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Piqued Oil Interest: Overstating the Priority for United States Military Fuel Sustainability in Australia

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Abstract

Reducing the United States military's petroleum consumption became a declared Obama Administration-era policy. This policy was often framed as a measure to address the tactical losses suffered during fuel supply operations in the Middle East, but there were notable links to environmental and broader energy security agendas. While the US military undertook a large number of mostly modest initiatives to reduce tactical fuel consumption, overall organisational fuel consumption has remained persistently steady for most of this century; consumption peaked during intense military operations in the Middle East, and existing military hardware continues to require large quantities of fuel. During this period, a prominent argument emerged in Australian strategic commentary suggesting that the Australian military should follow the lead of the United States by making major changes to reduce tactical fuel consumption. In making this demand, Australian commentators either misunderstood or misrepresented the extent of the fuel-related changes adopted by the US military. The lack of grounding in existing theory—either within Australian defence policy or within military logistics theory—and the common application of a basic comparison with the actions of the United States military has been predominant. While Australian policymakers have mostly considered military fuel sustainability and broader logistics to be lower priority issues, with some recent focus on domestic facilities and governance, commentators have focused on niche issues that could only be pursued if more fundamental aspects of the capability were established. Meaningful commentary would need to address relative fuel priorities in the Australian Department of Defence; the relative priority of fuel within military logistics; and the relative priority of military logistics within Australian defence policy. A lack of contextualisation has precluded an adequate understanding of the complexities associated with Australian military fuel sustainability.

Introduction

Based on a perceived major organisational shift in the United States (US) approach to military fuel sustainability, Australian strategic commentary regularly presented the idea that the Australian Department of Defence (herein referred to as 'Defence') should take more decisive actions in this area. A common view was that Australia should adopt the 'successful strategies' from the US to reduce military fuel consumption and related emissions.[1]

While this commentary often comprised an environmental angle, fuel supply was clearly an operational challenge during previous Australian military missions, such as the International Force East Timor (INTERFET) commitment in 1999,[2] and military fuel sustainability is therefore an important topic for greater analysis. However, this paper will challenge the orthodoxy that the US took significant action to improve military fuel sustainability. The advocacy of Australian commentators was based on a mistaken understanding of what the US accomplished.

The vast gap in military fuel consumption between the US and all other nations has periodically been reflected in concerns raised by US policymakers and commentators. Indeed, access to fuel was a decisive factor during major 20th century wars.[3] Identified military fuel concerns could generally be classified as either geological, relating to a fear of oil depletion;[4] or geopolitical, relating to a fear of oil supply being withheld. These concerns were particularly prevalent during periods of elevated oil prices, although previous US efforts to mitigate any perceived risk were discontinued when oil prices subsequently fell;[5] mitigating the perceived military risk of over-dependence on oil has consistently proven to be prohibitively expensive. More recently, environmental concerns have also encouraged interest in military fuel consumption.

On assuming US Secretary of Navy responsibilities in 2009, Ray Mabus came to epitomise the cause of military fuel sustainability for many; he quickly declared fuel issues to be one of his highest priorities, and he set some ambitious targets.[6] And he was not the only actor who sought to influence military fuel sustainability at the time. US Congress determined that fuel was of sufficient importance to the military that an annual Congressional update has been mandated since 2012. National security strategies identified oil supply as a security concern.[7] President Obama even periodically engaged on issues of military fuel sustainability.[8] A vast body of US commentary emerged to overwhelmingly offer immense support for what was argued to be extensive action to improve US military fuel sustainability.

Secretary Mabus's tenure ended in 2017, and the declared US prioritisation of military fuel sustainability has diminished. However, there was a distinct gap between the rhetoric and the reality in the 2010s. Changes to military fuel sustainability during the Mabus era could best be described as incremental rather than profound. Accordingly, commentators who advocated for the Australian military to take more decisive fuel-related action because the US had done so either misinterpreted or misrepresented the extent to which the US military had enacted change.

Further, the Australian commentary seemingly wished away the fundamental problems relating to military fuel sustainability in Australia. Fuel and broader logistics have long been declared to be a lower Defence priority. When senior-level attention eventually turned to fuel around 2014, the focus was on the most basic aspects—trying to remediate significant problems with Australian-based (non-deployable) fuel infrastructure. Australian military fuel sustainability commentary lacked any sense of how suggestions such as the uptake of very specific biofuels[9] might be prioritised against, or emerge from, the existing military fuel infrastructure in Australia.

This paper will use the term 'military fuel sustainability' to describe the approach taken by policymakers to procure, distribute, tactically supply, protect and consume fuel for military purposes. The term 'sustainability' refers to the fact that fuel is an essential requirement to achieve the military mission.

Peak Rhetoric

There is no doubting the enormous tactical fuel supply challenges faced by the US military during its 21st century military operations. Military and civilian personnel who distributed fuel around Iraq and Afghanistan often faced extraordinary risk. Although estimates vary, a vast number of the US casualties from Middle Eastern operations occurred during resupply convoys.[10] In a technologically sophisticated military with widely dispersed forces, US military commanders had little choice but to repeatedly send fuel convoys around these countries to allow for continued military operations.

