.

<sup>139</sup> Air Power Development Centre, *The Air Power Manual*, 148.

<sup>140</sup> Royal Australian Air Force, *KC-30A Multi Role Tanker Transport*, [website], <<https://www.airforce.gov.au/technology/aircraft/air-mobility/kc-30a-multi-role-tanker-transport>>, accessed 2 January 2019.

capability with a combat aircraft Squadron on a bare base also adds complexity to the logistical support that would need to be deployed forward (such as for aircraft repair).

Similar to the challenges associated with HMAS Sirius, the KC-30A is not optimised to be exposed to significant enemy threat. The KC-30A is a modified A-330 aircraft with 'advanced communication and navigation systems' and an electronic warfare self-protection system.<sup>141</sup> These features improved the KC-30A's survivability somewhat, but the use of the aircraft could 'introduce an additional level of vulnerability (which) should be mitigated by...dedicated force protection'.<sup>142</sup>

The KC-30A air-to-air refuelling aircraft would almost certainly be considered an essential component of a forward deployed combat aircraft Squadron. However, their primary purpose is the forward distribution of fuel to combat aircraft engaged with the enemy, rather than more strategic movement of bulk fuel to a forward base.

#### *Other fuel supply options*

A combination of fuel supply options would be sought for a major combat operation. If HMAS Sirius and HMAS Success were not able to support a forward deployed combat aircraft Squadron operating independently, or their support was constrained, Australian military planners would be compelled to look outside Defence for options (and would do so even if the fuel tanker was available). The past reliance on other military partners for fuel supply, including the US, New Zealand and Spanish examples presented earlier, could be an option. However, this would be entirely predicated on the other nation's military commitments, their speed of deployment, and whether that nation would support the military objectives being pursued by the Australian Government. Relying on such an approach would appear imprudent, given the vagaries of international politics, the military schedules of other nations and the willingness of other nations to expose a fuel supply platform to military risk. Such an approach would also not meet the declared policy intent, central to the 2016 White Paper, of Defence being 'able to independently and decisively respond to military threats, including incursions into Australia's air, sea and

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<sup>141</sup> Ibid.

<sup>142</sup> Air Power Development Centre, *The Air Power Manual*, 68.

northern approaches'.<sup>143</sup> Nonetheless, seeking fuel supply from another nation's military is still an option, and could be pursued in certain circumstances.

It is more likely that Defence would be compelled to rely on commercial shipping and overland transport for fuel supply. Indeed, although this case study specifically considers a combat aircraft Squadron deployment, the limitations associated with HMAS Sirius are applicable against other contingencies, and commercial fuel supply options would be central to any contingency planning for independent Australian military operations – noting that the reliance on an external fuel supplier may blur the concept of an 'independent' deployment. Chapter Five identified that the US relies heavily on contracted fuel supply to sustain its military operations, for example with contractors delivering 115 million gallons (435 million litres) annually to 13 different sites in Afghanistan,<sup>144</sup> a model that is effective in this operational theatre.

Defence doctrine highlighted that commercial supply would be central to an Australian military deployment. Indeed, Chapter Five identified through interviews with tactical fuel supply practitioners that US military commanders and planners now view a reliance on contractors for fuel supply in tactical areas as 'the norm', although the US Navy still maintains 15 fleet 'fleet replenishment oilers' to ensure it could be self-sufficient when necessary.<sup>145</sup> Capstone Royal Australian Navy doctrine argued that strategic 'effective sea lift' relied even more on commercial vessels than it did on naval vessels, to conduct logistical replenishment into operational areas. A desire to use chartered shipping would require an understanding of available vessels from a national register, or chartered vessels from overseas if no satisfactory vessels resided in the (relatively small) Australian national inventory.<sup>146</sup> The current small number of Australian flagged vessels (14, compared to China's 4608 and the United Kingdom's 1157 flagged vessels) was argued to present a national security risk and became a 2019 Australian election issue.<sup>147</sup> Similarly, high-level

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<sup>143</sup> Department of Defence, *2016 Defence White Paper*, 17.

<sup>144</sup> Special Inspector General for Afghanistan Reconstruction, *Management and Oversight of Fuel in Afghanistan: DoD is Taking Steps to Improve Accountability, but Additional Actions Are Needed* (SIGAR 18-41-IP Evaluation Report, April 2018), 2.

<sup>145</sup> United States Navy, *Fact File: Fleet Replenishment Oilers T-AO* (9 January 2019), 1.

<sup>146</sup> Royal Australian Navy, *Australian Maritime Doctrine* (Second Edition, Commonwealth of Australia, 2010), 131.

<sup>147</sup> Anthony Albanese, *Labor will Revive Australia's Shipping Industry and Create a Strategic Fleet* (Media Release, 24 February 2019).

Navy logistics doctrine emphasised the role of commercial support vessels, arguing, 'Historically, navies have a larger civilian/commercial support footprint than the other Services'.<sup>148</sup> The concept of employing a 'Ship Taken Up From Trade' for military operations is not new,<sup>149</sup> and would be considered a valid option in the event of a contingency.

For bare base operations in Australia, commercial road transport supply is the most common method of supply, although it varies between the bases. Learmonth regularly relies upon the 1600 kilometre road trip from Perth for fuel resupply. Curtin also relies upon a lengthy road transport journey, from either Perth or Darwin, with the Port of Derby a challenging resupply option due to extreme tidal variation. Conversely, Scherger could only rely on maritime resupply of bulk fuel, using the Port of Weipa, and road transport between the Port and the airbase via a sometimes impassable 30 kilometre unsealed road.<sup>150</sup> This was considered by a senior military commander to be a particular ongoing risk for fuel supply.<sup>151</sup>

Road transport of fuel was used for most major exercises conducted from the bare bases, and generally sufficed for short exercises if sufficient pre-planning and stockpiling occurred. A senior Defence logistics officer indicated that the importance of logistics planning for major exercises could not be understated, and that the preparatory fuel and logistical demands were not widely understood in enough detail.<sup>152</sup> Numerous interview participants indicated that while fuel supply for short major exercises had worked, ensuring sufficient fuel was still challenging, and the fuel supply system had never been tested against a scenario where there was a real threat.<sup>153</sup> The Commander of the RAAF Air Combat Group stated that fuel supplies via road transport were more reliable in

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<sup>148</sup> Royal Australian Navy, *Australian Maritime Logistics Doctrine*, 100.

<sup>149</sup> Naval Historical Society of Australia Webmaster, 'STUFT-Ships Taken Up From Trade – An historical perspective', *Naval Historical Society of Australia*, [website], (June 1990), <<https://www.navyhistory.org.au/stuft-ships-taken-up-from-trade-an-historical-perspective/>>, accessed 1 January 2019

<sup>150</sup> Interview with Air Commodore Scott Winchester, Commander Combat Support Group (2015-2016) and Chief of Staff, Headquarters Joint Operations Command (2017-2018), conducted on 19 March 2019.

<sup>151</sup> Interview with Vice Admiral Ray Griggs, Vice Chief of Defence Force (2014-2018) and Chief of Navy (2011-2014), conducted on 18 April 2019.

<sup>152</sup> Interview with Brigadier Andrew Freeman, Commander 17<sup>th</sup> Combat Service Support Brigade (2018-2019), conducted on 18 February 2019.

<sup>153</sup> For example, interview with Group Captain Nicholas Hogan, Officer Commanding 84 Wing (2019), conducted on 15 February 2019.

Learmonth and Curtin, due to the existing mining infrastructure in those regions; however, Scherger was more problematic, with less fuel infrastructure and with roads often closed due to weather.<sup>154</sup> The most senior RAAF logistics officer stated that if the bare bases were being used for high intensity combat operations, each road transport vehicle would provide only a tiny fraction of the resupply necessary, and the number of vehicles required would be enormous.<sup>155</sup>

Senator Jim Molan argued that the bare bases could be important, although his primary concern was that they are ‘totally undeveloped’. He cited multiple iterations of Exercise Pitch Black, where the bare bases for this large and important exercise had to be supplied fuel by ‘parking a tanker in Darwin Harbour’. He was critical that on two different occasions, the exercise was disrupted through fuel problems; once due to a contamination, and once due to heavy consumption. He argued that this weakness in capability was symptomatic of a lack of a national security strategy and the absence of a clear declaration of the contingencies Australia would need to be prepared to face. If the strategic guidance was clearer, he believed that Defence could do more to be prepared.<sup>156</sup>

Others offered different or more nuanced views of Exercise Pitch Black, although with different understandings of the main problems. The Commander of the Army’s 17<sup>th</sup> Combat Service Support Brigade argued that Exercise Pitch Black had at least trained the RAAF to get its basic fuel processes to a level where there was some understanding about preparing for a conflict being fought from a bare base.<sup>157</sup> A senior RAAF operations planner indicated that early planning for this major exercise significantly reduced any training value for fuel and logistics units and methods.<sup>158</sup> Another senior RAAF officer believed that Exercise Pitch Black had become a more important international engagement activity, rather than a high intensity conflict rehearsal, and the RAAF used

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<sup>154</sup> Interview with Air Commodore Michael Kitcher, Commander Air Combat Group (2018-2019), conducted on 21 February 2019.

<sup>155</sup> Interview with Air Commodore Martin Smith, Director General Logistics-Air Force (2019), conducted on 1 April 2019.

<sup>156</sup> Interview with Senator Jim Molan, Senator for New South Wales (2018-2019), conducted on 7 March 2019.

<sup>157</sup> Interview with Brigadier Andrew Freeman, Commander 17<sup>th</sup> Combat Service Support Brigade (2018-2019), conducted on 18 February 2019.

<sup>158</sup> Interview with Air Commodore Philip Gordon, Director General Air – Headquarters Joint Operations Command (2017-2018), conducted on 12 March 2019.

the US Exercise Red Flag in Nevada to gain high intensity combat expertise (with fuel simply supplied by the US).<sup>159</sup>

A study funded by the US Department of Defense, examining the ability of the US military to operate in the Asia-Pacific region from Australia, placed further doubt on the current system of fuel supply for intensive military operations from northern Australia. Although the strategic premise upon which the report was based was fairly questioned,<sup>160</sup> the logistical and extended supply lines challenges remained valid assessments. Many of the findings relating to fuel supply were consistent with the challenges identified during World War Two when seeking to strategically position fuel for military operations, identified in Chapter Two.<sup>161</sup> The study assessed that there were 'insufficient pipelines to pump fuel to northern operation locations', with fuel having to be transported by rail to Darwin and then 'trucked or pumped through local pipelines to the other bases'.<sup>162</sup> However, pipelines to supply bare bases had been discussed internally within the RAAF for many years, but no substantive proposals or actions had occurred.<sup>163</sup> Further, the US study stated

Unfortunately, during the rainy season, roads connecting the bare bases to northern ports might be impassable...improving highway and rail links to these bases and strengthening the nation's infrastructural 'endoskeleton' should be a priority.<sup>164</sup>

Recognising the problems associated with fuel supply in northern Australia, the US recently released a 'request for proposal' to construct two 7,950,000 litre fuel storage tanks at RAAF Base Darwin, at a cost of between 50 and 100 million US dollars (2019

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<sup>159</sup> Interview with Air Commodore Scott Winchester, Commander Combat Support Group (2015-2016) and Chief of Staff, Headquarters Joint Operations Command (2017-2018), conducted on 19 March 2019.

<sup>160</sup> Rod Lyon, 'Misperceiving Australia: the CSBA report', *The Strategist*, [website], (27 November 2013), <<https://www.aspistrategist.org.au/misperceiving-australia-the-csba-report/>>, accessed 1 March 2019.

<sup>161</sup> Douglas Gillison, *Royal Australian Air Force 1939-1942* (The Griffin Press, Adelaide, 1962), 183.

<sup>162</sup> Thomas, Cooper and Rehman, *Gateway to the Indo-Pacific: Australian Defense Strategy and the Future of the Australia-US Alliance*, 18.

