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Energy Security

Siloed Systems, Shared Stakes

Keeping the Nation's Engine from Stalling

William Nichols

Defending Australia and its National Interests
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Cover image: Glowing storage tanks and a labyrinth of pipes define an oil refinery under the cover of darkness, a testament to continuous industrial activity. *Shutterstock*.

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Abbreviations

ADF	Australian Defence Force
ASPI	Australian Strategic Policy Institute
CSIRO	Commonwealth Scientific and Industrial Research Organisation
FSSP	Fuel Security Services Payment
LCLF	low carbon liquid fuels
NESA	National Emergency Supply Agency
NRMA	National Roads and Motorists' Association
MSO	Minimum Stockholding Obligation

Author's Preface

Fuel underpins much of Australia's economy, national resilience and military capability, yet repeated reviews identified the same vulnerabilities with little change to the underlying system.

My interest in fuel security grew over several years of work on fuel resilience and energy security within Joint Logistics Command within the Department of Defence. During that time, I contributed to national vulnerability assessments of Australia's fuel network, supported the development of the department's fuel requirements and worked closely with Australian Government agencies responsible for national fuel policy.

What struck me throughout that period was the comparative disconnect between the importance of liquid fuels and the level of policy attention they received. Fuel underpins much of Australia's economy, national resilience and military capability, yet repeated reviews identified the same vulnerabilities with little change to the underlying system. That remained the case until the latest oil shock associated with the Iran conflict that highlighted the strategic importance of fuel security.

This prompted two questions. First, why had these vulnerabilities persisted despite years of analysis and warnings? Second, was there a practical way to improve national fuel resilience without disregarding the realities of market economics, industrial capability and cost?

The research for this paper emerged from those questions. Rather than revisiting Australia's fuel vulnerability, I sought to understand the factors that created it, why it has endured and the options that might be considered to address it.

The paper argues that fuel security is not solely an energy policy issue. It sits at the intersection of economic resilience, national security, critical infrastructure and climate policy. Viewing it through only one lens risks overlooking both the scale of the challenge and the opportunities for reform.

While reasonable people may disagree with the conclusions, I hope this paper contributes to a broader discussion on preparedness and the fuel systems that underpin Australia's national capability.

William Nichols

28 August 2026

Executive Summary

Australia's reliance on imported liquid fuels is one of the nation's most profound structural risks, reducing resilience, hindering the Department of Defence's (Defence) readiness and threatening economic stability during crises or disruptions. Fuel underpins sectors such as aviation, freight, agriculture, mining, emergency services and Defence—areas lacking scalable alternatives—making national capability vulnerable to failures. Decades of deregulation have entrenched cost-driven policies, resulting in lower stockpiles, reduced refining capacity and greater dependence on imports. This has created a fragile system with limited redundancy or sovereign control. The Liquid Fuel Security Review formalised this vulnerability by prioritising efficiency over resilience, sidelining Defence needs and failing to prepare for long-term disruptions. Meanwhile, billions of dollars committed to Defence capabilities face paralysis if access to liquid fuel is not assured. Finland and Japan demonstrate that fuel resilience is achievable when regarded as a sovereign capability, built through robust legal frameworks, strong institutions and public acceptance of higher costs. For Australia, developing this resilience also entails climate responsibility, with regional partners assessing the country's commitment to climate action through its energy policies. A sovereign, low-carbon liquid fuels industry is the only viable option to expand Australia's refining capacity, reconcile security with climate commitments and ensure long-term national preparedness.

Introduction

In Australia's national security, economic stability and crisis response capacity are reliant on secure access to liquid fuels, yet this strategic foundation is critically exposed. Over the past decade, intensifying geopolitical competition throughout the Indo-Pacific, the closure of domestic refineries,[1] mounting pressure on maritime chokepoints[2] and the disruptive dynamics of a global energy transition have magnified this vulnerability. Despite these converging risks, Australia's public and political discourse on energy has remained preoccupied with emissions reduction and affordability, thereby marginalising systemic fuel supply vulnerabilities and preventing strategic planning to address them.[3] This neglect is compounded by energy policymaking that isolates economic, security and environmental considerations. To this end, the central research question guiding this thesis is: How can Australia address its fuel vulnerability while supporting national security, economic continuity and environmental goals? Four subsidiary questions direct the inquiry:

- Why do liquid fuels remain essential to Australia's national capability?
- What structural and institutional factors have allowed this vulnerability to persist despite repeated warnings?
- What can be learned from international approaches to treating liquid fuels as a sovereign capability embedded in national planning?
- How can low-carbon liquid fuels (LCLFs) contribute to a more resilient and strategically aligned national fuel posture?

Although Australia's dependence on imported liquid fuels is not a new concern, it has grown more problematic over time. In 2023, Australia imported more than 90 per cent of its liquid fuels, mainly from a few refineries in north and southeast Asia, with only minimal onshore stockpiles to buffer potential supply shocks.[4] Almost all shipments pass through contested sea lines of communication, including chokepoints that are vulnerable to geopolitical tensions, congestion and disruption.[5] Despite this exposure, Australia continues to operate a 'just-in-time' supply model, even though its refining capacity has shrunk to just two operational facilities.[6]

The Liquid Fuel Security Review identified these vulnerabilities and proposed modest interventions, but progress has been slow.[7] The *Fuel Security Act 2021*, enacted in response, established new policy measures, including a Minimum Stockholding Obligation and subsidies for the last two refineries to ensure they remain operational until 2027.[8] However, analysts warn that Australia still does not meet stockholding benchmarks set by the International Energy Agency and remains vulnerable to external shocks.[9] The system continues to rely on fragile assumptions about the stability of global markets, even as the Indo-Pacific region becomes more contested.[10]

This vulnerability is exacerbated by fragmented policymaking, where economic, security and environmental portfolios pursue diverging objectives instead of operating within a cohesive framework.[11] Defence has historically assumed that the energy portfolio, responsible for national fuel security, would safeguard military surge demands.[12] Conversely, energy policymakers have long prioritised price stability and minimal market intervention, encouraging suppliers to maintain the leanest possible inventories. This efficiency approach has created a fuel system optimised for cost but dangerously deficient in resilience, leaving critical sectors vulnerable to cascading risks in the event of a disruption.[13] At the same time, the energy transition has fostered a flawed assumption that liquid fuel demand will soon decrease, despite forecasts indicating sustained long-term growth.[14] Demand is projected to rise significantly across the economy, particularly in heavy industries such as transportation, aviation, agriculture as well as for Defence. The result is a significant blind spot in national capability, where Australia's fuel vulnerability undermines both military preparedness and economic stability.[15]

The strategic consequences of this disconnection are clear. The Liquid Fuel Security Review identified systemic risks but opposed structural reform, warning instead that higher prices would burden consumers.[16] This dependence on market logic delayed investment in sovereign refining, storage and distribution infrastructure. Meanwhile, the *National Defence: Defence Strategic Review 2023* called for the adoption of a deterrence-by-denial strategy, which requires long-range strike systems, littoral manoeuvre forces and fortified northern bases.[17] All of these capabilities rely heavily on fuel, requiring constant access to diesel and jet fuel, particularly in northern Australia, to sustain minimum operational capacity. However, billions of dollars are being invested in these new military capabilities without ensuring the fuel networks that support them.[18]

Australia's strategic credibility, therefore, relies on integrating liquid fuel resilience into national planning, alongside defence modernisation and the energy transition.[19] The gap between Defence's fuel-intensive denial strategy and the market-based fuel supply approach reveals a structural flaw, where neither resilience nor transition pathways are sufficiently planned.[20] This thesis argues that Australia's market-led approach has created systemic vulnerabilities that have been worsened by fragmented policymaking.[21] Tackling this fragmentation requires a unified strategy that considers Australia's fuel security a vital component of its national capability.

Methodology

This research used policy and discourse analysis, supported by comparative case studies and descriptive data, to interrogate Australia's structural fuel vulnerabilities and the policy frameworks that have shaped them. The analysis draws on government legislation, strategy reviews, institutional submissions and industry reports. The focus was on how Australia's fuel security has been framed, understood and inadequately addressed by its policies. The thesis evaluates how vulnerabilities have been repeatedly recognised yet left unresolved, highlighting the institutional gaps that weaken Australia's national resilience.