Even prior to the Middle Eastern wars, the US had faced tactical fuel supply risk and acknowledged its limited options to mitigate such risk; for example, the 2001 terrorist attack in Yemen on the United States Ship *Cole* raised US consciousness that tactical fuel supply was a vulnerability for a force that needed to operate globally in areas of heightened military threat, and that the US had a small number of imperfect resupply alternatives.[11]

Although rarely a central consideration in military operational planning, the challenges and risks associated with military fuel sustainability have long been accepted in US military doctrine.[12] The risks associated with military fuel sustainability have not always been translated into policy, but policy pressure started to mount as the tactical fuel challenges in the Middle East became more apparent. Internal reviews, such as Defense Science Board reports from 2001 and 2008, offered concerning views of the US military's reliance on fuel.[13]

So fuel was on the military radar when Ray Mabus became Secretary of Navy in 2009. The internal reviews and a growing body of US commentary on military fuel sustainability had raised awareness of the risks facing the US military. He wasted little time in declaring military fuel sustainability to

be one of his highest priorities for the US Navy, and articulated several aims consistently during his tenure. These aims included operational aims such as reducing the need for platforms to continually refuel; energy independence aims such as reducing the US reliance on foreign oil suppliers; and environmental aims, which included a desire to reduce carbon dioxide emissions.[14] Military fuel sustainability became the issue du jour for Secretary Mabus, and he routinely provided public and Congressional briefings on the matter.

Secretary Mabus was a driving force, but he was by no means the only prominent US actor to demonstrate a piqued interest in military fuel sustainability. Congress legislated an annual reporting requirement, with the Fiscal Year 2012 Operational Energy Annual Report the first in an ongoing series.[15] Other government entities increased their scrutiny of military fuel sustainability.[16] Joint Chiefs of Staff,[17] and even President Obama, regularly commented on aspects of military fuel sustainability.[18] 'Great Green Fleet' and 'Hybrid Humvee' became catchphrases that were synonymous with the US military's efforts to address fuel risks and reduce consumption.

Fuel and energy issues were raised in profile. Entities such as the little-known Defense Logistics Agency Energy came into public view.[19] Broader military and societal efforts such as climate change mitigation brought even more scrutiny to the military's use of fuel, particularly as the US military signalled that its climate change mitigation efforts were 'mainly through changes in our energy use'.[20] US military doctrine positioned fuel as a more central issue and a 'limiting factor', particularly in the US Air Force, where the most fuel is consumed.[21]

Concurrently, US commentary on military fuel sustainability hit a peak. This commentary almost exclusively presented two key themes. First, commentators encouraged US policymakers and the military to take decisive action to reduce fuel consumption and expand the use of alternatives. Second, commentators were highly supportive of the actions already being taken by the military, although they often conflated legislated requirements to reduce domestic energy consumption (which were quite extensive and particularly focused on increasing renewable energy in domestic facilities[22]) with actions to reduce tactical petroleum consumption (a much harder proposition). For example, some felt that the US was 'systematically address[ing] the need to decrease the amount of

energy used in tactical weapon systems'.[23] One commentator admired the admirals' ability to 'solve intractable problems' (referring to the US reliance on foreign-supplied oil) that 'stymie the rest of us';[24] many felt that the US military would successfully 'replace petroleum with renewable and non-polluting biofuels'.[25] The commentary was extensive and overwhelmingly consistent in its message.[26]

Declared US military fuel sustainability initiatives were developed and expanded. Secretary Mabus's 'Great Green Fleet'—the 'transformation' of an aircraft carrier strike group to alternative fuel sources and using energy conservation measures—was the highest profile of these initiatives.[27] However, the Services were also empowered to propose a large number of other initiatives relating to military fuel sustainability.[28] By many accounts, the US military was transforming its fuel use and leading the nation by doing so.

Fuelling Some of the People, Some of the Time

> *Australia is fortunate in that it can examine successful climate change security strategies that key allies … are implementing.*[29]

US commentary and declared policy proved to be influential in shaping the debate in Australia through the 2010s. Australian commentators quickly sought to translate the message from the US into the Australian context, and the perceived US actions to improve military fuel sustainability became a more significant topic in Australia.

Australian commentators regularly made definitive recommendations based on the perceived US action. One prominent group of commentators argued that the 'unprepared and uninformed defence force' should follow the US Navy's efforts to lessen climate change impacts by 'reducing petroleum use'.[30] Others felt that 'a stark contrast' existed between US and Australian actions to reduce fuel consumption.[31] Others inferred that Defence did not necessarily understand the full extent that the US military was going to in its effort to improve military fuel sustainability.[32] One commentator argued that Australia's 'military … mobility [would become] unaffordable' if changes were not made.[33]

Commentary was not solely focused from a military fuel sustainability perspective. Indeed, a significant component of the Australian commentary viewed the issue through a lens of environmental sustainability, given that the military's fuel consumption is its primary source of greenhouse gas emissions.

The environmental sustainability viewpoint was dominant during a 2018 Senate references committee review. This political review—which reiterated

the belief that the US was progressing with a significant organisational transformation—made recommendations to set ambitious targets to reduce Australian military emissions and operational fuel consumption. Commentators who contributed to the review represented entities who had little historical involvement in military affairs but whose organisations primarily sought reductions to Australia's greenhouse gas emissions.[34] To many of these groups, the military was another source of emissions and its fuel consumption was a logical target. And evidence that the US military was taking major steps to reduce its fuel consumption proved compelling to transpose into an Australian context.