<sup>163</sup> Interview with Air Commodore Scott Winchester, Commander Combat Support Group (2015-2016) and Chief of Staff, Headquarters Joint Operations Command (2017-2018), conducted on 19 March 2019.

<sup>164</sup> Thomas, Cooper and Rehman, *Gateway to the Indo-Pacific: Australian Defense Strategy and the Future of the Australia-US Alliance*, 18.

figures).<sup>165</sup> While this storage was clearly for US purposes and based upon an expectation of increased US Air Force operations from northern Australia, such a storage facility could be drawn upon by the RAAF. Such a storage facility may moderate some of the logistics challenges associated with supplying fuel to bare bases Curtin and Learmonth, although the distance of those bare bases from Darwin meant that road transport would continue to be a challenge.

This chapter previously identified that there was the potential to rely on Defence platforms, and the potential to rely on other military forces, for the supply of fuel, but this entailed significant risk. Similarly, there was also potential for commercial providers to adequately supply a forward deployed combat aircraft Squadron to undertake independent operations. However, this would rely on the commercial provider mitigating an enemy threat that could actively target fuel supply, noting the evidence in Chapter Two that fuel supplies were historically a high value target for an enemy force due to the risk a lack of fuel posed to tactical operations.

#### *Fuel supply line security*

Supply lines have been commonly targeted in conflicts throughout history. The US military found in Iraq that the security required for land-based fuel resupply was particularly onerous.<sup>166</sup> Across a long maritime route, the task of securing supply lines could be particularly difficult. When planning for the US 'pivot' to the Asia-Pacific region, a US operational energy strategy assessed that there would be a greater reliance on aviation and maritime fleets (compared to operating in the Middle East) due to the vast distances involved.<sup>167</sup> For any nearer region forward deployment, supply lines are likely to be hundreds or thousands of kilometres – the closest country, Papua New Guinea, is 150 kilometres from Australian territory. Timor Leste is over 700 kilometres from Darwin. Even in smaller areas of operation during recent training exercises, Royal Australian Navy

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<sup>165</sup> United States Navy, *Draft Solicitation for FY18 MCAF Project PAF160600, Asia Pacific Resiliency, Bulk Fuel Storage Tanks, Royal Australian Air Force Base, Darwin, Australia* (Naval Facilities Engineering Command-Pacific, Hawaii, 8 February 2019), 1.

<sup>166</sup> United States Defense Science Board, *More Fight, Less Fuel* (Washington, D.C., February 2008), 15.

<sup>167</sup> United States Department of Defense, *2016 Operational Energy Strategy* (Office of the Assistant Secretary of Defense for Energy, Installations and Environment, 2016), 5.

vessels found it difficult to protect HMAS Sirius (as the 'High Value Unit') in an environment with surface, sub-surface and land-based threats.<sup>168</sup>

In contrast to the US planning considerations identified in Chapter Five, and despite viewing the challenges in Afghanistan and Iraq, security of fuel supply lines against a capable threat force has not been a Defence task in any recent operation. There was little Defence experience in providing fuel supply security against a realistic threat.

A senior Army logistics commander with previous tactical experience as a Petroleum Operations commander stated that fuel for training activities was 'often moved in an 'out of exercise' manner'; that is, with administrative expediency and with no consideration of operational factors such as security of supply lines.<sup>169</sup> This approach represented 'best case' military planning, rather than account for the challenges associated with conflict. A former Australian Chief of Joint Logistics said,

Our deployments are normally to places where there is some form of devastation...(which) usually results in there being limited or in some cases no commercial infrastructure or services we can draw on during the initial periods. The support the military force needs must be delivered in an environment that is less than orderly, has disrupted or poorly developed infrastructure and is subject to interference by a range of forces.<sup>170</sup>

Security of military fuel supply lines is a particular challenge. Some have highlighted the challenges to Australia, with an assessed need to enhance security procedures around the northern bases, as well as in the vicinity of fuel depots.<sup>171</sup> An offshore deployment would be an even more significant challenge, away from a national support base, and with potentially unsecured supply lines well beyond Australia's influence.

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<sup>168</sup> Interview with Commander Melanie Verho, Commanding Officer HMAS Sirius (2019), conducted on 16 March 2019.

<sup>169</sup> Interview with Colonel Mark Baldock, G4 Headquarters Forces Command (2019), conducted on 20 February 2019.

<sup>170</sup> *Australian Defence Magazine*, 'The new face of defence logistics', [website], (10 January 2008), <<http://www.australiandefence.com.au/D6E07770-F806-11DD-8DFE0050568C22C9>>, accessed 1 March 2019.

<sup>171</sup> Thomas, Cooper and Rehman, *Gateway to the Indo-Pacific: Australian Defense Strategy and the Future of the Australia-US Alliance*, 13.



Security of military supply lines did not feature as a key task in recent policy. Protection of military logistics was not mentioned in the 2013 and 2016 White Papers. Securing 'sea lines of communications' in the context of national trade was discussed in those White Papers, albeit with few specifics.<sup>172</sup> More consideration was given to whether the replacement vessels for HMAS Sirius and HMAS Success should be constructed in Australia.<sup>173</sup> 'Sea control' was a feature of Australian maritime doctrine, considered 'fundamental to maritime nations such as Australia in achieving their strategic goals', although Defence had no contemporary experience in independently achieving sea control.<sup>174</sup> Capstone RAAF doctrine identified national security being dependent on secure 'sea lines of communication', but the discussion on logistics and supply centred on their importance for air operations, with no reference to concerns about enemy interdiction of logistics;<sup>175</sup> logistics was contextualised as more of an administrative rather than an operational function. A senior RAAF logistics officer suggested that pilots cared about fuel for the purposes of remaining in the air (air-to-air refuelling), but not for the actions required to transport bulk fuel to an airbase. This reflected the lament of classical military logistics theorists, identified in Chapter Two, that logistics was not given sufficient thought or priority.<sup>176</sup> The limited reference in Australian policy and doctrine to military supply line security was an indication that such a task is not expected, and demonstrated that it had not been a strategic problem for Australia.

A 2004 parliamentary review into Australia's 'maritime strategy' was pessimistic about the level of security that Defence could provide to 'sea lines of communication'. A Defence submission to this inquiry indicated its limitations, stating,

The employment of Australian Defence Force maritime assets in the protection of shipping would be quite selective. Our efforts would likely be devoted to the protection of strategically important cargoes.<sup>177</sup>

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<sup>172</sup> Department of Defence, *2016 Defence White Paper*, 70, 76, 89; Department of Defence, *Defence White Paper 2013*, 84-85, 123.

<sup>173</sup> Department of Defence, *Defence White Paper 2013*, 84-85, 123.

<sup>174</sup> Royal Australian Navy, *Australian Maritime Doctrine*, viii.

<sup>175</sup> Air Power Development Centre, *The Air Power Manual*, 24.

<sup>176</sup> For example, Martin van Creveld, *Supplying War: Logistics from Wallenstein to Patton* (Cambridge University Press, United Kingdom, 1977), 1-2.

<sup>177</sup> Joint Standing Committee on Foreign Affairs, Defence and Trade, *Australia's Maritime Strategy*, 101-102.

The review acknowledged the ‘significant challenges’ to provide comprehensive protection for sea lines of communication, and there was some acceptance that the necessary security could only be done with multi-national cooperation.<sup>178</sup> Therefore, it is reasonable to conclude that security of military supply lines would be an enormous challenge for Defence to undertake, and would require a significant component of the total Australian military, or mobilisation of additional military units,<sup>179</sup> to perform the task credibly. Further, the ability for Defence to keep an entire national sea trade route open, as outlined in the 2013 and 2016 White Papers,<sup>180</sup> given the enormous area that this would comprise (even just within Australian territorial waters) and the extensive air, land and sea military task force that would be required, appears fanciful.

If using military fuel supply assets to support a forward deployed combat aircraft Squadron, the vulnerabilities associated with HMAS Sirius and HMAS Success are significant. As a modified commercial vessel, HMAS Sirius has limited integral defences (this vulnerability may be partly remedied by the replacement vessels for HMAS Sirius and HMAS Success, which have been planned to be designed for military purposes with more security features).<sup>181</sup> HMAS Sirius was also reported to be slower than other fleet vessels, another potential liability.<sup>182</sup> If it was known that a forward deployed combat aircraft Squadron was reliant on HMAS Sirius for its fuel supply, HMAS Sirius would become an even more valuable target.

If commercial fuel supply was used (an almost certain approach), potentially diversified across a number of different commercial providers, significant vulnerabilities would exist. Unless provided by Defence, the lack of integral security for commercial fuel vessels would make them vulnerable targets, similar to the risks that Australia and General MacArthur faced when relying on commercial fuel supply into Australia during World War Two,<sup>183</sup> highlighted in Chapter Two. With contemporary surveillance technology, the locations of fuel supply vessels could be easily understood by an enemy, allowing more effective

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<sup>178</sup> Ibid, 102.

<sup>179</sup> Air Power Development Centre, *The Air Power Manual*, 23.

<sup>180</sup> Department of Defence, *2016 Defence White Paper*, 70, 76, 89; Department of Defence, *Defence White Paper 2013*, 84-85, 123.

<sup>181</sup> Department of Defence, *2016 Integrated Investment Program*, 72.

<sup>182</sup> David Ellery, ‘Amphibious fleet a multi-million dollar shambles’.

<sup>183</sup> Gillison, *Royal Australian Air Force 1939-1942*, 183, 297.

targeting of these vessels. Further, Navy doctrine identified that the chartering of vessels can be most difficult to achieve in emergencies, when there may be other pressures on the commercial fleet.<sup>184</sup> Although this case study specifically examined combat aircraft, the likelihood of other military demands on commercial shipping would be almost certain for any credible scenario.

Once the fuel is on an Australian military base, the base security purely relating to the fuel (as a separate issue to broader aspects of security) would be intensive, with each bare base able to hold approximately two million litres. Providing such security in an offshore base would be more difficult, particularly given the large size of air bases and the runways, and the volume of fuel that would need to be stored. A RAAF study highlighted the many challenges associated with keeping fuel supplies on an airbase secure from enemy action during combat operations,<sup>185</sup> and this would further increase the size of the Australian military force required to support a combat aircraft Squadron.

There are many ways to improve security for military fuel supply – for example, by allocating additional military forces to provide that security. Another option may be to separate the KC-30A tanker from the combat aircraft Squadron and operate the tanker from a permanent base like Darwin, to reduce the amount of fuel that would be needed at the bare base. Also, if there was sufficient warning time, the Australian Government could expand its oil tanker inventory, with both military platforms and commercial options, to mitigate the risk of HMAS Sirius being disrupted or destroyed. Actions to improve security may be onerous or expensive; however, if the mission was important, political leaders would, wherever possible, take necessary actions to achieve mission success for the exceptional military task. However, the current Defence options appear particularly vulnerable to fuel supply line interdiction.

In summary, this section considered the challenges of getting fuel to a forward deployed combat aircraft Squadron conducting independent operations. The immense logistical challenges in Australia, to allow for a functioning bare base, would be magnified in an offshore location. The mechanics and limitations of supplying fuel to a bare base are at

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<sup>184</sup> Royal Australian Navy, *Australian Maritime Doctrine*, 131.

<sup>185</sup> Sidoti, *Airbase Operability: A Study in Airbase Survivability and Post-Attack Recovery*, 1-2.

least understood through a regular exercise regime, whereas this is not the case for offshore deployments. Independent fuel supply line security is an unfamiliar requirement for Defence, despite experience in Afghanistan and Iraq with the US, yet this resource-intensive task would be central to the effective functioning of a combat aircraft Squadron. The use of military platforms to conduct fuel supply tasks appears tenuous, given the known platform availability and security factors and the fact that the Navy could be left without its entire integral fuel replenishment capability. The use of commercial fuel providers (without providing them with high levels of security) would also appear to be a highly risky decision if there was a threat to fuel supply lines. Notably, if a combat aircraft Squadron is deployed, it is almost certain that a much larger Australian military force would be deployed on the same mission as that Squadron, and this would amplify the many challenges relating to fuel supply and logistics already identified. Indeed, a major combat scenario may even necessitate a 'hybrid' option, with Australian-based, afloat and regionally deployed forces, in which the fuel supply and broader logistical support requirements would be extensive.