Comparative case studies of Finland and Japan offer practical insights into how fuel can be institutionalised as a sovereign capability. The actions of these countries demonstrate the importance of legal mandates, empowered institutions and civil-military planning to embed fuel planning within national resilience frameworks. Their experiences offer relevant lessons for Australia, not as models to replicate, but as reference points to understand how other nation states have integrated fuel planning into broader strategies of national preparedness.

The analysis also examined the role of LCLFs within Australia's policy framework. Instead of a technical evaluation, the study concentrates on their potential as a strategically aligned policy tool capable of reconciling both national resilience and decarbonisation. This approach enables a systematic assessment of how Australia can balance its security, economic and climate goals to develop a cohesive national fuel strategy to address one of its most critical vulnerabilities.

Significance

The significance of this research lies in redefining national fuel resilience as a strategic capability rather than a narrow market issue. By demonstrating that liquid fuels support economic stability, emergency response and military capacity, the thesis shows that Australia's fuel security is fundamentally linked to national resilience. The ongoing reliance on fragile international supply chains makes Australia vulnerable to coercion and disruptions, while its fragmented policy approach has hampered coordinated planning.

This research aimed to address shortcomings in the current body of literature on Australian fuel strategy, which remains fragmented. It consolidates previously isolated fields (security, energy policy and climate transition) to tackle a vital national blind spot. Existing research on Australian energy needs has mainly concentrated on emissions reduction, while security studies have focused on military capability in isolation. Few works examine how the energy transition intersects with national preparedness and resilience. By connecting these areas, the research closes a significant gap in understanding how Australia can reduce this systemic vulnerability while advancing security, economic and environmental goals.

Structure

The thesis presents a cumulative argument across five chapters, moving from a structural diagnosis to coherent reforms and ending with a conclusion that reaffirms the central argument. Chapter One traces how efficiency-focused reforms dismantled resilience, leading to the collapse of refining capacity, a thinning of storage and the exposure of distribution systems, thereby embedding systemic vulnerability within Australia's national fuel system. Chapter Two demonstrates why liquid fuels remain essential to sovereign capability and analyses cascading dependencies across freight, aviation, mining, agriculture, emergency services and Defence without scalable substitutes. Chapter Three critiques the government's Liquid Fuel Security Review and the subsequent policy and legislative package, illustrating how efficiency bias and the exclusion of Defence requirements limit their strategic adequacy.

In contrast, Chapter Four explores the cases of Finland and Japan, illustrating how legal mandates, empowered institutions and civil-military planning integrate fuel resilience as a national capability. Chapter Five assesses low-carbon liquid fuels as a strategic opportunity, arguing that they offer a means to align resilience with decarbonisation by providing compatibility, sovereign production potential and measurable emissions reductions. The Conclusion summarises these findings, arguing that fragmented policymaking has reinforced Australia's fuel vulnerability and that only a cohesive strategy, supported by measures such as governance reform, mandated stockpiling and investment in LCLFs can redefine the importance of fuel as a core aspect of Australia's sovereign capability.

Imported fuel arriving by tanker represents Australia's transition from sovereign refining capability to import dependency, a legacy of market-driven reforms that has increased exposure to geopolitical and supply chain risks.

How Market Logic Undermined Resilience

The overall condition of Australia's national fuel network reflects decades of policies favouring efficiency and integration with global markets.[22] Yet, this legacy has left the country dangerously exposed to modern security threats. The current literature shows how long-standing policies favouring deregulation and privatisation built a market-driven system centred on cost, while systematically diminishing national resilience and preparedness.[23] Building on these findings, this chapter examines the structural and institutional roots of Australia's fragility, highlighting the efficiency-oriented decisions that have created enduring weaknesses within the national fuel system.

Sovereign Production to Import Dependency: The Dismantling of Domestic Refining

This fragility became most apparent with the decline of Australia's domestic refining industry. Privatisation and deregulation reduced government involvement just as larger, more efficient Asian refineries undercut local production in terms of cost.[24] Rather than being protected as a strategic asset, Australia's refineries were left to compete in global markets where scale dictated survival. As a result, refinery closures accelerated and the national system grew increasingly dependent on imported fuels transported through extensive maritime supply chains.[25] These arrangements were adequate during periods of regional stability but now conceal significant risks in a contested strategic environment. Despite repeated assessments warning of supply shortfalls, governance over the national fuel system remains fragmented, reactive and insufficiently prepared for sustained or deliberate disruption.[26]

> *Historically, Australia regarded fuel as a strategic resource, particularly during periods of threat, investing in domestic refining, stockpiling and developing planning systems to ensure a stable supply under stress.*[27]

During World War II and the oil shocks of the 1970s, there were state-led efforts to build resilience, recognising that market supply could not be assured in crises.[28] This approach demonstrated that Australia was once capable of acting decisively when the risks were evident. That memory has faded and capacity has declined over the course of decades of peace, liberalisation and fiscal restraint.[29] Strategic planning for fuel disruptions has diminished as policymakers increasingly rely on global markets, eroding the institutional safeguards that once supported national preparedness and self-reliance.[30]

The most noticeable consequence of this policy change was the collapse of Australia's domestic refining industry, which was once considered vital to the country's sovereignty and adaptability. Seven refineries were operational in 2000. However, five have since ceased operations and now only two remain. Both refineries are dependent on government subsidies and are at risk of closure in the future without ongoing financial support.[31] Most decommissioned refineries were converted into fuel import terminals, creating a structural reliance on overseas production and diminishing Australia's ability to control the type, timing or origin of the fuels supplied into the country.[32] This shift confined Australia to long maritime supply chains that reduces sovereign control and the capacity to reprocess crude oil during a supply shortage.[33]

Supply and Storage Vulnerabilities

Today, over 90 per cent of Australia's diesel and jet fuel is transported by sea, much of it originating from Asia and passing through maritime chokepoints that are susceptible to disruption.[34] Key shipping routes, including the Strait of Malacca, the South China Sea and the Lombok Strait, are becoming increasingly congested, contested and prone to geopolitical pressure, blockade or conflict.[35] These maritime routes are also exposed to piracy, cyber interference and sabotage, all of which could delay or obstruct fuel shipments without resorting to conventional military conflict.[36] Australia's fuel security now depends on the unimpeded passage of vessels through these delicate corridors, an assumption that cannot be assured, particularly during times of crisis or hostility.[37]

Australia's onshore fuel storage is limited, typically covering only 19 days of diesel and 14 days of jet fuel at normal consumption levels, which is well below international standards.[38] This falls significantly short of the International Energy Agency's 90-day stockholding requirement, which Australia only meets through offshore 'ticket' arrangements that provides no physical redundancy.[39] The scarcity results from decades of market-led just-in-time logistics, that optimises commercial efficiency and eliminates any redundancy needed to withstand supply shocks or support surge requirements during national emergencies.[40] Most storage infrastructure is privately owned and commercially managed, with facilities designed for stock turnover rather than buffering. Consequently, there is no obligation to serve national interests during a crisis.[41] In the event of a significant disruption, this lean system lacks strategic depth; stocks in key ports and cities could be depleted within days if maritime routes or import terminals are disrupted.[42]

Australian Army Petroleum Operators conducting civilian fuel transfer to the Bulk Fuel Installation System at Cowley Beach Training Area in Queensland. *Image: Department of Defence*

Fragmented Governance and the Failure of Market Logic

Responsibility for liquid fuel resilience in Australia is spread across various departments and jurisdictions and no singular authority manages strategy or investment.[43] Defence assumes fuel access will remain available where required. Energy departments focus on maintaining just-in-time supply chains and advancing decarbonisation objectives, as reflected in their key policies. Emergency agencies, meanwhile, prepare for the impacts of localised disruptions rather than developing mitigation measures or planning for long-term national fuel resilience.[44] The National Oil Supply Emergencies Committee facilitates coordination during disruptions but lacks the mandate, funding or statutory authority to lead national infrastructure planning or reserve development.[45] Repeated reviews have identified these institutionalised gaps, yet no agency has been empowered or resourced to oversee a comprehensive approach to strategic planning to address them.[46] This is most notable in the Liquid Fuel Security Review, where the report explicitly excludes Defence from the sectors examined as a core pillar of its analysis.