The 2018 Senate review was one of a number of Australian reviews which raised the prospect that military fuel sustainability needed to be prioritised higher than it had been.[35] Australian defence policy historically accepted fuel and broader logistics to be areas where a level of risk could be accepted, with the potential to build up capacity over time if a more significant military threat to Australia emerged. However, cautious fuel recommendations were eventually made in Australian defence policy.[36] As a result, a number of investments were made, although these mostly addressed major problems with the military's domestic fuel infrastructure rather than shortfalls for deployed forces, and they were concerned with assurance of fuel supply capability, not with reduced fuel consumption.[37] Some tenuous claims made in lower-level Defence policy—such as an intent to minimise the military's environmental 'footprint' during overseas operations[38]—were not reiterated in more authoritative sources.

Ultimately, however, senior Defence leaders began to question the extent of the US action to change military fuel sustainability. For example, in 2018 the Australian Vice Chief of Defence Force stated:

> *… I think a bit of the steam has come out of the momentum on that … 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.*[39]

The extent of US actions to influence military fuel sustainability will now be considered.

Bureaucracy Preventing Blowout

An oil well blowout is the uncontrolled release of oil (or other liquids and gases) from a well, after the failure of existing safeguards. Preventing a blowout is a critical requirement for oil well drilling, and the basic techniques for preventing a blowout have been similar for the last century.

Military bureaucracies similarly have well-established methods (both intentional and unstated) to limit the ability of individual actors or policies to achieve wholesale change or add risk to the system, thereby preventing a 'blowout' in terms of resources and organisational priorities. As a result, military strategy can sometimes suffer from a disjunction between declared policy and operational practice, if rhetoric precipitously precedes what can actually be achieved. This paper contends that despite the strong rhetoric in the 2010s relating to changes to US military fuel sustainability, change could at most be described as incremental, and policies during the period of peak interest from 2009 to 2017 effectively had little strategic impact, with organisational fuel consumption continuing to rise.[40]

There is no doubt that US military and political leadership changes in 2017 heralded the de-prioritisation of military fuel sustainability in declared policy. For example, Navy Secretary Spencer did not refer to fuel in his 'Mission, Vision and Priorities';[41] nor did the 2018 Department of the Navy Business Operations Plan,[42] despite the predominance of Secretary Mabus's fuel-related plans up until 2017. It is also possible that changes in leadership even prevented some of the most ambitious military fuel sustainability plans from being fully realised, thereby limiting the impact of some initiatives.

Further, there is also little doubt that Secretary Mabus and others genuinely sought significant improvements to military fuel sustainability, and this saw a sustained focus on the issue for a number of years. The extensive range of US fuel initiatives throughout the 2010s[43] resulted in a commendable number of fuel efficiency achievements.[44]

However, the US Department of Defense is vast and can be difficult to change, particularly as it is an organisation that almost exclusively values operational performance over other considerations. Further, the different Services have different fuel priorities. For example, the US Army cares deeply about dispersed tactical distribution in a specific theatre, whereas the US Air Force must protect bulk quantities of fuel at air bases; this makes organisational coordination more difficult. As a result, outside the political rhetoric and consistently overstated US commentary, almost all evidence points to the fact that the US military was unable to change its overall fuel consumption habits, and that there was a growing gap in the 2010s between declared policy and operational practice.

While the US rhetoric consistently focused on specific initiatives, the overall figures are perhaps the most telling. One notable organisation-wide fuel consumption reduction has occurred since 2010, and this was caused by a major reduction in operational effort in the Middle East.[45] Apart from that reduction, which was specific to US operational circumstances, there was no reduction to military fuel consumption on an organisational scale. Consumption remained consistent, and fuel was procured at rates of around 100 million barrels per year. This figure has been consistent in recent times, and also prior to the 2001 commencement of the war in Afghanistan (at which time it grew to meet operational requirements).[46] There is also no forecasted reduction in future consumption, with credible military analysts seeing few technology improvements that will reduce military fuel consumption.[47]

The figures showing overall organisational fuel consumption achievement are arguably the most consequential, but they are often not clearly presented and they can be lost in volumes of other information and public commentary on military fuel sustainability. As a result of the annual reporting requirements, the large amount of internal military correspondence and the significant amount of positive US commentary on military initiatives, there is a sizeable quantity of largely repetitive information available on US military fuel sustainability. Information of this nature makes analysis

somewhat challenging. However, there are numerous examples relating to prominent fuel-related projects that demonstrate how a large volume of information can suggest that significant changes are afoot, but where the end results are less compelling. Hybrid electric propulsion systems, 'Hybrid Humvees', and the 'Great Green Fleet' are three examples to be highlighted.

First, the initiative for hybrid electric propulsion systems to be retrofitted to US warships was regularly detailed, and scholars periodically assessed this project to have 'demonstrated positive developments'.[48] The amount of information released, and the sense within the released information that the project was on track, could easily have given an impression that a significant amount was being achieved. However, a trace of the timeline paints a clearer picture of relative progression.