This case study demonstrates that the fuel supply required for a single RAAF unit outweighs the fuel supply capacity across all of Defence. Other types of logistical sustainment, such as rations and repair parts, would only add to the immense challenges. Nevertheless, Chapter Two highlighted that the focus of Australian policymakers is on remediating domestic fuel governance challenges, and not the tactical deficiencies associated with military fuel sustainability; indicating that policymakers view an independent combat requirement as an improbable scenario.

This chapter will now turn to emergency national legislation that could be enacted in the context of this case study.

### **National prioritisation of fuel for military use**

In the event of an activation of a bare base and the forward deployment of a combat aircraft Squadron for military operations, it could be envisaged that the security threat faced by Australia would be of such magnitude (such as Australia facing an existential threat) that national prioritisation of fuel for military use would at least be considered. A RAAF publication highlighted that although the RAAF relied on commercial fuel suppliers,

their commercial imperatives did not always have national security objectives in mind, and market-based mechanisms may need to be reconsidered.<sup>186</sup> There would be a number of challenges in achieving fuel prioritisation for the military, as this section will outline, but an exceptional military task would be compelling for political leaders to take extraordinary action to prioritise fuel supply.

Chapter Two was critical of a considerable segment of the literature relating to Australian military fuel sustainability for *conflating* national and military fuel issues, and failing to adequately represent the issue of military exceptionalism and the priority of fuel for military operations should the need present; this case study method seeks to highlight that conflation of national and military fuel issues did not allow an accurate representation of military fuel sustainability.

Chapter Four highlighted the 1984 Liquid Fuel Emergency Act and its transition away from a military focus towards an economic continuity focus. Despite this, the Act would be able to be activated in the event of a military requirement. The Act specified the ability for the Energy Minister to exercise his or her powers for the purposes of ‘defence of Australia’, ‘protecting the existence of Australia as a nation’, and ‘ensuring that trade or commerce...may be carried on in an efficient, competitive and profitable manner’.<sup>187</sup> Defence’s senior military logistics officer indicated that the Act protected Defence’s ‘equities’, and he was satisfied that the periodic reviews of the Act allowed Defence to ensure its requirements were understood.<sup>188</sup> A former Secretary of Defence similarly felt that fuel resources could be built up relatively quickly, and saw risk for Defence’s budget if Defence was too ‘forward leaning’ in seeking additional fuel supply at the current time (when there was no foreseeable military threat).<sup>189</sup> Defence did not seek to influence some major aspects of Australia’s national fuel structure, to ensure that prioritisation for military purposes would be most effective, particularly in the unlikely event of a major or existential threat. For example, the level of oil refining capacity in Australia (potentially relevant to this case study if there was a threat to fuel supply lines) was primarily governed

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<sup>186</sup> Air Power Development Centre, ‘Air Power and Energy Security’, *Pathfinder* (Air Power Development Centre Bulletin, 270, July 2016), 2.

<sup>187</sup> Commonwealth of Australia, *Liquid Fuel Emergency Act 1984* (Canberra), Part I Section 6.

<sup>188</sup> Interview with Major General David Mulhall, Commander Joint Logistics (2017-2019), conducted on 26 February 2019.

<sup>189</sup> Interview with Mr Dennis Richardson, Secretary of the Department of Defence (2012-2017) and Australian Ambassador to the United States (2005-2010), conducted on 15 April 2019.

by commercial considerations,<sup>190</sup> but the additional risk to national fuel supply lines (with more international movement of refined petroleum) would be of military interest.

Political leaders regularly highlighted that the Liquid Fuel Emergency Act, and the inter-departmental National Oil Supplies Emergency Committee, would be the mechanisms to prioritise fuel for security purposes if the military need arose. This was a bipartisan approach, with many examples including from the Howard Government,<sup>191</sup> the Rudd Government,<sup>192</sup> and the Turnbull Government,<sup>193</sup> although these often *politicised* claims were not tested in military fuel sustainability literature, identified in Chapter Two. The legislation for fuel prioritisation, and the function of the National Oil Supplies Emergency Committee, were periodically exercised but were untested in real circumstances. As untested legislation, the purpose of which evolved over time to cover a broader range of circumstances, significant confidence was displayed in this legislation to allow Defence to continue military operations in extraordinary circumstances. The perceived low likelihood of needing to activate this legislation is a factor that influenced military fuel sustainability, as is the exceptional nature of the military task that would see resources prioritised for military use.

In this case study, the question of when emergency legislation and prioritisation mechanisms would be activated is fundamental. The concept of warning time was discussed earlier in this chapter. While not always precise, preparedness and readiness are concepts that are generally well understood in a military sense. However, supporting mechanisms that may be necessary for mobilisation of military forces, such as national fuel prioritisation, were not discussed in those terms. The Liquid Fuel Emergency Act did refer to ‘contingency planning powers’ resident with the Minister, including the ability for the Minister to direct ‘relevant fuel industry corporations to maintain reserves’ at ‘specified places in Australia’.<sup>194</sup> The Energy Minister could also act in the event of ‘the

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<sup>190</sup> Interview with Group Captain Tim Pedley, Director of Fuel Operations (2017-2018), conducted on 13 February 2019.

<sup>191</sup> House of Representatives, *Official Hansard* (Forty-Second Parliament, First Session – Second Period, No. 4, Commonwealth of Australia, 15 May 2008), 2108.

<sup>192</sup> Senate, *Official Hansard* (Fortieth Parliament, First Session – Sixth Period, No. 11, Commonwealth of Australia, 12 August 2003), 18313.

<sup>193</sup> House of Representatives, *Official Hansard* (Forty-Fifth Parliament, First Session – Fourth Period, No. 17, Commonwealth of Australia, 4 December 2017), 12514.

<sup>194</sup> Commonwealth of Australia, *Liquid Fuel Emergency Act 1984*, Part II, Section 12.

likelihood of a shortage of liquid fuel’ (as opposed to when a shortage had already occurred, or when stocks had already been depleted).<sup>195</sup> Therefore, the legislative mechanisms appear to be in place to allow an Australian Government to increase the responsiveness of fuel prioritisation for military purposes, although the politics of pre-emptively restricting public fuel use to prioritise military fuel use would be difficult.

The level of confidence in the Liquid Fuel Emergency Act and the National Oil Supplies Emergency Committee is not without basis, but it is unproven, and there have been some concerns with fuel prioritisation in the past. For example, Chapter Two identified the challenges faced by the Curtin Government during World War Two in prioritising fuel for military use, despite the fact that Australia was involved in a major or even existential conflict. National resources were prioritised for military use against a backdrop of serious external threat, and the difficult processes of resource prioritisation and supply route protection were progressed, but with US support rather than independently,<sup>196</sup> as this case study has discussed. Generations have passed since an Australian Government was compelled to consider military resource requirements in a more holistic, national sense, where actions such as the formation of the portfolio of War Organisation of Industry in 1941 were taken.<sup>197</sup> The level of political interest in military fuel sustainability, evident immediately after World War Two,<sup>198</sup> had not been since repeated.

Despite the challenges, there are mechanisms in place to allow fuel to be prioritised for military use in the event of a major or existential conflict. The exceptional nature of the military role means that although there was little concern about this prioritisation during periods where there was no serious conflict or emerging contingency, prioritisation would occur if necessary. Senator Molan’s view that ‘as soon as there is a serious situation, the cost is far less relevant, and the government would just be expected to pay it’<sup>199</sup> would almost certainly become the orthodoxy during this type of contingency.

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<sup>195</sup> Ibid, Part III, Section 16.

<sup>196</sup> Sydney James Butlin and Carl Boris Schedvin, *War Economy 1939-1942* (Australia in the War of 1939-1945, Australian War Memorial, 1955), 289.

<sup>197</sup> Ibid, 290.

<sup>198</sup> For example, see parliamentary debates including House of Representatives, *Parliamentary Debates* (National Oil Proprietary Limited Agreement Bill, Second Reading, 10 September 1937), 1.

<sup>199</sup> Interview with Senator Jim Molan, Senator for New South Wales (2018-2019), conducted on 7 March 2019.

### Case study findings

This case study examined a contingency scenario that was consistently outlined in Australian defence policy over numerous decades. Given the centrality of combat aircraft contingencies to Australian defence policy, a level of generalisability can be validly applied, and triangulated with the previous case study from Chapter Five and broader review of primary documents and semi-structured interviews from Chapter Four. Specifically, there is significant evidence that military fuel sustainability is indicative of a greater expectation of Defence providing support to US-led military operations, rather than being primarily structured for contingencies relating to Strategic Defence Interest 1 – ‘a secure, resilient Australia, with secure northern approaches and proximate sea lines of communication’ – defined in the most recent White Paper.<sup>200</sup> This aligns with the findings from Chapter Four.

The case study showed that a number of the strategic requirements for this contingency were established. First, highly capable and operationally-proven combat aircraft Squadrons exist. Second, there are a number of bare bases in Australia able to be activated, these bare bases are planned to receive some additional fuel infrastructure investment (identified in Chapter Four), and these bases are tested periodically during major high intensity, multilateral training activities such as Exercise Pitch Black. Third, there are military and commercial platforms and other mechanisms to provide fuel to either bare bases in Australia, or to a forward deployed element in the nearer region. Finally, there are legislative and federal coordination mechanisms in place to allow the national prioritisation of fuel for military purposes, if the need arose.

This chapter demonstrated that none of these strategic requirements were fully optimised or resourced. However, with no current perceived threat to Australia and a pragmatic approach to only resource military fuel sustainability to meet existing tasks; with an exceptional military task that would be prioritised should it be required; and, with a reasonable expectation that there would be some strategic warning time of a military threat to Australia or Australia’s interests in the nearer region, allocating more resources to capabilities such as bare bases could be desirable but could also represent unnecessary expenditure and effort. Policymakers had to make challenging decisions on this issue, but

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<sup>200</sup> Department of Defence, *2016 Defence White Paper*, 68.



this case study has demonstrated that decisions have generally been to achieve a basic level of capability or posture that could be expanded, but not seek to exceed the basic level of capability unless compelled.

Most notable from this case study, the strategic shortfalls (when compared to declared policy) associated with military fuel sustainability are extensive.

Achieving assured fuel supply to the bare bases, or to an offshore deployed location, is the most significant challenge. Successful and consistent fuel supply to a forward deployment is particularly tenuous, with extremely limited integral bulk fuel transport, repurposed commercial platforms with few integral security features, and no prioritisation of supply line security identified in policy.

Further, the substantial amount of fuel supply that would be required for a single combat aircraft Squadron is not sustainable within Defence's resources. Defence's supply system barely coped with the fuel demands for INTERFET,<sup>201</sup> a land based operation (noting Army had the lowest fuel demand of the Services, by far), and with minimal enemy threat. Aircraft operations present an entirely different scale of fuel consumption. Further, it was unlikely that a combat aircraft Squadron would be the only unit required for an independent, high intensity mission in Australia's northern approaches or in the nearer region. Indeed, this case study identified that the level of support just for the combat aircraft Squadron would include other units to provide security for air bases and runways, security for supply lines and separate aircraft such as KC-30A air-to-air refuelling.