Market mechanisms have failed to provide the required storage, essential distribution infrastructure or refining capacity needed for a resilient system because resilience does not generate a viable commercial return.[47] Private firms are designed to optimise efficiency, not to absorb risk and holding surplus fuel or investing in backup infrastructure diminishes profit without offering immediate economic gain.[48] The closure of refineries, limited surge capacity and minimal onshore storage all reflect this logic, where national vulnerability arises from short-term commercial choices.[49] Without clear mandates or government-backed financial incentives, the industry will not develop the necessary strategic reserves or infrastructure, leaving Australia exposed to risks that the market cannot adequately manage.[50]

Australia's fuel distribution network was designed for efficiency under normal conditions, not for resilience during crises or extended regional or national fuel shortages.

Australia's fuel distribution network was designed for efficiency under normal conditions, not for resilience during crises or extended regional or national fuel shortages.[51] Refined fuel enters through a limited number of ports in Darwin (NT), Kwinana (WA), Botany (NSW), Geelong (VIC) and Brisbane (QLD), creating a concentration risk and reducing flexibility in the event of disruption.[52] A single cyberattack, port closure or industrial dispute at one of these hubs could immediately disrupt supply to multiple regions with no quick alternatives.[53] Inland distribution relies on a limited number of pipelines, road tankers and rail routes, with fuel transported by rail from Brisbane, Kwinana and Darwin to specific regional centres. Most regional towns, mining centres and supply corridors rely on single-route delivery chains, with no capability to reroute fuel in the event of a disruption.[54] There is no national system to coordinate surge logistics or rerouting capacity across jurisdictions during sustained or widespread supply shortfalls.[55]

Strategic Consequences for National Capability

Australia's national capacity relies on continuous fuel access as any failure in import, storage or distribution could quickly undermine response, mobility and economic stability.[56] As emphasised, critical sectors including freight, emergency services, agriculture, aviation and Defence have no feasible energy alternatives, making fuel availability a vital factor for crisis stability and national resilience.[57] In a prolonged disruption, cascading failures would degrade logistics, halt supplies and cause food and medical supply chains to break down.[58] At the same time, essential services decline without the fuel necessary to sustain operations.[59] The strategic implication is clear: without reliable fuel access, Australia cannot ensure domestic stability, economic continuity or national defence in a contested environment.[60]

Australia lacks the sovereign capacity to withstand major fuel disruptions, risking cascading effects across national defence, critical services and economic sectors.[61] Even a brief interruption would destabilise the economy, while a prolonged disruption would weaken national resilience, hinder recovery and leave Australia vulnerable to coercion or strategic isolation.[62] The literature shows that this vulnerability is deeply rooted and exposed through weaknesses in supply, storage, distribution and institutional coordination.[63] This interdependence between secure access to liquid fuels and resilience underscores that the risks are not theoretical possibilities, but real pressures that can influence Australia's ability to act in an increasingly contested strategic environment.

This image collage illustrates the impact of fluctuating gasoline and oil prices in Australia on fuel costs and the cost of living in the country, amidst a complex geopolitical context, highlighting the crucial role of energy security in promoting national economic stability, energy markets and economic volatility.

Why Liquid Fuels Will Remain Important to National Capability

After illustrating how efficiency-driven reforms have resulted in a fragile fuel network with minimal redundancy, this chapter focuses on liquid fuels that remain vital to Australia's economy, emergency services and defence capacity. It examines how freight, aviation, mining, agriculture, maritime trade, emergency services and the defence forces rely on diesel and jet fuel without scalable alternatives.[64] Disruptions would trigger cascading risks that weaken national resilience, economic stability and strategic credibility. This shows that liquid fuels remain an essential foundation to Australia's sovereign capability.[65]

This importance becomes most evident when analysing how liquid fuels support sectors of Australia's economy and security.[66] Diesel fuel powers heavy transport and industry while jet fuel powers commercial aviation and accounts for about 75 per cent of Defence's total fuel use, particularly in areas of northern and north-western Australia where there are air operations, maritime patrols and force projection.[67] These fuels collectively enable operations, mobility and crisis response and their disruption would immediately erode Australia's national capability.

Economic Dependence: Freight, Mining, Agriculture and Trade

The reliance on liquid fuels is most evident in Australia's freight and logistics systems. Road freight accounts for over 75 per cent of Australia's domestic goods transport by volume and is powered almost entirely by diesel.[68] With vast distances between population centres, limited rail options and freight volumes expected to increase by 77 per cent out to 2050,[69] Australia's economy and supply networks will likely remain dependent on diesel-powered transport for the foreseeable future.[70]

In 2022–23, diesel accounted for around 69 per cent of Australia's total liquid fuel use, with the freight sector consuming the largest share.[71] Transport emissions account for 84 per cent of all liquid fuel-related emissions, underscoring their significant contribution to overall consumption and heavy road vehicles are the primary contributors.[72] While the number of electric vehicles is projected to increase steadily, there is currently no viable alternative fuel for long-haul freight.[73] Hydrogen and electric trucks are in their early trial stages and the necessary infrastructure to support them remains decades away from being commercially viable.[74] This means diesel will continue to power the transportation of food, fuel, pharmaceuticals and industrial goods for many years.[75] Assured access to these fuels is therefore crucial for maintaining national supply chains, ensuring economic resilience and sustaining regular societal operations.[76]

The mining sector is one of Australia's largest consumers of diesel. In 2021–22, mining accounted for around 14 per cent of national energy consumption, with more than half of that energy supplied by diesel.[77] This reliance extends to excavation, haulage, processing and remote power generation.[78] Most major mining operations are situated in off-grid or weak-grid regions where liquid fuels are the only feasible source of reliable and mobile energy.[79] Liquid fuels are vital for production and for export logistics. Heavy-haul trucks, rail links and port equipment all rely on diesel or bunker fuels to move bulk commodities, such as iron ore, coal and critical minerals.[80]

The sector's reliance on liquid fuels has national consequences. In 2022–23, resources and energy exports contributed over $460 billion to Australia's export earnings, making dependable access to liquid fuel crucial to maintaining the country's economic resilience.[81] Electrification of the mining sector is limited by geography, cost and the energy density required to meet operational demands.[82] Although some mining sites are testing hybrid or electric machinery, the

energy density and reliability of diesel still outweigh alternatives for most high-load, remote functions.[83] Fuel insecurity in this sector could have national consequences. It would significantly affect export income, erode investor confidence and harm Australia's reputation as a reliable supplier of these materials.[84]

Australia's agricultural sector also heavily depends on liquid fuels for its operation. From planting to harvest, fuel powers tractors, harvesters, pumps and on-site generators across thousands of rural and remote locations.[85] After food is harvested or livestock is reared, diesel remains essential to transport agricultural products to processors, markets and ports.[86] This mobility is vital for commercial purposes and for delivering food to urban centres and remote communities. Unlike other parts of the economy, the agricultural sector often operates far from electricity grids and with limited redundancy.[87] Most farms store only small quantities of diesel, making them very vulnerable to supply disruptions.[88] The seasonal nature of farming amplifies this risk and any delay in fuel delivery during critical periods, such as harvest, can cause substantial productivity losses and long-term financial hardship.[89]

Agricultural production in Australia relies extensively on liquid fuels for cultivation, harvesting and transport. Limited on-farm fuel storage, combined with the seasonal demands of farming, leaves the sector particularly vulnerable to fuel supply disruptions during critical production periods.

Approximately 70 per cent of the food consumed in Australian is produced locally and almost all of it is grown, processed and transported using diesel-powered machinery and freight, directly linking these vulnerabilities to national food security.[90] In 2021–22, diesel accounted for more than 80 per cent of total on-farm energy use and for crops like grain and cotton, this proportion was 85 to 90 per cent.[91] Despite this heavy reliance, agriculture is often overlooked in national fuel resilience planning even though a prolonged disruption could threaten the nation's food supply, price stability and regional economies, which have limited capacity to respond to supply shocks.[92]

With no shared land borders and a highly globalised economy, Australia's ability to import and export crucial goods mainly relies on maritime trade. The sea routes that transport refined fuels, food, pharmaceuticals, machinery and consumer goods form the core of the nation's economic activity. Bulk exports, such as iron ore, coal and liquefied natural gas, also depend on these networks to sustain Australia's trade surplus and maintain its position in the global market.[93] In 2021–22, over 98 per cent of Australia's trade by volume was carried by sea, highlighting how the economy and the country's resilience are closely tied to the secure, uninterrupted flow of maritime freight.[94]

These operations, from international trade routes to domestic coastal shipping, are entirely reliant on liquid fuels, especially marine diesel and bunker fuels.[95] In addition to supporting export and import flows, coastal shipping plays a vital role in maintaining domestic freight networks and supplying fuel to regional communities without pipeline infrastructure.[96] Many vessels that provide essential goods to northern Australia, offshore facilities and island territories depend on well-organised, time-sensitive fuel distribution systems.[97] A disruption to marine diesel supply, whether caused by global market fluctuations, geopolitical tensions or logistical delays, would have widespread effects on national supply chains and affect everything from fuel availability to the delivery of essential goods.[98]

Building resilience in the maritime sector is not only about transportation but also a core part of economic security.