Informed by exploratory studies,[49] Secretary Mabus introduced a plan in 2009 for the hybrid systems to be installed on 12 vessels.[50] However, in 2012 the Department of Defense identified savings made from outfitting a sole vessel to that point. In 2013 the US Navy again highlighted hybrid propulsion as an important initiative; subsequently another plan indicated 34 Navy vessels would be retrofitted.[51] In 2016 the Navy was said to be 'on schedule' to retrofit three vessels within a year. The 2017 Operational Energy Annual Report stated that the 'initial fielding testing on one DDG-51 began in late 2017',[52] and further studies were undertaken.[53] In 2018 the US Navy de-prioritised hybrid propulsion and the project was cancelled. In 2019, members of the US House Armed Services Committee sought to reinvigorate hybrid propulsion development.[54]

The retrofitting of hybrid electric propulsion to US Navy vessels was highlighted extensively over more than a decade, backed by some scientific data. Despite the periodic appearance of progression, the timeline indicates that the objectives for the project were regularly changed. The technical challenges and expense ultimately proved fatal for the project.

Second, the 'Hybrid Humvee' was said to be one electric vehicle (EV) project from a 'Department of Defense up to its elbows in cutting edge EV projects'.[55] The reality was different. The US Army's planned procurement of a 'Hybrid Humvee' was periodically foreshadowed over the course of a decade and used to suggest a growing fuel consciousness in the US military,[56] but in 2015 the Army decided to procure a diesel-powered

vehicle, with the diesel needed to meet its performance requirements.[57] Even if the project had come to fruition, the term 'Hybrid Humvee' suggests a level of environmental awareness that may not actually have been present.

Third, the 'Great Green Fleet' was the program that became Secretary Mabus's most important example of major organisational change. The fleet concept was marketed consistently in public commentary. Claims that the Navy was now 'greener' and that the fleet offered a 'strategic advantage'[58] were difficult to reconcile with the fact that the eventual fleet operated on a blend of 90 per cent standard marine diesel and the aircraft carrier remained nuclear powered (as it has always been). This is not to understate the technical and organisational challenge of achieving the 10 per cent ethanol consumption outcome, but it again puts into perspective how difficult fundamental change to military fuel sustainability is, and highlights the vastly overstated nature of much of the commentary.

Apart from major equipment procurements, further mismatch between perception and reality was observable on military operations. For example, much was made in US commentary of a directive from General David Petraeus when he commanded US forces in Afghanistan. General Petraeus formally sought technology to help reduce operational fuel consumption.[59] But any reduction in overall fuel distribution and consumption was difficult to discern, and ultimately the operational requirement was for fuel to be distributed widely across the country.[60] Indeed, other simultaneous measures increased fuel consumption, including the additional armouring of vehicles due to the risk of improvised explosive devices,[61] and the provision of additional security forces to protect regularly traversed routes.[62] General Petraeus's demand captured headlines, but the reality was more mundane and with little overall effect on military fuel sustainability.

Fuel rhetoric also exceeded reality at times in US politics. For example, the Giffords-Udall bill 'Department of Defense Energy Security Act of 2010' invoked the (very real) threat to fuel supply convoys in the Middle East as a means to justify the proposed legislation.[63] Yet the Act (which ultimately remained unlegislated) almost exclusively focused on measures to reduce domestic military energy consumption on bases, and would not have improved tactical aspects of military fuel sustainability.

A Non-Stop Flight

The initiatives to implement change to military fuel sustainability stand in stark contrast to projects that embed existing fuel consumption habits over the long term. Major US military procurements that entailed significant implications for the long-term level of military fuel consumption continued over the 2009 to 2017 period, with no obvious pressure to consider military fuel sustainability issues. For example, the US$1 trillion Joint Strike Fighter program is far more consequential in reinforcing existing fuel requirements than measures that were taken to change military fuel sustainability. Two other examples are as follows.

First, the KC-46 Pegasus, an air-to-air refuelling capability, was a high priority for the US Air Force[64] and was considered essential to ensure US force projection.[65] Some senior Air Force officers argued that 550 to 650 of these aircraft may be needed,[66] and the US$35 billion project was initially scoped for 179 aircraft.[67]

Second, costing over US$1 billion per vessel, the planned fleet of 20 John Lewis Class oiler tankers (designated T-AO 205) is a substantial investment to ensure the reliable provision of fuel to deployed Navy vessels. A Congressional submission relating to the tankers did not highlight any considerations relating to alternative fuel sources, and performance remained the primary consideration.[68] A more recent Congressional submission identified increasing oiler demands, and stated that 20 vessels would now be the minimum number required to support more distributed maritime operations.[69]

There is little question from any quarter that the oil tankers and the air-to-air refuelling aircraft are critical for a military superpower with global interests. Yet their procurement will almost certainly lock in historically high rates of operational fuel consumption into the future, particularly given the fact that 75 per cent of US military energy consumption relates to tactical fuel, the vast majority of which is consumed by the Navy and Air Force. These long-term procurements have always been far more influential on military fuel sustainability than the lesser initiatives that were raised during the 2010s, and clearly demonstrate that US policymakers support the US military's primary emphasis on equipment performance over all other factors. Anything that could potentially jeopardise US strategic interests would never be countenanced.

Ultimately there were a substantial number of military fuel sustainability initiatives and trials raised, examined and pursued. Many were successfully completed. However, the inertia of the US military bureaucratic system, and the need for military performance over any other factor, clearly inhibited strategic change to US military fuel sustainability. The level of information produced relating to military fuel sustainability, and the large number of fuel initiatives that were raised prior to 2017, could understandably mislead a casual observer; however, organisational figures and forecasts show that the US military has not fundamentally changed its approach to fuel.