The case study findings reinforce and extend findings from Chapter Four, which highlighted the major effort and significant resources being applied to improve domestic fuel governance after a series of adverse audit and review findings, but comparatively little effort being applied to tactical aspects of military fuel sustainability. As a result of this domestic priority, resources were seldom applied to improve military fuel sustainability for tactical contingencies. For example, the Defence Fuel Management Committee did not fill its declared role, to provide 'Defence-wide strategic guidance and policy direction on fuel issues to ensure effective support to Australian Defence Force

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<sup>201</sup> Australian National Audit Office, *Management of Australian Defence Force Deployments to East Timor*, 79.

operations'.<sup>202</sup> However, this committee was mostly focused on solving immediate governance problems,<sup>203</sup> with little evidence of discussion focusing on declared contingencies. The semi-structured interviews undertaken for this thesis consistently reinforced the point that tactical fuel supply was not viewed as a particularly noteworthy risk, and therefore resources were not applied. Chapter Four also highlighted the significant gap between strategic and tactical fuel personnel, with tactical fuel personnel not familiar with the most important strategic Defence fuel initiative – the Defence Fuel Transformation Program – because it had little relevance to the tactical environment.

In current operational theatres, the US military and commercial providers are accepting fuel supply risk on behalf of Defence, and Defence demonstrates little price sensitivity to fuel procured for operations. Through this arrangement, Defence could comfortably achieve fuel supply for the tasks currently asked of it, such as for Middle East commitments and for disaster relief support to the Australian community. Operations in the Middle East have reinforced the approach that Defence's fuel provision for contemporary operations is sufficient. A Howard Government review of operations in Iraq assessed that 'effective logistics support underpinned the overall success of the ADF's contribution'.<sup>204</sup> Military success in nearer region stabilisation operations such as INTERFET and in the Solomon Islands, and in tactical operations in the Middle East as a junior alliance partner,<sup>205</sup> fostered continuity in the approach to tactical fuel provision.

Quite clearly, from the perspective of military fuel sustainability, independent operations in the nearer region are not able to be achieved from the existing force, and this represents a disjunction between declared policy and operational practice. Declared policy consistently stated that a combat aircraft deployment was a fundamental requirement, yet military fuel sustainability was largely inadequate to allow such a deployment to occur. This case study demonstrated that an independent military operation would see Defence face much more risk in supplying fuel to tactical units.

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<sup>202</sup> Department of Defence, *Defence Fuel Management Committee Terms of Reference* (Canberra, 2016), 1.

<sup>203</sup> Defence Fuel Management Committee, *Minutes* (Meeting at Russell Offices, Canberra, 29 August 2013), 1.

<sup>204</sup> Department of Defence, *The War in Iraq: ADF Operations in the Middle East in 2003* (Commonwealth of Australia, 2004), 29.

<sup>205</sup> Albert Palazzo, *The Australian Army and the War in Iraq 2002-2010* (Department of Defence, Freedom of Information Disclosure 049-1617, 2018), 261-262.

However, with a low likelihood of such a scenario quickly emerging, this risk was not evident within declared Australian defence policy.

Recent strategic concepts, such as Australia's 'maritime strategy', faced the same risk (as faced in this case study) from a military fuel sustainability point of view. Planning for fuel provision is complex and presents significant risk based on the fuel supply assets available to the current force, yet fuel is just a single logistical consideration, in deploying just a single Defence unit. A maritime strategy involving multiple mission types and many platform types has far greater complexity and a much higher support burden for fuel provision and for other logistical support, yet little analysis was found during this research into resolving how this support would be provided, if the US was not providing it. This challenge would be particularly momentous if the area of operations encompassed by the maritime strategy included both the Pacific and the Indian Oceans, an area of operations designated in the 2013 White Paper.<sup>206</sup>

Therefore, if a scenario involving the independent forward deployment of combat aircraft is considered realistic, as all White Papers since 1976 have deemed, it is implausible that Defence could effectively conduct such a mission from within its existing force structure. It is highly misleading for any policymaker to declare or imply that combat aircraft are ready to operate independently outside Australia, because there is a significant imbalance between the combat elements and the fuel capacity required to support those combat elements. If a mobilisation period was anticipated, fuel supply capacity could be enhanced, and despite the considerable complexities, problems would not necessarily be insurmountable. However, even with a known mobilisation period, this would require significant expansion and government intervention. With military fuel sustainability representing just a single aspect of a military deployment such as this, mobilisation to meet the contingency would be an enormous undertaking. The fact that combat aircraft contingencies remain central to Australia's declared defence policy, but major operating shortfalls such as fuel provision were not raised as key considerations for their ongoing operation, is indicative of the most anticipated operational scenarios and the disjunction between declared policy and operational practice in Australian defence policy. In this

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<sup>206</sup> Department of Defence, *Defence White Paper 2013*, 7.

sense, this finding adds to the body of knowledge and the existing hypothesis of a disjunction between declared Australian defence policy and operational practice.

## **Conclusion**

The case study presented in this chapter demonstrated that Defence had in place many of the key types of equipment and processes to allow the forward deployment of a combat aircraft element, operating independently from bare bases in northern Australia or from elsewhere in the nearer region. This operational contingency was consistently presented within Australian defence policy as a high priority. The maintenance of highly capable combat aircraft, the establishment of bare bases and their activation for exercises, and federal legislation allowing prioritisation of fuel to military use, were all necessary aspects of a combat aircraft deployment and they were all in place.

However, with all factors considered, a deployment would be extremely challenging from a military fuel sustainability perspective, noting that fuel was just one aspect of many other challenging aspects to achieve a contingency of this nature. Supporting equipment such as bulk fuel transporters currently resident within the Defence inventory would be insufficient to support such a mission, and a period of mobilisation would require a major refocus on aspects of military operations – such as securing fuel lines of supply across wide expanses – to be developed from a low organisational starting point. INTERFET, a predominantly land-based mission with fuel demands a fraction of those required by a combat aircraft Squadron, is a useful example to see how far a mobilisation effort would have to go. The procurement of Joint Strike Fighter aircraft, with fuel demands potentially double those of existing aircraft, would further bring into question Defence's ability to achieve this declared contingency independently.

When triangulated with the findings of previous chapters, there is significant evidence that Defence's approach to military fuel sustainability reinforced the hypothesis that there is a disjunction between declared policy and operational practice. In the case of military fuel sustainability, the low priority afforded to tactical aspects of fuel means that the highest priority contingencies outlined in declared policy could not be achieved. Although successive governments argued that Australia could not afford to have a gap in air combat capability, if military fuel sustainability and declared contingencies were taken into

account, there was arguably no period where there *has not* been a gap in air combat capability. However, the provision of expeditionary forces to US-led operations could comfortably be achieved, with sufficient combat elements available to offer a small combat force of substance, and fuel support provided by the US or other commercial contractual arrangements.

Military exceptionalism is also a factor influencing military fuel sustainability in this scenario. Both from a commercial fuel supply perspective, and from a national emergency legislation perspective, the approach by political leaders was that if it became militarily necessary to resource the military in a conflict of an existential nature, fuel would just be provided no matter the cost. Although the mechanisms for commercial supply and for national prioritisation of fuel are not particularly robust, they exist and could be built upon further – for example, this chapter highlighted that there was a significant opportunity cost associated with using HMAS Sirius, and a high risk that the vessel would not be available due to maintenance requirements, but it exists and all efforts would be made to allow it to be used if it was identified as a key platform for the support of a deployed combat unit. Equally importantly, the scenario was one that was not anticipated within a reasonable time frame, and with many competing demands for policymakers, any apparent tactical fuel supply shortfalls were not a high organisational priority to resolve.

Chapter Seven will now summarise the main aspects of this thesis, linking the significance of this research and new knowledge from across the chapters, summarising the factors that have influenced military fuel sustainability since INTERFET, and identifying further areas of research that may be conducted.

## **CHAPTER SEVEN – CONCLUSION AND RECOMMENDATIONS FOR FUTURE RESEARCH**

### **Introduction**

The aim of this thesis is to examine the factors that have influenced Australian military fuel sustainability since 1999, when the Australian Department of Defence (herein titled 'Defence') led the International Forces in East Timor (INTERFET) mission; a unique mission for Australia in terms of scale and leadership, and one that tested Defence's capacity to sustain a mission that bears similarities to other more challenging missions in declared defence policy statements.

This work is important for a number of reasons, which will be summarised in this chapter.

First, there is a common perception in the literature that a long-standing ambiguity exists between Australian defence policy statements and operational practice. Commentators frequently assessed that Australian military force structure was optimised for an expectation of providing expeditionary forces to United States (US)-led military operations rather than for declared nearer region and independent scenarios.<sup>1</sup> This ambiguity has never been examined through a military fuel sustainability lens, and this thesis uniquely adds to the policy-practice disjunction hypothesis.

Second, this thesis adds to existing understanding of the relationship between the military and society, through analysis of military exceptionalism, and the consideration of when and whether a military force would be prioritised for resources such as fuel should the need arise. This thesis is situated within the existing understanding of military logistics and broader military-civilian relationships, wherein military fuel sustainability is consistently and pragmatically treated as a lower priority than the combat elements within Defence because of resource constraints and a view that military fuel supply capacity would be expanded should the need arise.<sup>2</sup>

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<sup>1</sup> For example, Alan Dupont, 'Full Spectrum Defence: Re-Thinking the Fundamentals of Australian Defence Strategy', *Lowy Institute*, [website], (13 March 2015), <<https://www.lowyinstitute.org/publications/full-spectrum-defence-re-thinking-fundamentals-australian-defence-strategy>>, accessed 1 March 2019.

<sup>2</sup> Interview with Mr Dennis Richardson, Secretary of the Department of Defence (2012-2017) and Australian Ambassador to the United States (2005-2010), conducted on 15 April 2019.

Third, none of the existing literature presented a holistic view of all the factors affecting Australian military fuel sustainability. This chapter will summarise those factors, and thus contribute to closing a current gap in knowledge.

Fourth, three key trends identified in the literature tended to skew understanding of military fuel sustainability. The *isolation* of military fuel sustainability commentary from broader Australian defence policy, the *conflation* of national energy concerns with military fuel sustainability, and the absence of critical analysis relating to the *politicisation* of aspects of military fuel sustainability, were all prevalent in the literature and critiqued throughout this thesis.

This chapter will summarise the research methodology used for this thesis and the research questions that were developed; summarise the findings from this thesis; outline limitations associated with the findings; and, recommend further research arising from this thesis.

### **Research methodology**

Chapter Three identified that a qualitative methodology emerged as an appropriate approach for this thesis, following the discoveries of the literature review. The paucity of literature relating to military fuel sustainability was evident, particularly regarding the research questions that this thesis seeks to answer. In a largely uncharted field, a qualitative analysis of the underlying structures and influences affecting Australian military fuel sustainability since the conduct of INTERFET (as a major, Australian-led nearer region mission) was assessed to be of most value.

Specifically, a disjunction between declared Australian defence policy and operational practice was routinely identified by defence commentators, and this was outlined in the Chapter Two literature review.<sup>3</sup> However, military fuel sustainability was never identified as an aspect of the policy-practice disjunction, and no assessment has been made to

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<sup>3</sup> Christopher Cowan, Andrew Davies, Malcolm Davis, Rod Lyon, James Mugg and Mark Thomson, 'Defence Policy', in Malcolm Davis (ed.), *Agenda for change 2016: Strategic choices for the next government* (Australian Strategic Policy Institute, June 2016), 19-20; Hugh White, 'Strategic risk in the new era: a response to Paul Dibb and Richard Brabin-Smith', *The Strategist* [website], (20 November 2017), <<https://www.aspistrategist.org.au/strategic-risk-in-the-new-era-a-response-to-paul-dibb-and-richard-brabin-smith/>>, accessed 3 January 2018; Mark Thomson, *War and Profit: Doing business on the battlefield* (Australian Strategic Policy Institute, Canberra, March 2005), 28.

determine whether military fuel sustainability is consistent with the policy-practice disjunction hypothesis. A qualitative methodology, developed in part on an 'instrumental' case study method,<sup>4</sup> sought to build upon the existing hypothesis and well developed understanding of Australian defence policy, but through a lens that has not been previously used.