Currently, there are no viable alternatives to liquid fuels for long-distance shipping. Electrification is technically unfeasible for large commercial vessels and new fuels like ammonia or methanol are still years away from commercial realisation.[99] Without alternatives, securing reliable access to marine diesel remains crucial for Australia to sustain its trade, support its population and protect its strategic independence in an increasingly unpredictable global environment.[100]

National Resilience: Aviation and Emergency Services

Australia's aviation sector depends entirely on liquid fuels, with jet fuel powering commercial flights, air freight, military aviation and essential services, including aeromedical transport.[101] In 2022–23, the country used over 6 billion litres of aviation turbine fuel, accounting for about 15 per cent of total liquid fuel consumption.[102] There are no scalable alternatives for aviation fuel in the short to medium term.[103] Aviation is crucial for connecting remote communities, supporting fly-in, fly-out workforces in the resources sector and facilitating high-value exports.[104] Emergency services organisations, such as the Royal Flying Doctor Service, rely on secure fuel access to provide life-saving care over vast distances.[105] Air freight volumes continue to rise, with an expected increase of over 100 per cent by 2050 Dependence on jet fuel is likely to grow.[106]

Unlike road transport, where battery-electric vehicles are becoming increasingly available, aviation has no viable alternative due to the energy density requirements.[107] Electrified aircraft are limited to short-haul prototypes and hydrogen-powered aviation remains in the research phase.[108] Liquid fuels will be required for domestic and international air travel, medical logistics and economic continuity for the foreseeable future.[109] Disruptions to jet fuel supply would have immediate effects on national mobility and regional cohesion.[110]

Liquid fuels are essential for Australia's emergency response capabilities. Firefighting vehicles, ambulances, police fleets, mobile command units and evacuation transport all depend on access to diesel and petrol.[111] During crises such as bushfires, floods and cyclones, the ability to quickly deploy emergency services resources, often over large distances, is crucial for saving lives and restoring vital services.[112] Liquid fuels also power backup generators for hospitals, telecommunications infrastructure and emergency coordination centres, particularly when the primary power grid is disrupted.[113]

The vulnerability of this system lies in its reliance on just-in-time fuel logistics. Most emergency services organisations do not hold substantial fuel reserves and depend on the same commercial supply chains as the rest of the economy.[114] This indicates that when fuel supply is disrupted, whether due to a emergency, cyberattack or supply shock, emergency services face the same limitations as the wider public.[115] In remote or disaster-affected areas, where roads might be blocked or fuel deliveries delayed, this reliance can significantly reduce operational reach and response times.[116]

Unlike road transport, where battery-electric vehicles are becoming increasingly available, aviation has no viable alternative due to the energy density requirements.

Ensuring a stable fuel supply during emergencies is not just a logistical issue, but a matter of resilience and preparedness. While contingency plans and localised fuel storage exist in some jurisdictions, there is no consistent national framework for emergency fuel assurance.[117] As the frequency and severity of climate-related disasters increase, the need for robust, decentralised and pre-planned fuel supply will become increasingly urgent, especially for affected communities and for maintaining critical services.[118]

Defence and Strategic Imperatives

Liquid fuels are vital to Australia's military strength. From air missions and naval deployments to logistics convoys and land mobility, the Australian Defence Force (ADF) remains almost entirely reliant on diesel and jet fuel to project power and sustain operations.[119] Unlike other energy sources, these fuels are particularly suitable for the mobility, energy density and logistical flexibility needed in contested or expeditionary environments.[120] Currently, no credible alternative exists to meet the operational demands of combat aircraft, naval vessels, armoured vehicles or deployable support systems on the scale required for modern conflict.[121]

This dependence is heightened by the ADF's regional stance and its evolving strategic outlook. The National Defence Strategy increasingly focuses on deterrence from a distance, forward presence and rapid joint-force deployment across the Indo-Pacific, all of which are energy-intensive and rely heavily on fuel.[122] However, the ADF does not control its fuel supply chains nor maintain substantial reserves. Its fuel is sourced from the national market and supplied through foreign-owned, commercially operated networks that also support the Australian economy.[123] This creates a risky assumption: that fuel will be available when needed, even during times of disruption, crises or conflict.[124]

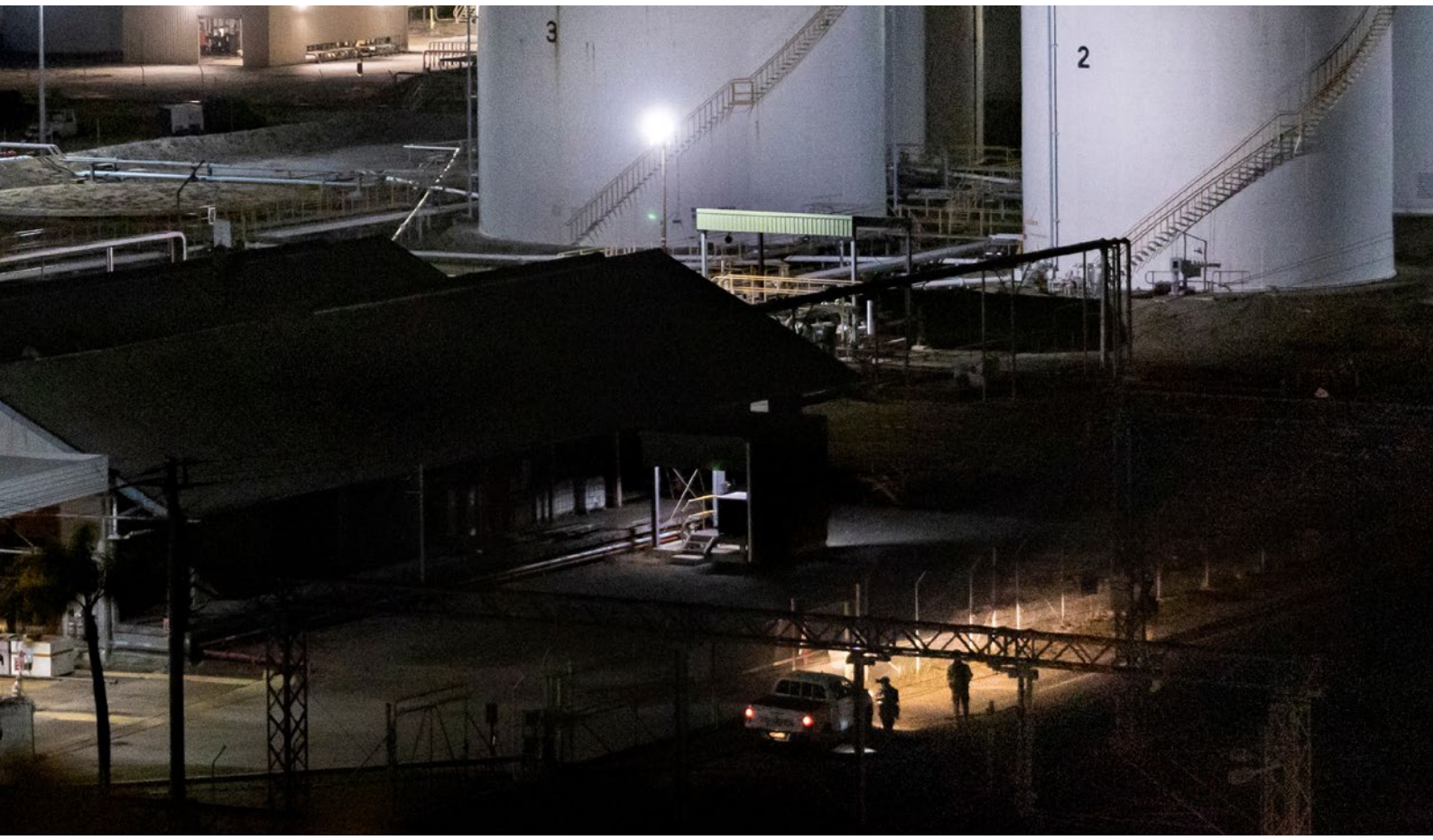
Fuel dependency is also deeply ingrained in the long-term structure of Australia's military capability. The ADF's platforms, from joint strike fighters and armoured vehicles to naval destroyers and amphibious ships, are a fleet of multi-billion-dollar assets designed to operate for decades and run exclusively on liquid fuels.[125] Unlike parts of the civilian economy where electrification is progressing, there is no credible pathway to transition these systems away from petroleum-based energy sources.[126] This reliance makes fuel security not only a short-term operational concern but also a long-term strategic imperative that will influence Defence readiness and sovereign capability into the 2040s and beyond.[127]