This invites the question: Why did so many Australian commentators forcefully advocate for the Australian military to follow the US into making significant changes to military fuel sustainability when fundamental change did not actually occur?

Grounding the Fuel Convoys (in Existing Knowledge)

There exists a large and credible body of established theory on Australian defence policy, particularly since the Second World War. There also exists a large body of historically established theory on military logistics. Australian military fuel sustainability sits firmly within both of these bodies of grounded theory. Yet commentators rarely invoked either existing theoretical or practical basis to contextualise or strengthen their observations, preferring simple comparisons with perceived US actions. As such, this prevented a shared understanding of the factors affecting military fuel sustainability in Australia, and the lack of contextualisation represents a weakness in the Australian literature.

First, there are many fundamental aspects of Australian defence policy that have direct relevance to military fuel sustainability. For example, there is a longstanding debate relating to the relative priorities of defending the continent and operating in the nearer region, versus the more prevalent requirement to operate further afield (often in support of the US).

This ongoing debate has fundamental implications for Australian military fuel sustainability. These implications include how much Australia can rely on US fuel supply, and in what circumstances; how the *Liquid Fuel Emergency Act 1984*—which legislated the ability for the Australian Government to prioritise fuel for military purposes, away from civilian and commercial uses[70]—would be operationalised; the degree to which the Australian Government's acceptance of a lower level of operational readiness for logistics adds risk to a military response;[71] and the relative importance of military fuel sustainability compared to the many pressing non-fuel-related military problems. One could reasonably expect military fuel sustainability

commentary to touch on these issues. However, these matters were rarely raised in the literature, and therefore proposals such as the use of a specific biofuel for Royal Australian Air Force aircraft, which was not contextualised into a defence policy or broader logistic framework,[72] leave more questions than answers and do not bring clarity to the issue of Australian military fuel sustainability.

Second, the lack of reference to longstanding military logistics theory further brings into question the validity of some of the military fuel sustainability commentary.

Much of the commentary relating to the assurance of fuel supply for military use did not reference the Defence logistics system; nor was the question of how Australia may independently supply an alternative fuel blend such as ethanol to an operational area addressed.[73] Enduring observations from classical logistics theorists such as Thorpe and Eccles—particularly relating to the consistently low priority of *all* military logistics (not just fuel)—were absent.[74] The effect of 'competition' between different classes of logistic supply (such as fuel and rations), particularly during scenarios such as resupply missions, was absent.[75] The historical consistency of national prioritisation of resources for the exceptional military role during a period of national emergency was mostly absent. Even Australian logistics doctrine was rarely noted.

The failure to ground commentary in established theory was particularly detrimental to much of the commentary that viewed military fuel sustainability through an environmental lens. Given that the Australian military only contributes approximately one-third of 1 per cent of national greenhouse gas emissions[76]—a 'drop in the ocean' compared to national users[77]—and is responsible for a mission of national importance, any argument which advocates for fundamental changes to military fuel sustainability as a method to reduce Australia's carbon emissions must start on precarious ground.

Compelling the military to reduce its energy consumption in non-operational areas, such as domestic facilities, is reasonable and responsible and should be pursued. However, arguments such as 'there is no reason why Defence should not set an ambitious target in terms of moving towards alternative fuels'—which imply major changes to operational practices—are more problematic, and they are further compromised by the misrepresentation

of US military fuel sustainability action and the lack of grounding in existing theory. These weaker environment-related arguments have the potential to distract from other more reasonable positions relating to the nexus between the military and the environment. For example, commentators such as Thomas have argued that military forces need to be prepared to respond to more climate change related events,[78] but that important message is easy to lose among less compelling and non-contextualised arguments.

In summary, the majority of Australian commentary throughout the 2010s relating to military fuel sustainability was not grounded in well-established theory relating to defence policy and military logistics. When combined with the fact that the US military has not made significant changes to its own military fuel sustainability, the validity of much of the Australian commentary is brought into question and an inaccurate picture of the factors affecting Australian military fuel sustainability has emerged. Further, Australian commentary rarely acknowledged the most prominent aspects of military fuel sustainability in Australia. These will now be examined.

Back to Basics

This paper has identified a number of key factors that are relevant to consideration of military fuel sustainability in Australia. Changes to US military fuel sustainability were not strategically significant; military fuel consumption represents a very small component of Australian carbon emissions; and logistics and fuel have long been a declared lower priority in Australian defence policy. Further, US and commercial providers have consistently and effectively provided fuel to Australian military forces when conducting expeditionary military operations since the Second World War.[79] Put simply, military fuel sustainability has not been a primary issue for recent Australian governments, because the problems associated with military fuel sustainability have not been strategically urgent.[80] However, underinvestment in Australia-based military fuel infrastructure over the course of decades has seen a number of significant emerging problems. When set against this context, much of the Australian military fuel sustainability commentary could fairly be criticised for focusing on marginal issues. This marginal issue focus has limited the attention given to some more mundane but fundamental aspects of military fuel sustainability.