A multi-method qualitative approach was chosen for this research. This allowed the potential flaws or risks inherent in any one individual method to be mitigated because the flaws in different qualitative methods are not identical.<sup>5</sup> The methodological triangulation<sup>6</sup> of data from document analysis, semi-structured interviews and two case studies was used to develop the findings of the thesis and establish the validity of the research.

The primary method of document analysis sought to establish the priority of military fuel sustainability within Australian defence policy, and the actions taken by policymakers to influence military fuel sustainability over time. It became evident early in the research process that Australian defence policy and other relevant documentation was mostly not written to address military fuel sustainability as a key issue, but the documents allowed contextualisation and the development of themes. In contrast, Chapter Five outlined the extensive document set in the US relating to military fuel sustainability, and the challenge when analysing US data was to reconcile the extensive repetition of claims over time in the documentation with the reality of actions that occurred. Two case studies complemented primary document analysis, both chosen due to their relevance to Australian defence policy and their ability to help answer the research questions, with multiple case studies seeking to make the research findings more robust.<sup>7</sup> The use of semi-structured interviews with policymakers, military logistics practitioners, personnel managers and commentators sought to gain practical knowledge of the topic and insights into senior decision making. The interviews allowed a greater understanding of issues

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<sup>4</sup> Robert Stake, *The art of case study research* (Sage, Thousand Oaks California, 1995), 3.

<sup>5</sup> John Brewer and Albert Hunter, *Foundations of Multimethod Research: Synthesising Style* (Sage Publications, California, 2006), 4.

<sup>6</sup> Norman Denzin, *The Research Act: A theoretical introduction to sociological methods* (McGraw-Hill, New York, 1978), 297.

<sup>7</sup> Robert K. Yin, *Case Study Research: Design and Methods* (Second Edition, Sage, Thousand Oaks California, 2003), 45-46.



such as Defence's efforts to address domestic fuel governance problems (in comparison to other methods). The methodological framework adopted for this thesis proved to be effective in answering the research questions.

### **Research questions and outcomes**

The first of the three research questions developed for this thesis was: Is military fuel sustainability an issue that is seriously considered in Australian defence policy? This research question was specifically answered through analysis of the actions taken to influence Australian military fuel sustainability since INTERFET. As such, this research question will be addressed immediately below, in the section summarising the factors affecting military fuel sustainability since 1999.

The second and third of the research questions were as follows: Is the Australian approach to military fuel sustainability indicative of an approach and an expectation of providing expeditionary forces to US-led military operations? Is the approach by Australian policymakers to military fuel sustainability indicative of the military being treated as an exceptional or unique organisation?

These research questions were partly answered through the direct analysis of Australian military fuel sustainability, but they were also answered as data obtained through this thesis was generalised and relationships between military fuel sustainability and Australian defence policy were established. As such, these two questions will be addressed further below, in the section on generalisability.

### *Factors affecting Australian military fuel sustainability*

There are numerous reasons why Australian military fuel sustainability *might* have been a higher priority for Australian policymakers, and these reasons were highlighted throughout Chapters Two to Six. In laying out the factors influencing military fuel sustainability since 1999, and the reasons that fuel might have been a higher priority (but was not), the first research question is answered: Is military fuel sustainability an issue that is seriously considered in Australian defence policy?

Military fuel sustainability *might* have been a higher priority for Australian policymakers for the following reasons. First, access to fuel was an important factor that influenced World War Two outcomes,<sup>8</sup> and could reasonably be expected to influence a future conflict of similar magnitude.<sup>9</sup> Second, sophisticated future military capability will require an even greater quantity of fuel than contemporary equipment,<sup>10</sup> making fuel an even more important resource for military operations. Third, the sheer quantity of fuel needed for a high intensity military operation, and the potential magnitude of the support required from commercial or civilian sectors to provide it, could raise its importance. Chapter Six demonstrated this is the case for a military contingency that is central to declared Australian defence policy.<sup>11</sup> Fourth, fuel governance risks and failures in the 2000s and 2010s required significant effort to manage, and were ongoing challenges.<sup>12</sup> Fifth, the tactical risk of supplying fuel to deployed military units was evident during conflicts in the Middle East, and this risk has been previously recognised<sup>13</sup> and was assessed to be an enduring feature of warfare.<sup>14</sup> Finally, Chapter Five highlighted the assessed risk of ‘hostile’ nations withholding or blocking fuel supply for political reasons, a potential risk during future conflict.

However, these possible reasons for military fuel sustainability to be a higher priority did not prove influential enough to actually make it a priority. Military fuel sustainability was not a high priority for Australian policymakers at any time since World War Two, and the primary factors influencing Australian military fuel sustainability since 1999 are as follows.

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<sup>8</sup> Daniel Yergin, *The Prize: The Epic Quest for Oil, Money and Power* (Free Press, New York, 1991), 308-371.

<sup>9</sup> Roland G. Ruppenthal, *Logistical Support of the Armies: Volume 1, May 1941-September 1944* (Center of Military History, United States Army, Washington D.C., 1953), vii, 516.

<sup>10</sup> United States Department of Defense, *Energy for the Warfighter: Operational Energy Strategy* (Office of the Assistant Secretary of Defense for Operational Energy, Plans and Programs, Washington, D.C., 2012), Introduction.

<sup>11</sup> Air Power Development Centre, ‘Air Bases – Sustaining Air Power’, *Pathfinder* (Air Power Development Centre Bulletin, 88, May 2008), 2.

<sup>12</sup> Interview with Major General David Mulhall, Commander Joint Logistics (2017-2019), conducted on 26 February 2019.

<sup>13</sup> Charles Russo, *Soviet Logistics in the Afghanistan War* (United States Army War College, Pennsylvania, 1991), 12, highlighted the security vulnerabilities of Soviet fuel transportation in Afghanistan.

<sup>14</sup> United States Department of Defense, *2016 Operational Energy Strategy* (Office of the Assistant Secretary of Defense for Energy, Installations and Environment, Washington, D.C., 2016), 9.

First, there are simply many other competing strategic priorities that relegate military fuel sustainability to a lower priority in a constrained budgetary environment.<sup>15</sup> If fuel assumed a higher priority, other areas of military capability, which were considered by successive Australian Governments to be more important, would have to assume lesser priority and be assigned fewer resources.<sup>16</sup> Chapter Four highlighted that senior military commanders only addressed domestic fuel governance shortfalls after the risk of these shortfalls hit a 'crisis point' and after many years of external reviews identifying similar problems.<sup>17</sup> Inertia was a key factor at play, with a consistent, pragmatic Australian approach to military fuel sustainability over time, where the fewest resources were applied to keep military fuel sustainability at a necessary level to achieve current tasks. This even occurred at 'crisis point', whereby fuel infrastructure was improved but not with the aim of achieving greater sustainability in relation to declared contingencies and priorities.

Through the conduct of semi-structured interviews, it became apparent that the most senior leaders within Defence were well attuned to the budgetary risk of making fuel a 'security concern'. A recent Secretary of Defence and a recent Vice Chief of Defence Force argued that by elevating military fuel sustainability as an issue to the Australian Government, Defence would then risk carrying the cost liability for doing so. For example, the issue of Australia not complying with International Energy Agency fuel stockholding obligations was clearly viewed as a security concern, but overstating Defence's position could have resulted in the Defence budget being used to mitigate that problem.<sup>18</sup> This is an influence on military fuel sustainability, but was absent from the literature and from the interviews with less senior military personnel, because budgetary pressures were most acutely felt by the most senior Defence personnel. When triangulated with the known pressures from major projects such as future frigates, submarines and combat

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<sup>15</sup> Interview with Brigadier Andrew Freeman, Commander 17<sup>th</sup> Combat Service Support Brigade (2018-2019), conducted on 18 February 2019.

<sup>16</sup> Interview with Mr Dennis Richardson, Secretary of the Department of Defence (2012-2017) and Australian Ambassador to the United States (2005-2010), conducted on 15 April 2019.

<sup>17</sup> Interview with Major General David Mulhall, Commander Joint Logistics (2017-2019), conducted on 26 February 2019.

<sup>18</sup> Interview with Mr Dennis Richardson, Secretary of the Department of Defence (2012-2017) and Australian Ambassador to the United States (2005-2010), conducted on 15 April 2019; Interview with Vice Admiral Ray Griggs, Vice Chief of Defence Force (2014-2018) and Chief of Navy (2011-2014), conducted on 18 April 2019.

aircraft, and with an already significant budgetary allocation for remediation of fuel infrastructure problems,<sup>19</sup> the pressure of protecting the Defence budget from important but lower priority spending is high.

Second, despite the fact that independent, high intensity Australian military scenarios are central to declared Australian defence policy, there is no expectation amongst policymakers that such scenarios would arise in the foreseeable future.<sup>20</sup> Fuel supply would be a challenging aspect of an independent, high intensity mission, but has not been a risk for the missions that Australia has been required to undertake since 1999. INTERFET was the closest historical mission to more challenging declared scenarios outlined in Australian defence policy. Chapters Two and Six outlined that INTERFET was widely considered to have been a successful mission, despite a range of logistical shortfalls.<sup>21</sup> The Australian approach to military fuel sustainability was ‘a symptom of the lack of a national security strategy’,<sup>22</sup> but in a pragmatic sense, was not a risk to the expeditionary missions in support of the US and the nearer region stability and humanitarian assistance missions that successive Australian Governments directed Defence to undertake.

Budgetary pressures, higher priorities and threat expectations are also relevant when considering the fuel infrastructure available in northern Australian ‘bare bases’, highlighted as a limitation to declared operations in Chapter Six. The Chapter Six case study identified that existing fuel infrastructure to the bare bases is inadequate to meet declared contingencies, and there would be immense challenges in building up this infrastructure as a threat emerged. The bare bases are a defence policy priority, but the fuel infrastructure is a known risk that is accepted because the scenarios associated with activating those bare bases for high intensity military operations are remote.<sup>23</sup>

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<sup>19</sup> Department of Defence, *2016 Integrated Investment Program* (Commonwealth of Australia, 2016), 39.

<sup>20</sup> Interview with Mr Dennis Richardson, Secretary of the Department of Defence (2012-2017) and Australian Ambassador to the United States (2005-2010), conducted on 15 April 2019.

<sup>21</sup> Bob Breen, *Struggling for Self Reliance: Four case studies of Australian Regional Force Projection in the late 1980s and the 1990s* (Strategic and Defence Studies Centre, Canberra Papers on Strategy and Defence, No. 171, ANU E Press, Canberra, 2008), 163.

<sup>22</sup> Interview with Senator Jim Molan, Senator for New South Wales (2018-2019), conducted on 7 March 2019.

<sup>23</sup> Interview with Mr Dennis Richardson, Secretary of the Department of Defence (2012-2017) and Australian Ambassador to the United States (2005-2010), conducted on 15 April 2019; Interview with Vice Admiral Ray Griggs, Vice Chief of Defence Force (2014-2018) and Chief of Navy (2011-2014), conducted on 18 April 2019.

Third, the fundamental nature of the US alliance to Australian defence policy is an influence on Australian military fuel sustainability, despite fuel not being a significant aspect of the military alliance. Chapter Five highlighted the centrality of the alliance to Australian defence policy; the focus on interoperability and the Australian procurement of US equipment; the regular shared operational commitments; the similar geographical advantages and challenges (requiring both nations to traverse vast distances to conduct military operations); and, the previous prioritisation of national resources such as fuel for military operations undertaken by both nations. There were also notable differences between the Australian and US approaches, and the commitment of expeditionary Australian forces to US-led missions in the Middle East meant that Australian forces received fuel supply from the US, rather than having to provide it from within Defence resources or having to secure fuel supply lines. The US, conversely, maintained the ability to independently project military force across the globe, consistent with its geostrategic interests. The commitment of expeditionary Australian military forces to US-led military operations reinforced an operating model that relied on US fuel supply, and this US fuel supply proved to be reliable and efficient for the expeditionary Australian military contributions.