Navy Marine Technician conducts a fuel sample alongside the Port of Townsville as HMAS *Canberra* prepares for Exercise Sea WADER 2026. *Image: Department of Defence.*

Wargames and strategic assessments have repeatedly identified this vulnerability. The 2023 Defence Strategic Review acknowledged, for the first time, the necessity of evaluating domestic fuel resilience as part of Australia's preparedness.[128] However, neither Defence nor other Australian government departments have articulated a clear strategy to ensure fuel supply for the military during crises.[129] With adversaries increasingly capable of targeting critical infrastructure and exploiting supply chain dependencies, Australia's lack of fuel refining capability and lack of redundancy in the national fuel network pose a significant risk to operational continuity, deterrence credibility and national sovereignty.[130]

Cascading Risks to National Capability

Despite differences in geography and infrastructure, Australia's critical economic sectors, emergency services and national security functions are heavily reliant on liquid fuels.[131] Together, they support Australia's economic strength, crisis response and defence capacity.[132] Yet this dependence is often overlooked in national planning, where focus remains on electricity and emissions reduction.[133] Even as global supply chains tighten, energy geopolitics become increasingly complex and refining capacity decreases, Australia continues to operate under the assumption that fuel will always be available, without adequately addressing this risk to national capability.[134] Chapter Three explores the implications of this vulnerability and the structural factors that have enabled it to continue.



Joint Task Force 629 soldiers conduct an interagency search and secure operation with Queensland Police Service at AMPOL fuel facilities in Gladstone during Exercise AUSTRAL SHIELD 2026.

Image: Department of Defence.

The Review and Policy Package

Australia's first comprehensive fuel security review in a decade reasserted fuel security as a key issue within national policy discourse, yet its framework left several vulnerabilities unresolved. The Liquid Fuel Security Review, commissioned in 2018 and completed in 2020, emerged amid growing concerns about Australia's declining refining capacity, increasing reliance on imports and contested regional supply chains.[135] As the first comprehensive government-led assessment of national fuel security in over a decade, it established a baseline understanding of fuel system resilience, identified vulnerabilities and recommended measures to improve supply continuity under various conditions.[136] By privileging efficiency over resilience, modelling only short-term disruptions and excluding Defence requirements, the review's recommendations were suited to stabilising markets rather than preparing for strategic contingencies.[137]

Its findings influenced the Liquid Fuel Security Package[138] that introduced expanded stockholding obligations, targeted infrastructure investment incentives and legislated amendments under the *Liquid Fuel Security Act 2021*.[139] The culminating policy package, including the Fuel Security Services Payment and Minimum Stockholding Obligation, introduced market-stabilising interventions but failed to address enduring structural deficiencies. Scholarly and policy analyses of the review emphasised that integrated civil-military planning, sovereign production and preparedness for protracted disruptions were missed. This illustrated how the review underestimated the strategic dimensions of Australia's national fuel security.[140] This chapter examines the review's conceptual framework, scenario design and prioritisation choices. It evaluates how these decisions influenced the policy measures that followed while leaving critical strategic vulnerabilities unaddressed.

Framework, Scope and Scenario Design

While the Liquid Fuel Security Review signified a notable reconnection of fuel security with the national policy agenda, its analytical framework contained inherent biases that curtailed its strategic utility. By prioritising economic efficiency over resilience, excluding Defence from its core definition, and modelling only short-term, recoverable disruptions, the review's recommendations were better suited to smoothing market volatility than withstanding prolonged, strategically driven supply shocks.[141] These choices narrowed the range of policy interventions considered and left the fuel security framework misaligned with the demands of a more contested and unpredictable strategic environment.[142]

While the Liquid Fuel Security Review signified a notable reconnection of fuel security with the national policy agenda, its analytical framework contained inherent biases that curtailed its strategic utility.

The review was conducted in a context where secure access to liquid fuels underpins economic stability, national security and societal resilience.[143] Nonetheless, the scope was narrowly defined in terms of whether Australia's fuel system could support Australia's economic, environmental and social objectives.[144] This definition excluded Defence requirements from its core concept of national fuel security, instead treating Defence's fuel requirements as a separate

responsibility to be delivered through departmental contracting.[145] By assuming Defence could operate independently of the national supply system, the review overlooked a significant element of Australia's national capability, limiting its capacity to assess how fuel disruptions might constrain crisis response and the military's ability to protect or project force from Australia.[146]

> *The review's conceptual framework was built on three pillars: adequacy, efficiency and reliability.*

Adequacy was evaluated to determine whether supply levels could meet demand and be transported to where supply was needed. Efficiency focused on the ability of market mechanisms to deliver fuel at the lowest possible cost. Reliability assessed the capacity of supply chains to absorb and adapt to disruptions. While this provides a logical structure, the review's prioritisation showed a bias towards efficiency, explicitly warning that increased supply security would come with higher costs.[147] By prioritising price stability, the framework effectively rendered resilience a secondary concern, even though contested environments inherently make secure supply more costly but also strategically crucial.[148]

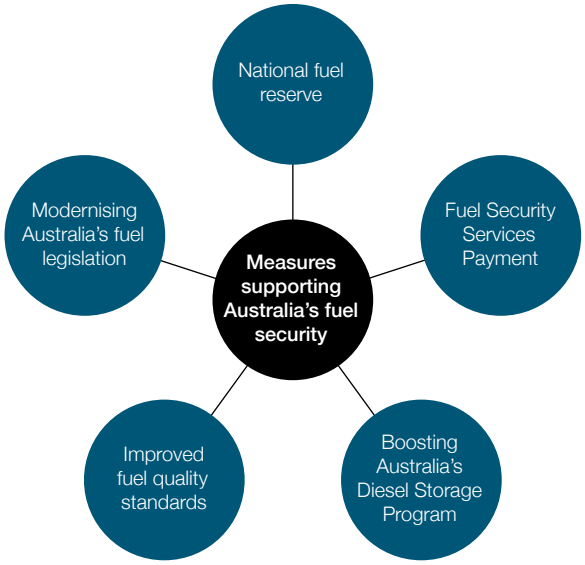
Applying this framework to national fuel use patterns without integrating Defence requirements led the review to identify diesel as the most critical fuel.[149] The extensive use of diesel highlights its vital role if freight, agriculture, mining and maritime operations. However, Defence fuel requirements were excluded from the analysis, which would have shown that jet fuel accounts for around 70 per cent of Defence fuel use. This meant the review did not consider the operational and geographical needs that influence Australia's national capability during crises.[150] This omission limited the review's recommendations and failed to address vulnerabilities in the northern and north-western supply networks that are essential for force projection and regional security.[151]

The scenarios used to test Australia's fuel system resilience simulated short-term market disruptions, assuming global supply availability and rapid recovery.[152] They did not consider severe or lasting disruptions caused by geopolitical conflict, regional blockades or sustained cyberattacks, risks recognised by independent assessments as plausible and strategically significant.[153] Reports such as 'Over a Barrel' and the NRMA's 'Australia's Liquid Fuel Security' have criticised this limited scenario design and noted that it underestimates vulnerability and paints in an overly optimistic view of resilience.[154] By prioritising assumptions of rapid adaptation and ongoing market access, the review favoured incremental measures over comprehensive, preparedness-focused reforms that are necessary to manage high-impact contingencies.