A recent Commander Joint Logistics (CJLOG)—the most senior logistics officer in the military—identified that Defence's fuel governance hit a 'crisis point' around 2013 as the organisational risk from underinvestment in domestic fuel facilities became impossible for policymakers to ignore.[81] A chronology of military fuel sustainability issues since INTERFET will demonstrate how domestic fuel governance risks finally reached the point where major changes had to be made, and why governance remediation has reasonably been the predominant Defence focus in matters of military fuel sustainability.

Not Fuelly Committed

Military fuel sustainability concerns have rarely been identified in the deployed context. In military operations in the Middle East, reliable fuel supply was provided by US and commercial providers. Australia has also maintained a modest baseline of tactical fuel distribution capabilities. For example, Her Majesty's Australian Ships *Sirius* and *Success* performed important fuel distribution functions for the Royal Australian Navy over the course of several decades.[82] Joint Project 157 provided Army with a level of fuel supply capacity.[83]

In the only example of a large independent operation, significant fuel supply concerns emerged during INTERFET.[84] However, the challenges associated with INTERFET have not been replicated in other deployed environments since that time, and the structures established within Defence since that time have mostly been centred on ensuring minimal but sufficient fuel governance and infrastructure, and relying on tactical fuel provision from others. In the main, this was an effective approach.

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.[85] 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 2002 audit, Defence reviewed and partially clarified the responsibilities of the many disparate military entities that were involved in fuel sustainability.[86] Even so, Defence did not always comply with government direction on fuel issues,[87] 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). DFMC minutes described the requirement of the DFMC to 'combat ANAO recommendations'[88]—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 paper contends that the DFMC has only ever had the capacity to respond to the most pressing 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. There could be no reasonable expectation that major changes relating to alternative fuels would be actioned by the DFMC; yet, as the pre-eminent entity responsible for military fuel sustainability matters in Defence, the DFMC's role and responsibilities did not feature in Australian commentary.

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 management.[89] 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.[90] 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;[91] and to manage price unpredictability and reduce (or prevent) growth in fuel expenditure.[92]

For most of its history, the DFMC was subordinate to the Defence Logistics Board (this entity became the Defence Logistics Committee (DLC)), and the DFMC was careful to ensure that the role of the individual Services was not seen to be usurped.[93] The 2008 DFMC terms of reference positioned the committee as subordinate to the DLC, and identified that a one-star military officer was the DFMC's chair.[94] 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.[95]

The first DFMC attendance list indicated that no military officer above the rank of Lieutenant Colonel regularly attended committee meetings.[96] 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 and that no minutes were produced, and the May 2005 meeting was declared to be a 'new start' for the committee.[97] 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 10 different committee chairs.

The Directorate of Strategic Fuel (the predecessor organisation to the Fuel Services Branch, within 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 meeting suggested that its terms of reference could move away from remediating ANAO recommendations and towards contemporary issues and Service support.[98] In the May 2005 DFMC meeting, 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'.[99]

However, the DFMC and Directorate of Strategic Fuel were not even resourced to implement some non-trivial but basic governance requirements. For example, an electronic fuel management information system, identified as a need in the 2002 ANAO audit,[100] was estimated in 2005 to be complete in the second half of 2006[101] but in 2010 was estimated to be complete by mid-2011.[102] The Joint Fuel Information Management System was declared operational in December 2011 but required ongoing enhancement.[103] An ANAO report from 2017–18 again identified information technology deficiencies causing fuel supply chain problems, with an anticipated systems remediation date of 2022.[104] If fuel sustainability had been a higher priority and had been 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.[105] The 2004 DFMC terms of reference focused on addressing the ANAO audit recommendations,[106] 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'.[107]

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 Australian dollars (2008 figures) per barrel.[108] Concurrently, 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 to deploy military hardware that was not reliant on oil within 10 years.[109] 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.[110] Defence did not endorse this non-binding and unrealistic recommendation, and confirmed that military equipment would remain reliant on oil for at least 20 years.[111] However, the motivation for Defence leaders to reinvigorate a coordinating entity for fuel issues was evident, both to respond to cost and governance pressures and to address political concerns.

The September 2008 DFMC minutes indicated that the DFMC had been 're-invigorated'.[112] Reinvigoration was a theme that was also applied to wider military logistical functions in 2010,[113] although 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 no such logistics apogee had been reached.[114] 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,[115] although some senior officers delegated attendance to their subordinates after the first meeting.[116]

Similar to the first DFMC iteration, the 2008 DFMC attempted to move into broader fuel issues but was not resourced to do so. 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'.[117] 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.[118] Despite concerns about the limited focus of the DFMC, governance and consumption forecasting remained the DFMC's primary function,[119] and this limited focus caused no immediate problems for Defence.

There were emerging references to fuel in defence policy. Consistent with US actions around the same time and concomitant with record oil prices, the Rudd Government used the 2009 Defence 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.*[120]

This is 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's suggestion that Defence influenced national fuel markets was broadly rejected.[121] A 2009 Senate standing committee report stated, 'Defence is a comparatively minor user of fuel within the broader national context'.[122] 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 on matters such as petroleum refining capacity in Australia.[123]

From within Defence, frustrated by a perceived lack of action to address the emerging issue of fuel availability risk,[124] numerous military officers formed a group known as the Australian Defence Force Peak Oil Study Group. This group was active for several years, commencing around the time of the 2009 White Paper. It argued that global oil depletion was a pressing military concern but that Defence had taken insufficient action to mitigate the risk.[125] 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 is no evidence of resultant Defence actions.