Fourth, military exceptionalism, and the idea that Defence would be provided with sufficient resources such as fuel should the need arise, influenced the Australian approach to military fuel sustainability. Chapters Four, Five and Six highlighted the legislative and policy frameworks that allowed prioritisation of national fuel supplies for military purposes in Australia and the US – the 1984 Liquid Fuel Emergency Act in the Australian context<sup>24</sup> – and the military doctrinal basis for mobilisation of resources should a larger Australian military force be required in the event of major or existential conflict. While these mechanisms are not well tested (or even recently discussed in any detail within Defence),<sup>25</sup> they exist and could be enacted if required, and contribute to the flexibility available for policymakers to pragmatically provide only a base level of resources to military fuel sustainability.

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<sup>24</sup> Commonwealth of Australia, *Liquid Fuel Emergency Act* (Canberra, 1984), Part I, Section 6.

<sup>25</sup> Interview with Mr Dennis Richardson, Secretary of the Department of Defence (2012-2017) and Australian Ambassador to the United States (2005-2010), conducted on 15 April 2019.

Fifth, the low priority of military logistics (when compared to military strategy and tactics), identified in Chapter Two as a key lament of classical military logistics theorists over several centuries,<sup>26</sup> is a factor influencing Australian military fuel sustainability. Interviews conducted with Australian military logistics practitioners, highlighted through Chapters Four and Six, consistently identified that the historically low priority for logistics continued in Defence in recent times.<sup>27</sup> As a field of military logistics, fuel is similarly treated as a logistical commodity which is not as important as aspects of military strategy and tactics. Chapter Four identified the low priority for fuel-related projects within the Defence Integrated Investment Program, the relatively uncoordinated science and research effort into military fuel sustainability, and the shortfalls in personnel training, as being consistent with a lower priority for logistics and military fuel sustainability.

Chapters Four and Six identified one exception to the lower priority for fuel-related procurement – air-to-air refuelling aircraft. The procurement of the KC-30A aircraft and expansion of the Australian air-to-air refuelling fleet were consistently prioritised in Australian defence policy over time (as was the case in the US).<sup>28</sup> This is because air-to-air refuelling is considered fundamental to tactical force projection and combat aircraft operations. One interview participant argued that pilots only viewed fuel as a problem ‘in the air’ (rather than in the supply of bulk fuel to air bases), and this is consistent with Royal Australian Air Force doctrine.<sup>29</sup>

Sixth, a series of adverse external reviews (over more than two decades) consistently identifying inadequate governance for domestic fuel facilities eventually proved to be an influence on Australian military fuel sustainability, forcing the Abbott and Turnbull Governments to allocate resources to fix deeply embedded problems. Adverse external reviews such as the Wraith Review (highlighted in Chapter Four) identified safety, training,

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<sup>26</sup> Henry Eccles, *Logistics in the National Defense* (Naval War College Press Edition in the Logistics Leadership Series, Rhode Island, 1997), 321.

<sup>27</sup> Interview with Colonel Mark Baldock, G4 Headquarters Forces Command (2019), conducted on 20 February 2019; Interview with Brigadier Andrew Freeman, Commander 17<sup>th</sup> Combat Service Support Brigade (2018-2019), conducted on 18 February 2019; Interview with Major General David Mulhall, Commander Joint Logistics (2017-2019), conducted on 26 February 2019.

<sup>28</sup> For example, Department of Defence, *Defence 2000: Our Future Defence Force* (White Paper, Canberra, 2000), 85, 87, 93.

<sup>29</sup> Air Power Development Centre, *The Air Power Manual* (Sixth Edition, Australian Air Publication AAP 1000-D, Commonwealth of Australia, September 2013), 24.

oversupply and management deficiencies that had reached 'crisis levels'.<sup>30</sup> The strengthening of the Commander Joint Logistics position as Head of the Fuel Supply Chain, and the establishment of the Strategic Fuel Branch, sought to improve a structure that the Turnbull Government considered to be 'dysfunctional'.<sup>31</sup> Substantial resources were eventually applied to solve this difficult problem, with good results, but this effort left no capacity for other aspects of military fuel sustainability (such as providing more fuel capacity for declared contingency scenarios) to be resourced.<sup>32</sup> The priority was to reduce governance risk, ahead of ensuring sufficient fuel supply capacity for declared contingencies.

Finally, national level fuel and energy issues have some influence on military fuel sustainability. Defence is a small consumer of fuel in a national context, and is unable to exert much influence on the energy market.<sup>33</sup> Even in the US context, with the most sophisticated military force in the world, the US military only consumes 1.5 per cent of national fuel supply.<sup>34</sup> National level fuel concerns, such as concerns about hostile political actions preventing fuel supply to Australia and the US, were directly transferred as military concerns into policy and doctrine,<sup>35</sup> although as Chapter Five argued, the risks to the military are not the same as the national risks, given factors such as the prioritisation of fuel for military use should it be required and the historical Australian reliance on US fuel supply for military operations. Ultimately, national level fuel issues have a minor influence on the Australian military approach to fuel sustainability, in the sense that these national issues reinforce that Defence is dependent on the market for ensuring fuel supply, and Australian Governments still seek the most capable military equipment regardless of the fuel implications.

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<sup>30</sup> Interview with Major General David Mulhall, Commander Joint Logistics (2017-2019), conducted on 26 February 2019.

<sup>31</sup> Australian Government, *Australian Government response to the Joint Standing Committee on Foreign Affairs, Defence and Trade report: Review of the Defence Annual Report 2013-14* (Canberra, November 2016), 9.

<sup>32</sup> Interview with Major General David Mulhall, Commander Joint Logistics (2017-2019), conducted on 26 February 2019.

<sup>33</sup> Interview with Group Captain Tim Pedley, Director of Fuel Operations (2017-2018), conducted on 13 February 2019.

<sup>34</sup> United States Department of Defense, *Fiscal Year 2012 Operational Energy Annual Report* (C-584E097, September 2013), 2.

<sup>35</sup> For example, Department of Defence, *Defending Australia in the Asia Pacific Century: Force 2030* (White Paper, Commonwealth of Australia, 2009), 43.

These seven major factors affecting Australian military fuel sustainability have not been laid out in these terms in the literature. In presenting these seven factors, this thesis contributes to further the knowledge of military fuel sustainability. In answer to the first research question, fuel is not a high priority in Defence, because of the factors identified above. There is no coherent, holistic plan for fuel, and the lack of such a plan did not negatively affect the operations that Defence has conducted since 1999 because of the effective reliance on US theatre logistics support.

Further, this thesis critically analysed the existing literature on military fuel sustainability (in Chapter Two), and found three trends that distorted the understanding of military fuel sustainability and of the seven influential factors identified above. These literature trends will now be summarised.

### **Trends in military fuel sustainability literature – *isolation, conflation, politicisation***

Chapter Two found that three trends were common across the Australian and US literature relating to military fuel sustainability. The *isolation* of military fuel sustainability commentary from broader Australian defence policy and from military logistics theory, the *conflation* of national energy matters with military fuel sustainability, and the failure to identify *politicisation* of aspects of some approaches to military fuel sustainability, were critiqued throughout this thesis.

First, the failure of much of the military fuel sustainability literature to contextualise fuel observations and recommendations with Australian defence policy – its *isolation* – prevented a complete understanding of the factors affecting military fuel sustainability. For example, proposals to reduce tactical fuel consumption or diversify fuel supply, such as a proposal to use a specific biofuel as jet fuel for Royal Australian Air Force aircraft, were regularly made but not contextualised into broader Australian defence policy, or even within a broader logistics framework.<sup>36</sup> In the case of this biofuel proposal, how would this fit into an Australian defence policy that has consistently and pragmatically accepted shortfalls in military logistics? Chapter Six identified substantial fuel supply

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<sup>36</sup> Anthony Bergin, 'Defence must regard climate change as a serious security issue', *Australian Strategic Policy Institute*, [website], (2 December 2016), <<https://www.aspi.org.au/opinion/defence-must-regard-climate-change-serious-security-issue>>, accessed 28 December 2017.



shortfalls and challenges associated with the deployment of combat aircraft to bare bases in Australia – the biofuel proposal was silent on how such fuel might be incorporated into the existing immense supply challenge. Chapter Four highlighted the substantial, decades-long challenges that Defence faces in remediating critical fuel governance and safety concerns in domestic facilities – would the development of an alternative fuel be prioritised ahead of fixing the existing problems? How would the use of biofuel for Australian combat aircraft be practical for current operations in the Middle East, where the US and commercial providers supply all fuel to Australian forces?

The same difficulties arise from much of the other non-contextualised Australian military fuel provision commentary, such as proposals to reduce tactical fuel consumption, or move to lower emissions-producing fuels for military operations to improve environmental outcomes. Further, would such actions even be necessary or desirable, with Defence greenhouse gas emissions representing approximately 0.35 per cent of national emissions and with a steady emissions forecast (from military energy use) until 2030?<sup>37</sup>

Chapter Four identified that much of the military fuel sustainability literature was written from a point of view emphasising environmental sustainability, rather than a lens where achieving military missions was a primary objective. While such a perspective may be reasonable, the lack of contextualisation significantly weakened the feasibility of much commentary in the military fuel sustainability literature, and did not present a comprehensive view of the factors affecting Australian military fuel sustainability.

The case study method was an appropriate approach to provide greater contextualisation of military fuel sustainability within Australian defence policy. The primary use of government and Defence publications to inform the Chapter Six case study ensured a close focus on Australian defence policy, and this was complemented by interviews and analysis of existing commentary. The Chapter Six case study remained appropriately bound within the topic and within a discrete period of time, focused on the decisions of policymakers. In comparison to the existing literature, the case study method was able to

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<sup>37</sup> Department of the Environment and Energy, *Australia's emissions projections 2018* (Commonwealth of Australia, 2018), 19.

identify key issues that were absent from the literature, such as fuel supply line security for independent Australian military operations.

Second, the Australian and the US literature regularly but problematically *conflated* national energy issues with military fuel sustainability. Forecasts of Australian military ‘mobility (becoming) unaffordable’<sup>38</sup> due to geological oil shortages or hostile political actions – even if true from a national perspective, which is in no way certain – failed to contextualise fundamental military-specific factors. These military-specific factors include the almost certain prioritisation of fuel for military use if required (codified through national legislation) for the exceptional military role; the consistent assignment of Australian forces to operate in support of the US (where military fuel supply has been provided by the US); the likelihood of strategic warning prior to a conflict; the relative impact of fuel shortfalls on an opposing military force; and, the military innovation that has historically occurred during major conflicts.<sup>39</sup>

Chapter Five also demonstrated the conflation of national and military fuel issues in the US context. The regular prediction of geological supply shortfalls (sometimes known as ‘Peak Oil’) was prevalent in the commentary, particularly during periods when crude oil prices were high,<sup>40</sup> but was not influential in US (or Australian) defence policy. More influential was the concern about hostile political actions threatening US military fuel supply,<sup>41</sup> although this was ultimately a minor influence, as the US military continued to seek the most capable military equipment regardless of the fuel consumption, and US military fuel consumption is assessed to be on an upward trajectory over the next five years.<sup>42</sup> The same risks to military fuel supply were identified in the Australian literature, and this lacked contextualisation, particularly concerning the issue of military exceptionalism, with little acknowledgement in the literature of the assumption that

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<sup>38</sup> Albert Palazzo, ‘The Military Revolution of Limits and the Changing Character of War’, *Small Wars Journal*, [website], (21 October 2013), <<http://smallwarsjournal.com/jrnl/art/the-military-revolution-of-limits-and-the-changing-character-of-war>>, (accessed 28 December 2017).

<sup>39</sup> Ben White, ‘Sustainable Defence Capability: Australia’s national security and the role of defence industry’, *Australian Defence Force Journal*, 183 (2010), 91.