Policy and Legislative Outcomes

The Liquid Fuel Security Review nonetheless marked a significant improvement after years of limited attention to fuel security.[155] The review's structured analysis, evidence base and direct links to policy measures reintroduced the issue into the national policy debate. It enhanced awareness of supply chain risks, prompted reforms such as increased stockpiling and supported targeted investments in critical infrastructure.[156] However, these strengths were counterbalanced by notable limitations, including the exclusion of Defence requirements, a focus on efficiency over resilience and a reliance on short-term, recoverable disruption scenarios, which constrained the scope of policy options.[157] This approach made the review better able to handle market volatility than to prepare for strategically aimed or long-duration supply shocks.[158]

The Liquid Fuel Security Act of 2021 formalised the conceptual boundaries set by the review into law.[159] The Act introduced stockholding obligations, mandatory reporting and ministerial powers to modify requirements during declared fuel emergencies to improve transparency and short-term resilience.[160] However, it preserved the review's structural blind spots, notably excluding Defence requirements from its scope. No mechanisms were established to integrate Defence-civilian fuel planning or to set preparedness benchmarks against prolonged, strategically motivated disruptions. In practice, the legislation reaffirmed the market approach and prioritised affordability and efficiency over a comprehensive resilience framework for the nation. This left fuel security architecture misaligned with Australia's deteriorating strategic environment.[161]



Measures supporting Australia's fuel security.
Image: Department of Climate Change, Energy, the Environment and Water.

The Australian Government's post-review policy framework included measures such as securing oil stocks in the US Strategic Petroleum Reserve,[162] expanding diesel storage capacity, upgrading refineries, modernising fuel legislation and obtaining diesel exhaust fluid supplies.[163] However, two measures that stand out as the most structurally important include the Fuel Security Services Payment (FSSP) and the Minimum Stockholding Obligation (MSO). The FSSP offers financial support to domestic refiners to promote continued production of petrol, diesel and jet fuel even during uneconomic market conditions. FSSP funding is available until mid-2027.[164] The MSO sets mandatory minimum onshore stock levels for diesel to improve transparency and strengthen short-term supply resilience.[165] These measures are the most significant market-aligned interventions in decades and directly address vulnerabilities in fuel refining viability and stock availability.

Strategic Vulnerabilities and Alternative Perspectives

Although The FSSP and MSO enhance immediate capacity to manage disruptions, their design remains fundamentally shaped by the review's prioritisation of economic efficiency over resilience. This leaves Australia better equipped to manage routine market volatility, such as price swings or minor logistical interruptions, than to withstand long-term or strategically targeted disruptions. Such disruptions include blockades of maritime chokepoints, coercive export restrictions or hostile cyberattacks intended to weaken economic stability, Defence preparedness and national resilience during crises.[166]

Perspectives from the NRMA, the Australian Strategic Policy Institute (ASPI) and academic research present broader, alternative definitions of national fuel security. These focus on integrated Defence-civilian planning, redundancy in critical supply chains and sovereign production capacity as vital, regardless of immediate cost considerations.[167] Unlike the Liquid Fuel Security Review, these analyses incorporate models of long-duration disruptions, contested logistics environments and simultaneous crises affecting multiple fuel types.[168] NRMA's work highlighted the importance of strategic stockholding aligned with Defence operational needs. ASPI's 'Over a Barrel' report emphasised the fragility of northern supply nodes, which are crucial for air and maritime operations.[169] Academics such as Yates and Greet's (2014) scholarship advocate to integrate fuel security into whole-of-nation capability planning rather than isolating it within market regulation frameworks.[170] Overall, these perspectives reveal that the Liquid Fuel Security Review underestimated the strategic importance of preparedness and restricted its ability to develop an integrated resilience framework needed for Australia's increasingly unstable strategic environment.[171]

Global fuel supply networks. Finland and Japan demonstrate how strategic planning, strong institutions and fuel security policies can strengthen national resilience against supply disruptions.

Finland and Japan's Fuel Resilience Measures

Australia is not alone in confronting fuel insecurity. Still, it is uncommon among advanced economies in its level of dependence on foreign fuel supply chains and the absence of a strategic safety net. Building on the analysis of Australia's policy framing and limitations, this chapter examines how Finland and Japan have institutionalised liquid fuels as a national capability. In contrast to Australia, countries like Finland and Japan, which have experienced energy shocks and risks of disruption,[172] have established institutionalised systems to ensure the supply of liquid fuels during crises.[173] Although the strategic contexts of these countries differ, both view liquid fuels as a vital element of national capability.[174] While their methods for enabling this are not necessarily those Australia should follow, they demonstrate how nations can integrate fuel resilience into national planning.[175] Both countries have clear legal mandates,[176] empowered institutions[177] and prioritise assurance over efficiency.[178]

Finland's Comprehensive Security Model

Decades of proximity to an unpredictable Russia, combined with wartime scarcity and hybrid threats, have shaped Finland's deeply rooted culture of national preparedness.[179] Fuel security is regarded not as a market issue but as a vital foundation for its national resilience, demanding ongoing state attention and coordination.[180] This approach is institutionalised through the National Emergency Supply Agency (NESA), which manages strategic fuel reserves and organises logistics across critical sectors during crises.[181] Unlike countries that depend on commercial supply chains, Finland has established a framework to ensure that this is both legally mandated[182] and widely accepted by the public.[183]

This system is based on a dual-track model that combines state reserves with private sector obligations.[184] Under the country's *Security of Supply Act 2026* and the *Act on the Obligatory Stockpiling of Imported Fuels 1070/1994*, importers are required to hold two to three months' worth of fuel.[185] Simultaneously, the NESA maintains government-controlled reserves in secure, undisclosed depots across the country.[186] This layered structure ensures that strategic fuel stocks are not only available but also diversified among stakeholders, thereby reducing the risk of single points of failure during disruptions. Instead of relying on market responses, Finland integrates fuel requirements as a key element of national planning and incorporates it into national strategies as a vital component of its sovereign resilience.[187]

Decades of proximity to an unpredictable Russia, combined with wartime scarcity and hybrid threats, have shaped Finland's deeply rooted culture of national preparedness.

Finland's legal framework supports this through coordinated efforts among the state, industry and essential services. NESA organises sector-specific working groups, including the Oil Pool and the Energy Supply Sector, to create detailed response plans to maintain supply during disruptions.[188] These groups unite public agencies, infrastructure operators and private firms to coordinate roles and set allocation protocols for critical sectors. Private operators are contracted

in advance to ensure preparedness, enabling supplies to be directed quickly to priority users during a national emergency.[189] This approach aligns with Finland's broader Comprehensive Security Model, which views national resilience as a civic obligation shared across society, rather than solely a government function.[190]

The depth of Finland's fuel system has been tested through multiple crises, reinforcing its value as a foundation of national continuity and capability.

In 2022, NESA released oil reserves in response to Russia's invasion of Ukraine, confirming its capacity to manage external shocks with agility.[191] Earlier activations during the COVID-19 pandemic and poor harvest seasons showed that fuel stockpiles can stabilise supply chains beyond the energy sector.[192] These practical demonstrations highlight how deeply fuel resilience is integrated into Finland's crisis planning and operational readiness across society. While Australia has not faced similar tests, Finland's experience shows that long-term resilience can be designed proactively, rather than being recovered after failure.[193]

Japan's Strategic Energy Framework

Despite an increasingly volatile regional environment underscored by North Korea's weapons programme, China's assertiveness and tensions in the Taiwan Strait, Japan's approach to fuel security is shaped by its past energy shocks. In 1973, an oil embargo was a turning point that triggered economic disruption and prompted a national reckoning over energy dependence and systemic fragility.[194] In response, Japan established a legal and institutional framework in the hope of preventing fuel shortages from ever again threatening national stability or economic continuity.[195] Unlike Finland, where security evolved from territorial threat, Japan's system emerged from economic trauma, making energy resilience a permanent strategic priority. Japan's experience reinforced a core principle, whereby physical reserves, legal authority and coordinated institutions are essential to sustain national capability under pressure.[196]

Japan's fuel security extends beyond stockpiling to encompass detailed crisis planning, distribution logistics and integrated civil-military coordination during national emergencies.