Lower-level defence policy and procedures continued to emphasise the importance of fuel for military operations in 2009 and 2010, but without gaining a high profile. For example, Defence refined its processes in the event of an activation of the Liquid Fuel Emergency Act and the need for military prioritisation.[126] Defence fuel doctrine also continued to be released.[127]

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'.[128] However, the DFMC addressed the most pressing governance issues and brought scrutiny to Defence fuel budgets and forecasts. Other responsibilities, such as the introduction of alternative fuel types, were far lower priorities. The DFMC also oversaw important fuel-related issues and projects, such as rationalisation of fuel types,[129] and necessary improvements to some domestic fuel facilities.[130] The transition from Service to joint responsibility for the purchase and distribution of fuel was a challenging but required action from the ANAO audit[131] 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 generally agreed that modest governance improvements had been made.[132]

However, further external scrutiny crystallised the fact that military fuel sustainability risks were continuing to increase.

The Wrath of Wraith

As we turned over rocks, we found nasty things.[133]

There were at least six major external reviews of military fuel sustainability after 2010. These included reviews by Marshall, KPMG, Jacobs/SKM and Aurecon.[134] Further, 2011 federal workplace health and safety legislation led to a significant Defence undertaking to ensure compliance.[135] 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.[136] 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.[137] The 2013 Defence Fuels Seminar was almost entirely focused on legislative compliance, as were subsequent DFMC meetings.[138] The involvement of the two-star officer highlighted the importance that Defence placed on ensuring compliance with the *Work Health and Safety Act 2011*.

The many reviews of military fuel sustainability were punctuated by further warning signs arising from non-fuel-specific reviews and policy. The 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.[139] The 2013 Defence 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.[140] 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.[141] Some argued that the creation of joint headquarters in Defence, such as Headquarters Joint Operations Command, brought a number of fuel and logistical problems to the fore over time,[142] and there was broad acceptance at senior levels within Defence that too much risk was being accepted in the domestic management of fuel.[143]

The 'crisis point' identified by Major General Mulhall[144] came to a head through the 2013 Wraith Review.[145] The Wraith Review identified significant fuel governance concerns, some of which were repeated from earlier reviews,[146] 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'.[147] A former Director of Fuel Operations indicated that these issues resulted in a significantly increased interest in fuel from Defence leaders, 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.[148]

The Wraith Review led to structural changes, with the consequences of this review more influential than those of 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'.[149] The Wraith Review in its entirety has not been released. However, a number of other government and Defence publications provide 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 branch focused on remediating issues associated with the integrity of Defence fuel installations, safety and individual training.[150] 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.[151] Part of the Wraith Review released following a freedom of information request[152] 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.[153] The Turnbull Government accepted the majority of the Wraith Review recommendations.[154] Implementation of these recommendations became the responsibility of the Fuel Services Branch, with good progress made.[155]

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'.[156] CJLOG was appointed Head of the Defence Fuel Supply Chain in February 2014,[157] with the Fuel Services Branch established under his leadership. Joint Logistics Command also became a focal point for various external relationships.[158]

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 Capability', reporting to the Chief of the Defence Force through the Commander Joint Capabilities. 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 Joint Operations Command.[159]

Supporting CJLOG in this role is the Defence Logistics Committee (DLC). The DLC meets quarterly and is responsible for the coordination of joint logistics elements and logistics policy. Doctrinally, this includes military fuel sustainability.[160] The DLC's membership comprises 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, previously a subordinate committee to the DLC, was elevated in importance as a result of the assessed need to improve fuel governance, with CJLOG now chairing both the DLC and the DFMC. Many issues discussed at the DFMC are no longer discussed by the DLC.[161] This was a pragmatic decision, given that 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', implying that a higher degree of organisational oversight is important.[162] The Director General of Fuel Services Branch is not a standing member of the DLC[163] but does not need to be, given the raised profile of the DFMC and CJLOG's leadership 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 2017–18.[164] 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. They were arguably also worthy of the focus of Australian commentary on military fuel sustainability, but did not invoke much interest. However, CJLOG and his staff had finite work capacity. Defence's ability to assure fuel supply for tactical forces was modelled against classified scenarios[165] but there was not a significant

organisational effort, and tactical aspects were rarely 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.

Reviews of aspects of military fuel sustainability continued. Some Defence fuel practitioners considered the 'Cost Assurance Review' conducted prior to the 2016 Defence White Paper to have been significant because it resulted in the progression of various funding proposals for fuel.[166] A 2018 ANAO audit compelled a number of military fuel sustainability governance actions.[167] 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).[168] 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 ageing and unsafe fuel facilities, particularly in Darwin, was the main fuel-related issue he dealt with during his tenure,[169] 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,[170] 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 Defence Fuel Transformation Program was a resulting response. This program forecasted the need for AU$1.21 billion (2017 figures) over 30 years to reduce risk and improve the fuel supply chain.[171] Some of this funding proposal is yet to be agreed by the Australian Government, but the funding has been foreshadowed in the Defence Integrated Investment Program,[172] in the 2016 White Paper[173] and in the 2016 Defence Industry Policy Statement,[174] giving some confidence that the funding will be provided. In comparison, there was no similar funding allocation for fuel in the 2012 Defence Capability Plan. Instead, a non-forecast allocation of AU$150 million (2013 figures) from the Defence Support and Reform Group (now the 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.[175] The 2016 funding allocation demonstrates a level of forward planning for fuel infrastructure and governance investment that was not previously apparent, with an intention to ensure Defence is 'continuously developing, monitoring and maintaining critical infrastructure' including fuel facilities.[176]