<sup>40</sup> For example, Michael Hornitschek, *War Without Oil: A Catalyst for True Transformation* (Occasional Paper No. 56, Centre for Strategy and Technology, Air University, Maxwell Air Force Base, Alabama, 17 February 2006), 9-10.

<sup>41</sup> Geoff Dabelko, ‘Admiral Mullen and the ‘Strategic Imperative’ of Energy Security’, *New Security Beat*, [website], (13 October 2010), <<http://www.newsecuritybeat.org/2010/10/admiral-mullen-and-strategic-imperative.html>>, accessed 12 April 2019.

<sup>42</sup> United States Department of Defense, *2016 Operational Energy Strategy*, 9.

military forces would be prioritised for fuel in the unlikely event that a major conflict or existential threat arises.

There is certainly overlap between national energy issues and military fuel sustainability, but the argument that the military is confronted by the same fuel challenges as faced by broader society is misleading. Primary document analysis, particularly relating to the Liquid Fuel Emergency Act and related parliamentary debate,<sup>43</sup> Defence White Papers, Defence doctrine on mobilisation,<sup>44</sup> and the US case study, were useful in this regard, clearly highlighting that in the unexpected event of major or existential conflict arising, the military would be prioritised for resources.

Third, Chapter Two argued that military fuel sustainability is often *politicised*, but that such politicisation was not identified in the literature, and Chapter Five identified a number of examples in the US context where military fuel-related initiatives were exaggerated. For example, there was evidence that the US Navy had overstated its success in implementing biofuel consumption goals for tactical vessels,<sup>45</sup> but most of the commentary was overly positive about US Navy achievements and overstated the potential for transformational change.<sup>46</sup>

This is important to understand in the Australian context, because many commentators in Australia argued that Australia should follow the ‘rapid preparation’ of the US to transform its use of fuel.<sup>47</sup> Such claims were rarely challenged in commentary, and this line of argument became common in Australia, particularly from those who sought to more closely link climate change issues with the military.<sup>48</sup> While an argument that the

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<sup>43</sup> Commonwealth of Australia, *Liquid Fuel Emergency Act 1984*, Part II, Section 12.

<sup>44</sup> Department of Defence, *ADDP 00.2 Preparedness and Mobilisation (Provisional)* (Executive Series, Commonwealth of Australia, 2004), paragraph 2.43.

<sup>45</sup> Ship and Bunker, ‘Latest US Navy Biofuel Bunkers Are Bad For the Environment, Expensive, Barely Biofuel At All, Says Critic’, *Ship and Bunker*, [website], (6 July 2016), <<https://shipandbunker.com/news/world/143015-latest-us-navy-biofuel-bunkers-are-bad-for-the-environment-expensive-barely-biofuel-at-all-says-critic>>, accessed 28 December 2017.

<sup>46</sup> For example, Donald Fournier and Eileen Westervelt, *Energy Trends and their Implications for US Army Installations* (Energy Research and Development Center, USA, September 2005), iii-iv; Gregory Lengyel, *Department of Defense Energy Strategy: Teaching an Old Dog New Tricks* (Walker Paper No. 10, Air University Press, Maxwell Air Force Base, Alabama, January 2008), 5.

<sup>47</sup> Climate Council, *Be Prepared: Climate Change, Security and Australia’s Defence Force* (Canberra, 2015), v.

<sup>48</sup> Michael Thomas, *Climate Securitization in the Australian Military* (Second Oceanic Conference on International Studies, Melbourne, 9-11 July 2014), 11-15.

Australian military had not taken significant action to improve military fuel sustainability was reasonable, an argument that the US military had transformed its fuel usage was not accurate, and therefore invalidated the argument that Defence should take similar transformational actions to follow the US lead. Chapter Five argued that the US effort to improve military fuel sustainability was best described as incremental, and consistent with broader technological development across the force.

The US case study, and the analysis of primary US documents such as the Operational Energy Annual Reports to Congress that were initiated from Fiscal Year 2012,<sup>49</sup> were appropriate methods to identify whether claims made by policymakers were legitimate.

The critical analysis of these three trends in the literature contributes to the understanding of military fuel sustainability. In contrast to the orthodoxy represented in the literature, this thesis uniquely and closely links military fuel sustainability within an Australian defence policy context, differentiates between national energy issues and military fuel sustainability, and identifies the politicisation of aspects of military fuel sustainability that has skewed the understanding of what Defence may realistically seek to achieve.

### **Generalisation of findings**

The ability to generalise findings in qualitative research has periodically been questioned.<sup>50</sup> Chapter Three identified the likelihood that this research could be generalised, because military fuel sustainability sits as a recognised field under Australian defence policy, and the case studies used are central aspects to declared Australian defence policy – the deployment of combat aircraft to base areas or into the nearer region, and the US alliance. In recognising ‘delimitations’ as a check on the breadth of the generalisations that can be made,<sup>51</sup> this thesis only seeks to generalise within the Australian and US context (given the unique nature of the defence policies of these

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<sup>49</sup> United States Department of Defense, *Fiscal Year 2012 Operational Energy Annual Report*, 2.

<sup>50</sup> Denise Polit and Cheryl Beck, ‘Generalization in quantitative and qualitative research: Myths and strategies’, *International Journal of Nursing Studies*, 47 (2010), 1451-2.

<sup>51</sup> Allan Glatthorn and Randy Joyner, *Writing the winning thesis or dissertation* (Corwin Press, California, 2005), 168.

nations) and within a circumscribed time frame. Within these boundaries, the second and third research questions could be addressed.

This thesis has undertaken new research which builds upon an existing body of knowledge relating to Australian defence policy, but does so uniquely from the perspective of military fuel sustainability. Specifically, the identified disjunction between Australian defence policy and operational practice was a focus. The findings from this thesis are consistent with the identified disjunction, and this thesis has concluded, from the perspective of military fuel sustainability, that there is a primary expectation of Defence providing expeditionary forces to US-led operations.

Chapter Two highlighted aspects of the identified disjunction between Australian defence policy and operational practice. Specifically, this thesis has focused on the relative priority between the provision of expeditionary Australian military forces to US-led missions, and more independent missions declared as being central to Australian defence policy. A common criticism in the existing theory of a disjunction between declared policy and operational practice is that operations outside the nearer region have detracted from declared nearer region priorities,<sup>52</sup> and that these non-regional military commitments have reinforced an inconsistent strategic logic.<sup>53</sup>

Triangulated information developed in this research indicates that military fuel sustainability for declared independent operations was consistently prioritised lower than other aspects of defence policy (such as the procurement of new combat equipment). No single piece of evidence from this thesis was sufficient to confirm the existence of a disjunction between declared policy and operational practice, but through triangulation, there was almost complete consistency between the evidence obtained and the theory that a policy-practice disjunction exists. It could reasonably be expected that military fuel sustainability would have been a higher priority for policymakers if the declared policy of independent operations in the nearer region is indeed most important, given previously identified factors such as military access to fuel being critical to the outcome of previous

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<sup>52</sup> Paul Dibb and Richard Brabin Smith, *Australia's management of strategic risk in the new era* (Australian Strategic Policy Institute, Strategic Insights, November 2017), 2.

<sup>53</sup> Andrew Davies, *Let's test that idea – contestability of advice in the Department of Defence* (Australian Strategic Policy Institute, 22 January 2010), 3.

major conflicts, and the extreme challenges in supplying fuel to the bare bases (identified in the Chapter Six case study).

In all chapters of this thesis, attitudes towards military fuel sustainability demonstrate (or are consistent with) a policy-practice disjunction. Some important examples are as follows. A recent Secretary of Defence stated during an interview that fuel was just not a priority for successive Australian Governments, because fuel had caused no strategic problems during recent operations and major capability acquisition was a much higher priority.<sup>54</sup> The most senior Defence logistics officer highlighted that it took two decades of fuel governance issues and the emergence of extreme safety risk in domestic facilities before sufficient resources were applied to fix that specific aspect of military fuel sustainability.<sup>55</sup> Ambitious objectives outlined by the Defence Fuel Management Committee were never resourced.<sup>56</sup> The lack of focus on tactical aspects of military fuel sustainability was consistently apparent, highlighted during interviews and in analysis of primary documents. The absence of any Australian focus on fuel supply line security, identified in interviews and through its conspicuous absence in doctrine, is notable given the great costs borne by the US in seeking to supply fuel to tactical units in Iraq and Afghanistan, and with an expectation that such risks will endure for future conflicts.<sup>57</sup> The paucity of integral and militarised Defence platforms such as oil tankers to transport large quantities of fuel, and the poor state of repair and heavy maintenance burdens for platforms such as Her Majesty's Australian Ship (HMAS) Sirius and the older HMAS Success, is indicative of an expectation that Australian military forces would continue to receive fuel from commercial or US military sources. The lack of fuel supply capacity at the three Australian bare bases (for major combat operations to be undertaken) is an indication that this scenario is not considered likely.

The existence of legislative and policy mechanisms to allow prioritisation of national fuel resources for military use also tacitly permits Defence to not prioritise current fuel

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<sup>54</sup> Interview with Mr Dennis Richardson, Secretary of the Department of Defence (2012-2017) and Australian Ambassador to the United States (2005-2010), conducted on 15 April 2019.

<sup>55</sup> Interview with Major General David Mulhall, Commander Joint Logistics (2017-2019), conducted on 26 February 2019.

<sup>56</sup> Department of Defence, *Defence Fuel Management Committee Terms of Reference* (29 October 2008), 1-2.

<sup>57</sup> United States Department of Defense, *2016 Operational Energy Strategy*, 9.

resources. Chapter Four identified the consistent postponement or cancellation of fuel-related projects in the Defence Integrated Investment Program, the inconsistent level of training provided for military fuel practitioners, and the lack of coherence in science and research efforts for fuel technology. These factors are all indicative of military fuel sustainability not being seen as a major defence policy risk. The lack of action in relation to specified concern associated with hostile political actions to withhold or block fuel supply to Australia, as was identified in the US context, is indicative of a view that such a scenario is not necessarily applicable to Australia. The absence of a fully burdened cost of fuel within Australian military planning – relevant for understanding the total cost of independent forward projection of fuel to tactical forces – is also indicative of a perceived lack of relevance of this concept in the Australian context.

With all of these factors considered, it is reasonable to conclude that there is an assumption that fuel is not a concern for the most anticipated future military contingencies. If providing expeditionary forces to US-led operations is the primary expectation, then such lack of concern is entirely reasonable, albeit inconsistent with declared policy. If independent operations in the nearer region – the primary tasks identified in defence policy<sup>58</sup> – are most important, such an approach to military fuel sustainability is inadequate, with significant questions over whether the necessary focus could be brought onto military fuel sustainability during a period of warning time, particularly with the many other competing demands that would concurrently arise. This thesis therefore concludes that the Australian approach to military fuel sustainability is consistent with the identified disjunction between declared policy and operational practice, and provides greater evidence towards the existing, well-developed hypothesis relating to a disjunction.

The third research question was: Is the approach by Australian policymakers to military fuel sustainability indicative of the military being treated as an exceptional or unique organisation? The discussion on civilian-military relations and the armed forces and society framed analysis in this thesis on military exceptionalism, and the concept that the military would be prioritised for use of fuel from broader national resources if it was ever required. While aspects of military exceptionalism have been the subject of extensive

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<sup>58</sup> Department of Defence, *2016 Defence White Paper* (White Paper, Canberra, 2016), 17.

commentary, identified in Chapter Two, military exceptionalism has not been discussed in relation to critical analysis of military fuel sustainability, making this aspect of the thesis unique. Specifically, the fact that Australian policymakers do not prioritise military fuel sustainability is evidence of a pragmatic approach, whereby current fuel requirements are resourced only to the level they need to be – for example, to support the establishment of civilian refuelling points during the 2019 Queensland floods<sup>59</sup> – with an expectation of additional resources should a more challenging task arise in the future.