Japan's fuel security framework is anchored by its *Oil Stockpiling Act of 1975*, which mandated substantial reserves across the public and private sectors. As of 2022, Japan maintained over 199 days of oil reserves, significantly exceeding the International Energy Agency's 90-day requirement for net importers. These reserves are split between government-managed stocks and industry commitments, with companies required to keep fuel inventories at specified domestic terminals. The Japan Organization for Metals and Energy Security manages state reserves and offers financial support to private operators via loans and subsidies.[197] This hybrid model guarantees national control over the reserves while using private infrastructure and sharing the costs and responsibility for maintaining fuel security.[198]

Japan's fuel security extends beyond stockpiling to encompass detailed crisis planning, distribution logistics and integrated civil-military coordination during national emergencies. The government maintains prioritisation protocols so that fuel is swiftly allocated to defence, emergency services and critical infrastructure during times of disruption.[199] During the 2011 Great East Japan Earthquake, fuel reserves enabled Japan's Self-Defense Forces to mobilise swiftly and assist communities affected by power and transportation failures.[200] The crisis demonstrated the importance of decentralised supply, backup systems and regular drills to test coordination at national, regional and local levels.[201] Resilience in Japan is not defined by passive reserves; it is demonstrated through simulation, planning and the expectation that disruption will inevitably happen again.

Japan's approach to fuel security is based on the principle that resilience should be established before disruption occurs, rather than hurriedly constructed once systems start to fail. Although the global energy environment is changing, Japan continues to invest in physical reserves and considers fuel vital for national defence and economic stability. Its guiding energy policy, S+3E, balances security, economic efficiency, environment and safety, but always prioritises assured access to fuel at the strategic core.[202] While diversification through renewables and hydrogen continues, planners accept that liquid fuels will remain essential to aviation, transport and the military for the foreseeable future.[203] This mindset presents a notable contrast to Australia, where assumptions of availability persist despite increasing geopolitical risks and a decline in sovereign control over supply chains.

Comparative Insights and Implications for Australia

Finland and Japan view fuel resilience as vital and recognise that the cost of disruption greatly outweighs the investment required to establish secure supply systems. Both nations employ hybrid stockpiling models,[204] coordinate closely with private operators[205] and regard fuel as a vital enabler of national continuity and crisis response. Their systems have developed through experience and have been supported by legislation,[206] tested by emergencies[207] and continuously improved through planning and simulation.[208] In contrast, Australia remains dependent on highly vulnerable and lean maritime supply chains and market assumptions and there is limited sovereign control mechanisms to assure access during times of stress. Until Australia repositions fuel security as a strategic imperative, it will remain exposed to shocks that others have systematically prepared to absorb.

Biofuels and low carbon fuels can enhance Australia's fuel resilience and support decarbonisation, but questions remain regarding their cost, scalability and long-term viability.

Stockpiles to Sovereignty, Low-Carbon Liquid Fuels as a Strategic Capability

The comparative analysis of the fuel supply approaches used by Finland and Japan reveal that both countries embed resilience through strategic stockpiling and applying mandated reserves and government authority to maintain continuity during disruptions. The Liquid Fuel Security Review emphasised the importance of stockpiling but limited its scope to a market stabilisation measure, excluding broader strategic needs and sovereign production capacity.[209] These insights show that stockpiling is only one component of resilience, as Australia remains vulnerable to coercion, contested supply chains and prolonged disruptions in the absence of domestic refining capacity.[210]

This chapter posits that low-carbon liquid fuels offer a sovereign production pathway that can complement an increase in stockpiles while supporting resilience, economic sovereignty and decarbonisation goals.[211] However, their adoption is debated as critics highlight high costs, feedstock limitations and regulatory uncertainty, which raise questions about scalability and affordability.[212] By examining these viewpoints, this chapter outlines that despite these challenges, low-cost liquid fuels remain a strategically aligned solution that enhances resilience, improves sovereign industrial capacity and produces measurable decarbonisation benefits. In doing so, the chapter targets Australia's policymaking fragmentation, showing how security, economic and environmental objectives can be aligned through a coherent national fuel strategy.[213]

Strategic Value and Emerging Debates

Where stockpiling offers temporary security, LCLFs provide a lasting capability by establishing sovereign production capacity, thereby reducing dependence on contested overseas imports and enhancing national resilience.[214] Their strategic importance goes beyond emissions reduction, ensuring the continuity of Defence, freight, agriculture and emergency services across Australia.[215] Defence is especially vulnerable since jet fuel accounts for around 75 per cent of its total use, with no scalable substitutes available for air or maritime platforms.[216] This reliance makes interoperability with allies equally crucial, as the United States, Japan and the European Union are all progressing with sustainable aviation fuel mandates.[217] Without sovereign LCLF capacity, Australia risks falling behind these partners, compromising interoperability, operational credibility and increasing exposure to contested supply chains.[218]

Critiques and Counterarguments

Critics, including analysts at the Grattan Institute, warn that the higher costs of LCLFs could burden consumers and subsidise inefficiency, cautioning against governments 'picking winners'.[219] The institute has consistently argued that large-scale subsidies distort energy markets, increase consumer prices and delay more cost-effective transition pathways such as electrification or the use of hydrogen.[220] Conversely, organisations focused on security, such as ASPI and NRMA, argue that resilience entails unavoidable costs and view LCLFs as strategic insurance against coercion, contested chokepoints and extended disruptions.[221] For these analysts, affordability in peacetime matters less than guaranteed availability during a crisis, when price becomes irrelevant compared with the continuity of national capability.[222] The government's Future Made in Australia agenda reflects this tension, cautiously supporting industry development while balancing fiscal discipline with the recognition of LCLFs as both an industrial opportunity and a sovereign necessity.[223]

Concerns about feedstock availability further drive the scepticism. Environmental groups argue that biofuels risk repeating earlier 'food versus fuel' controversies as they compete with agriculture and raise questions about sustainability.[224] Critics have emphasised that Australia's domestic residues may be insufficient to boost production, leading to reliance on imported inputs that could weaken sovereignty.[225] However, a report by Bioenergy Australia in 2025 counters this pessimism by highlighting substantial untapped potential in tallow, waste oils, crop residues and advanced synthetic pathways.[226] It argues that the fundamental constraint is policy coordination as many domestic feedstocks are exported cheaply overseas and re-imported later as higher-cost refined products.[227] By redirecting these resources into local production, Australia could strengthen its sovereign capability while gaining significant economic value currently lost to offshore.[228]

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Infrastructure and scalability are also often subject to criticism. Analysts emphasise that Australia's limited refining capacity and underdeveloped biorefinery infrastructure restrict feasible options for increasing production.[229] Building a new LCLF facility requires an investment of $200 to 400 million, which critics see as a significant obstacle in an uncertain policy environment.[230] However, CSIRO and the Clean Energy Finance Corporation have demonstrated that these costs are comparable to those of hydrogen hubs, which already benefit from concessional finance and federal funding.[231] Strategic procurement can also mitigate risks in development, with Defence acting as a guaranteed early procurer, underwriting capacity that can later be leveraged in commercial aviation and freight markets.[232] This approach positions sovereign production of LCLFs as a staged investment in resilience rather than an inefficient subsidy for marginal technologies.[233]

Capability, Credibility and Policy Pathways

LCLFs include renewable diesel, sustainable aviation fuel and emerging synthetic fuels that match the energy density and performance of traditional petroleum products.[234] Unlike early-generation biofuels, they meet international drop-in standards, allowing for immediate replacement in existing fleets, distribution systems and Defence platforms.[235] This compatibility is strategically important because it avoids costly infrastructure duplication, reduces transition risks and enables rapid integration without requiring operational redesign.[236] Their lifecycle emissions reductions, often between 60 and 90 per cent, are recognised under international accounting frameworks, including CORSIA and the European Union Renewable Energy Directive.[237] By embedding measurable abatement within aviation, freight and Defence supply chains, LCLFs would strengthen Australia's climate diplomacy, signalling credibility to its regional partners at a time when environmental performance increasingly influences strategic alignment and cohesion.[238]

The dimension of economic sovereignty reinforces the argument as critics contend that subsidies will create fiscal burdens while diverting resources away from more cost-effective energy technologies.[239] Critics assert that LCLFs offer limited value relative to its cost, primarily when Australia already imports fuels efficiently from global markets.[240] Yet, Bioenergy Australia projects a $36 billion industry by 2050, creating up to 28,000 jobs by 2030, with many of these jobs located in regional and rural communities.[241] The capacity to refine waste oils, residues and agricultural by-products locally avoids the current paradox where Australia exports feedstocks at a low cost only to re-import refined products at a higher price.[242] Sovereign production is not only a source of national resilience but also a driver of value-added domestic industry, supporting regional economic growth while reducing exposure to external economic shocks.