Of note, the transformation program was described in the Defence Annual Report 2017–18 as a 'corporate enabling service',[177] offering an indication of the non-tactical lens through which policymakers viewed fuel sustainability priorities. The strategic priorities for fuel, mostly relating to fixed infrastructure, were not necessarily influential on fuel planning at the tactical level.[178] Although many references to the Defence fuel supply chain implied that the transformation program encompassed an 'end-to-end' view of all Defence's fuel sustainability interests,[179] the end-to-end focus ceased at the point of handover to the Services. The Services, rather than Joint Logistics Command, would normally take responsibility for developing the tactical aspects of fuel supply, distribution and security.[180] The task of bringing project documentation to government, and expending allocated money, has already proven to be demanding for Joint Logistics Command.[181] As the Defence Fuel Transformation Program is a 30-year program, its implementation 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 more senior involvement in military fuel sustainability post-2014 solved other problems. There is 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.[182] The 2015 First Principles Review and the greater empowerment of a 'strong strategic centre' almost certainly supported more collegiate outcomes.[183] 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, after normal aspects of organisational inertia were overcome. He considered the role of the Defence Science and Technology Group to be very important, from a science and evidence perspective, to support change management efforts that affected the Services and the joint environment.[184]

CJLOG's oversight of the Defence fuel supply chain allowed resolution of other difficult organisational problems. For example, the challenge of gaining ongoing Service consensus for progression towards a 'single battlefield fuel' was discussed in many pre-2014 DFMC meetings, but with little progress.[185] 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 and a collegiate approach.[186] The DFMC that occurred in December 2012 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 about the lack of action;[187] progression was only achieved after 2014.

In sum, fuel and logistics have long been a declared lower priority of Australian defence policy, and the modest level of resourcing applied to fuel over decades sought to maintain a minimal baseline, but no more than that. Significant external scrutiny eventually led to a view that military fuel sustainability was facing a 'crisis' in domestic 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.[188] The focus was on domestic issues, as no overseas or operational deployment issues were considered to be as contemporarily important as these governance issues by policymakers.[189] 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'.[190] Fuel infrastructure, such as storage facilities in northern Australia, was important for this.[191] 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[192]—creating efficiencies, and establishing clearer accountability.

This examination of two decades of the policymaker approach to Australian military fuel sustainability demonstrates the wide gap between the fuel issues that have been common in Australian commentary, and the divergent challenges faced by Defence. The divergence has meant that Defence has been unable to benefit from scholarly examination of issues that are most relevant to military capability—for example, the relative merit of prioritising domestic fuel infrastructure over tactical fuel supply capacity.

Further, the common encouragement in Australian commentary for Defence to follow the US lead to 'transform' its military fuel sustainability not only was misunderstood or misinterpreted but also meant that most Australian commentary rarely focused past peripheral capability issues. This trend in Australian military fuel sustainability demonstrates the value of grounding observations in an empirical theoretical or practical framework, rather than relying on simple comparisons with an incomplete view of another nation's actions. If Australian commentators do believe that issues such as the increased use of alternative fuels in tactical operations are important, recommendations can only be meaningful if they account for relative Defence fuel priorities; the relative priority of fuel within military logistics priorities; and the relative priority of military logistics within Australian defence policy.

Conclusion

Following the significant loss of personnel and equipment in fuel convoys in Afghanistan and Iraq, US military fuel sustainability became a topic of great interest to policymakers and commentators alike. US military fuel sustainability became a high priority in declared policy from 2009 to 2017. Many military fuel initiatives were commenced, investments were made, and there was a sense that positive steps were being taken by the US military to reduce the tactical dependence on oil.

However, despite the efforts of Secretary Mabus and other political and senior military actors, changes to US military fuel sustainability can only be described as incremental. There was little change to overall military fuel consumption over time, and many of the projects that characterised the declared policy priority were either relatively small or exploratory in nature, or were quietly discontinued. While some commentators have fairly argued that military fuel sustainability declined in organisational priority after 2017, this paper has observed that no measures were taken that would have resulted in fundamental change to the US military at any point.

Many Australian commentators either misinterpreted or misrepresented the extent of US action, consistently arguing that Australia should follow the US lead to implement major changes to military fuel sustainability. Such commentary was a misinterpretation of US action, and was consistently not grounded in existing well-established theory relating to Australian defence policy or military logistics. This paper has examined the actions that have occurred in Defence over the past two decades, and identified a wide gap between the commentary and the practice.

Lamentably, Australian military fuel sustainability commentary has focused on issues of marginal relevance to military outcomes, and Defence's approach has been unable to benefit from robust scholarly scrutiny of the actual fuel priorities, of the relative priorities of fuel within broader military logistics, and of military logistics within broader defence policy. As a result, there is less clarity relating to the factors affecting Australian military fuel sustainability, and this is therefore a topic that would stand to significantly benefit from more investigation and appropriate contextualisation.

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