Military fuel sustainability is not a unique-to-military aspect that requires the ‘management of violence’ – a pre-requisite, according to Huntington, of what constitutes the military profession.<sup>60</sup> In part, this contributes to the low priority of military fuel sustainability in Australian defence policy. Further, as a field of military logistics, military fuel sustainability was also related in Chapter Two to the work of prominent military logistics theorists, who consistently argued that logistics was treated as a lower priority than other aspects of strategy and tactics. The classical military logistics literature was not influential on Australian defence policy, but the observations made by theorists such as Eccles were nonetheless valid.<sup>61</sup>

The low status of both military fuel sustainability and broader military logistics was discovered to be a consistent theme through many of the semi-structured interviews conducted for this thesis. This low status is consistent with the regular recognition within Australian defence policy that successive Australian Governments were prepared to accept risk to logistics – that is, to resource logistics less than combat equipment and accept an unbalanced force-in-being that could support US-led contingencies but not declared independent contingencies.<sup>62</sup> At various points in all interviews with Australian military logistics officers, the issue of the low status of logistics within Defence was highlighted as a feature. For example, fuel and logistics was forbidden to be the cause of exercise limitations, and extensive logistics pre-planning, often involving unrealistic pre-

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<sup>59</sup> Interview with Brigadier Andrew Freeman, Commander 17<sup>th</sup> Combat Service Support Brigade (2018-2019), conducted on 18 February 2019.

<sup>60</sup> Samuel Huntington, *The Soldier and the State* (Harvard University Press, 1957), 11-12.

<sup>61</sup> Eccles, *Logistics in the National Defense*, 321.

<sup>62</sup> Department of Defence, *Defence White Paper 2013* (White Paper, Commonwealth of Australia, 2013), 29.



positioning of resources prior to an activity, was directed.<sup>63</sup> Fuel and logistics equipment was consistently recognised as a lower priority to combat equipment, and this was identified in Chapter Four in the context of delays and cancellations in the Defence Integrated Investment Program.<sup>64</sup> Although not wilful, there is a general ignorance at senior levels in understanding logistics issues; very few senior military commanders understood the intricacies of the fuel supply chain;<sup>65</sup> and, logistics is a 'victim of prioritisation'.<sup>66</sup> The ill-defined metrics of fuel sustainability improvement highlighted in White Papers<sup>67</sup> is in contrast to clearly defined capability objectives for combat equipment.<sup>68</sup>

Chapter Six identified the approach of policymakers to air-to-air refuelling as an exception to the otherwise low prioritisation of military fuel sustainability, because it is viewed as being central to the application of air power, and a capability that could limit the Royal Australian Air Force's dependence on logistics on the ground.<sup>69</sup> Consequently, air-to-air refuelling consistently attracted the necessary funding to grow additional capability,<sup>70</sup> but was the only area of military fuel sustainability to do so.

The existence of legislation and doctrine that provided a framework for the mobilisation of more fuel resources for military use should they be required, allowed a continued focus on combat equipment, with an expectation that additional fuel supply capacity would be available should strategic circumstances change.<sup>71</sup> Interview participants such as Senator Jim Molan argued that in the event of a military emergency, the economics of military fuel sustainability became irrelevant as the government would just need to pay.<sup>72</sup> Defence's

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<sup>63</sup> Interview with Colonel Mark Baldock, G4 Headquarters Forces Command (2019), conducted on 20 February 2019; Interview with Brigadier Andrew Freeman, Commander 17<sup>th</sup> Combat Service Support Brigade (2018-2019), conducted on 18 February 2019.

<sup>64</sup> Peter Marshall, *Fuels Remediation Summit*, (Presentation, Canberra, 21-22 August 2013), Slide 10.

<sup>65</sup> Interview with Colonel Mark Baldock, G4 Headquarters Forces Command (2019), conducted on 20 February 2019; Interview with Brigadier Andrew Freeman, Commander 17<sup>th</sup> Combat Service Support Brigade (2018-2019), conducted on 18 February 2019.

<sup>66</sup> Interview with Lieutenant Colonel David Beaumont, senior Army logistics officer, conducted on 19 February 2019.

<sup>67</sup> For example, Department of Defence, *Defence 2000: Our Future Defence Force*, 84.

<sup>68</sup> Department of Defence, *2016 Defence White Paper*, 90-95.

<sup>69</sup> Air Power Development Centre, *The Air Power Manual*, 148.

<sup>70</sup> Department of Defence, *Defending Australia in the Asia-Pacific Century: Force 2030*, 122-4.

<sup>71</sup> Interview with Mr Dennis Richardson, Secretary of the Department of Defence (2012-2017) and Australian Ambassador to the United States (2005-2010), conducted on 15 April 2019.

<sup>72</sup> Interview with Senator Jim Molan, Senator for New South Wales (2018-2019), conducted on 7 March 2019.

imprecise and non-committal response to pressure within a 2018 Senate Committee to seek to limit or change military fuel consumption in response to climate change, identified in Chapter Four, is another indication that Defence views its role as being exceptional and would seek to avoid being unnecessarily constrained during major combat operations if they arose in the future.

Emergency legislation and mobilisation doctrine is effectively untested, and Chapter Two demonstrated that there was still significant debate in Australian society during World War Two as to whether resources should be prioritised for military use,<sup>73</sup> despite Australia being involved in a major or existential conflict. However, the existence of this legislation and doctrine is a factor indicating that the military role is viewed as exceptional, and the legislation offers assurance. Similarly, security of fuel supply lines is also untested, but is considered to be achievable – to a degree – if it ever needs to be addressed.<sup>74</sup> The implementation of fuel rationing in Australian society during World War Two, when the need arose, would be repeated in the event of a major or existential conflict, and the absence of any pressure on deployed elements to limit fuel use<sup>75</sup> is an indication that fuel expenditure is simply considered an essential cost when undertaking military operations. The absence of consideration of this legislation and doctrine from Australian military fuel sustainability commentary is therefore a major shortcoming.

In summary, the findings of this thesis support the view that the military is viewed as an exceptional entity with an exceptional role, with an expectation of resources being provided should the need arise. The lower priority of fuel and logistics, when compared to combat equipment, has been a pragmatic approach by Australian policymakers to prioritise current operations and sophisticated combat equipment, with the expectation that more resources for fuel would be forthcoming should they be required for independent operations.

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<sup>73</sup> David Mellor, *The Role of Science and Industry: Australia in the War of 1939-1945* (The Griffin Press, Adelaide, 1958), 212.

<sup>74</sup> Joint Standing Committee on Foreign Affairs, Defence and Trade, *Australia's Maritime Strategy* (Canberra, June 2004), 101-102.

<sup>75</sup> Interview with Mr Craig McConachy, Australian Fuel Contract Manager – Middle East and North Africa Region (2019), conducted on 13 February 2019.

### Limitations and further study

Although this research has validity and the chosen research methodology is appropriate, it is recognised that limitations to generalisability exist with elements of this study. These concern the political and security focus, the limited practitioner opinion sought, the limited examination of contemporary technology relevant to military fuel sustainability, and the focus on Western military forces.

First, as highlighted in Chapter Three, aspects of policy, time, location and concept bound this thesis. This thesis approached military fuel sustainability through a political and security lens, as this was necessary to achieve sufficient depth of analysis, and did not seek to cover the wide range of academic disciplines that this topic can reside within. Specifically, alternative observations of military exceptionalism and political opportunism may have been developed if study was undertaken through a different academic discipline. For example, Chapter Four identified a trend of military fuel sustainability being considered through an environmental sustainability lens, and such a view, if adopted for this thesis, may have produced different conclusions, but the focus was on the policymakers who could change or influence Australian defence policy rather than on those who implement it.

Second, whilst this thesis is focused at the policy level, broad tactical practitioner opinion was not sought, and this may have limited the breadth of opinion on military fuel sustainability presented. For example, practitioner opinion on the varying degrees of exceptionalism within Defence may have added to the findings made in this thesis.

Third, this thesis did not examine contemporary fuel technology in detail. Just as Winston Churchill was able to make a revolutionary military fuel technology decision in 1911 when changing the British Navy fleet from coal to oil,<sup>76</sup> it is possible that similar technology will emerge to change the existing crude oil-based military structure that currently exists. This is a significant area of study with potential for future interest, but does not change how fuel sustainability has been shaped by present technologies.

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<sup>76</sup> Daniel Yergin, 'Crisis and Adjustment: An Overview', in Daniel Yergin and Martin Hillenbrand, (eds.), *Global Insecurity: A Strategy for Energy and Economic Renewal* (Houghton Mifflin Company, Boston, USA, 1982), 21.

Fourth, this thesis examined military fuel sustainability only from a Western military perspective. The approach to fuel sustainability in non-Western military forces may present further insight into the subject. There may also be the opportunity to contrast the approach of conventional forces to irregular forces. This thesis also only peripherally assessed the relevance of concepts such as Peak Oil or climate change to Defence, and these areas are worthy of further research.

Each of these identified limitations also presents areas that may be of interest for further study, and these additional areas for further study will now be identified.

#### *Further study*

Four key areas for further study arising from this thesis may be considered. First, Chapter Five analysed US military fuel sustainability in detail, highlighting the potential for transfer of technology associated with military fuel sustainability between the US and Australia. The history of technology transfer within the ANZUS alliance may be useful to determine the possible trajectory of fuel technology transfer. This could potentially improve fuel sustainability in Australia and prove or disprove the assumption that such transfer would have a positive effect on Defence and military fuel sustainability in the future.

Second, gaining practitioner insights into military fuel sustainability, both in Australia and the US, is a research opportunity. Such study could include a diverse range of topics, including the effectiveness of security provided to fuel distribution in Iraq and Afghanistan, and the commonalities of fuel training between different military forces (or between different Services). Such studies could strengthen interoperability on these operations and deepen the understanding of military exceptionalism, or highlight other aspects such as Service rivalry.<sup>77</sup>

Third, Chapter One highlighted the relationship between technology and policy, with fuel technology determining possible military operations during the two World Wars, and the World Wars driving further inventions in fuel technology. This relationship between fuel technology and recent conflicts in Afghanistan and Iraq presents a further research

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<sup>77</sup> Gary Waters and John Blackburn, *Australian Defence Logistics: The Need to Enable and Equip Logistics Transformation* (Kokoda Paper No. 19, June 2014), 9.

opportunity. Furthermore, a comparison could be made between fuel technology innovation in periods of conflict and in periods of strategic competition (such as the Cold War, or the potentially emerging competition between the US and China), as the pace of fuel technology development may be indicative of broader military or logistical development trends.

Fourth, climate change is an issue growing prominence within Defence, being highlighted by commentators and within policy.<sup>78</sup> The direct linkage between climate change and military fuel sustainability may be considered a future area for research.

## Conclusion

This research has outlined the factors influencing Australian military fuel sustainability since INTERFET in 1999. This research identified that the Australian approach to military fuel sustainability is consistent with an identified disjunction between declared defence policy and operational practice, and is also consistent with a view of military exceptionalism and the pragmatic low prioritisation for fuel and broader logistics when compared to tactics and strategy. Australian defence policy has been uniquely considered through the lens of military fuel sustainability, and in doing so, a number of significant shortcomings were found in the existing literature associated with the topic, namely the *isolation* of military fuel sustainability from broader policy, the *conflation* of national and military fuel issues, and the failure to identify or critically analyse *politicisation* of military fuel sustainability. This thesis has revealed that there is opportunity for further research to be undertaken on what has been a relatively uncharted subject.

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<sup>78</sup> For example, Michael Thomas, 'The Securitisation of Climate Change: a military perspective', *Australian Defence Force Journal*, 192 (2013), 12-14.

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The references for this thesis are divided into three sections:

- Government and Official Publications, Elected Representatives.
- General References, Journals, Media.
- Interviews undertaken for this thesis.

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