Defence again highlights strategic necessity since, unlike civilian transport with partial electrification options, its platforms are built to operate for decades and cannot abandon the use of liquid fuels.[243] Fighter jets, amphibious ships and heavy armoured vehicles require dense, portable fuels that offer flexibility in contested areas and theatres.[244] LCLFs provide this without the need for fleet redesigns, ensuring operational continuity while supporting decarbonisation.[245] Interoperability is also crucial as allied militaries are increasingly using sustainable aviation fuels and joint operations will eventually require compatible supplies.[246] Without sovereign capacity, Australia risks relying on allies for supplies during

crises, which undermines its credibility as a security partner.[247] Framing LCLFs as Defence assurance strengthens the counterargument to cost critiques: these fuels are vital enablers of strategic capability, not mere luxuries.[248]

Climate diplomacy adds a new layer. Pacific Island nations often see climate credibility as a test of partnership, linking emissions reductions with strategic trust.[249] Including LCLFs in Australia's national strategy demonstrates that resilience and decarbonisation can advance together, countering the notion of neglect.[250] Globally, participation in schemes like CORSIA requires verified reductions in aviation emissions. Without LCLFs, Australia risks becoming isolated from international compliance frameworks, weakening both trade competitiveness and alliance unity.[251] Therefore, LCLFs are not just technical substitutes; they serve as credibility tools in regional diplomacy and international negotiations, aligning environmental responsibility with strategic influence.[252]

> *Expanding LCLFs will require deliberate statecraft as markets alone cannot sustain higher costs or develop sovereign production capacity.[253] Therefore, policy design is crucial.*

Demand-side measures, such as blending mandates, can create predictable markets but must be carefully sequenced with domestic supply to avoid sudden cost spikes.[254] Defence procurement can act as a market-shaping tool to support early demand and signal credibility to encourage private investment. On the supply side, concessional finance, targeted subsidies and ARENA-style grants can reduce capital barriers, while production credits based on hydrogen incentives could lower per-litre costs.[255] Governance measures, such as certification frameworks aligned with CORSIA and EU standards, alongside expanded Guarantee of Origin schemes would ensure credibility and attract international partners.[256]

These mechanisms collectively demonstrate that costs can be managed through strategic design by reframing subsidies not as inefficiencies but as premiums for resilience and sovereignty.[257] Critics who warn against 'picking losers' overlook that governments have historically shaped strategic industries, from refining and telecommunications to shipbuilding and critical minerals. By including targeted support, Australia can position LCLFs as the sovereign production complement to stockpiling, thus establishing twin pillars of resilience.[258] A unified national fuel strategy integrating LCLFs arguably strengthens national capability, decreases reliance on contested imports and aligns decarbonisation with security priorities.[259] The argument presented here is clear and decisive, demonstrating that stockpiling only results in redundancy, while sovereign production using low-carbon fuels establishes lasting resilience.

Conclusion

This paper examined Australia's heavy dependence on imported liquid fuels and how this dependence is a profound structural risk that weakens national resilience, economic stability and Defence readiness. Accounting for over half of Australia's energy consumption, fuel enables the function of heavy freight, aviation, agriculture, mining, the military and emergency services, all of which lack scalable alternatives. Decades of deregulation and market orthodoxy have entrenched a national fuel system that prioritises cost efficiency, but one that is dangerously lacking in redundancy and sovereign control. These structural weaknesses are highlighted by the dismantling of refining capacity, declining stockpiles and increased reliance on overseas imports, making the national fuel system fragile to disruption. This approach was institutionalised in the Liquid Fuel Security Review, which prioritised efficiency as the primary measure, relegating resilience to a secondary concern and emphasising that secure supply inevitably involves an increase in supply costs.

The implications of this structural weakness are profound, as Defence's fuel needs were excluded from the review's framework, leaving its surge demands excluded from national planning despite their vital role in supporting a key aspect of Australia's national power. Meanwhile, billions have been allocated under the National Defence Strategy to deliver a deterrence-by-denial posture that is essentially rendered ineffective without assured access to liquid fuels. Without them, new capabilities risk paralysis in a contested environment. In contrast, case studies of Finland and Japan show alternative approaches where resilience is a deliberate choice, implemented through statutory design, empowered institutions and public acceptance of higher costs as essential insurance against disruption. These examples show that resilience always comes at a price, but a far greater cost would be borne if their nations remained unprepared.

Delivering fuel resilience is also a question of climate credibility as Australia's pledge to achieve net zero by 2050 places its fuel policies under regional and international scrutiny, particularly among Pacific partners for whom climate action is central to their survival. Fuel resilience and how it is delivered serve as a gauge of Australia's credibility as a reliable partner in addressing climate change. A sovereign low-carbon liquid fuels sector provides the only feasible way to expand Australia's refining capacity, balance resilience with decarbonisation commitments for hard-to-abate sectors and uphold climate credibility with its regional partners. Developing low-carbon liquid fuels domestically would ensure that military preparedness, economic stability and environmental responsibility become interconnected pillars of a cohesive national fuel strategy.

Beyond a basic uplift in Australia's stockholdings, a logical early step is to conduct a comprehensive analysis of fuel demands across critical sectors, mapped geographically throughout Australia. This would identify the structural blind spots that leave the economy vulnerable to cascading failures during disruptions. Such an analysis must model long-duration disruptions, contested logistics environments and simultaneous crises affecting multiple fuel types to identify where surge requirements are concentrated and where stockholding mandates can create redundancy in the areas most vital to national resilience. This process should be benchmarked against the International Energy Agency's stockholding requirements at a minimum so that national obligations reflect not only compliance but also genuine preparedness for potential crises. Without granular demand mapping, stocks may accumulate in commercially convenient hubs, creating an illusion of redundancy while leaving areas such as the northern and regional networks dangerously exposed.

Distribution infrastructure requires a similarly comprehensive investigation as resilience depends not only on the volume of fuels available but also on the ability to deliver them swiftly and where needed. The strategy of denial, outlined in the National Defence Strategy, increases pressure on northern and north-western networks where secure access is vital for force projection. However, the infrastructure in these areas remains vulnerable. Critical modes, such as pipelines, sovereign-flagged coastal shipping, rail corridors and the availability of truck drivers must be prioritised as disruption in these areas affects both national defence and sectors like mining that support the broader economy. Without targeted investment in these distribution links, even expanding the nation's stockholding or sovereign production will not provide the redundancy necessary to keep the network strong enough to respond effectively in contested environments.

Creating a unified national fuel strategy requires collaborative planning as no single government portfolio or industry player is responsible for delivering fuel supply security. Addressing this challenge demands a deliberate, phased approach that outlines the long-term end-state of national fuel resilience and then sequences the necessary reforms to address current vulnerabilities.

By organising measures across long-, medium- and short-term time horizons, Australia can recognise the interconnectedness of immediate stabilisation, systematic investigation and lasting structural reform. Such planning must recognise that fuel prices have economy-wide consequences for all Australians. While efficiency should remain a priority, it must not come at the expense of resilience and long-term effectiveness. The goal is not to abandon efficiency but to balance it against the costs of fragility and reframe increases in fuel prices as an insurance premium for sovereignty and national preparedness. Collaboration must include Defence surge requirements, freight continuity, geographic vulnerabilities across the north and climate commitments to build regional climate credibility. Consideration should be given to distribution infrastructure and workforce sustainability. Fragmented approaches have repeatedly failed to deliver a network fit for purpose in the current environment. A comprehensive national fuel strategy that balances efficiency with resilience and grounds sovereign preparedness in an era of contested supply chains is urgently needed to address Australia's fuel vulnerability.

Long-term Measures

Enduring resilience cannot be achieved through stockpiling or investment in distribution alone as these measures would stabilise but not transform Australia's structural dependence on contested imports. A sovereign low-carbon liquid fuels industry offers the only practical pathway to expand Australia's refining capacity, deliver enduring redundancy and reconcile fuel resilience with Australia's decarbonisation commitments. Developing this capability requires a dual approach, where demand-side policies, such as blending mandates and government procurement mandates including for Defence, must be paired with supply-side incentives including concessional finance and certification frameworks. The right balance of these mechanisms would incentivise domestic production and allow critical sectors to receive certified LCLFs while positioning Australia as a credible climate. Sovereign production would reduce exposure to maritime chokepoints, generate regional economic renewal and align national security with climate commitments.

Long-term measures must transform fuel from a vulnerability into a sovereign capability, embedding preparedness as the foundation of national strategy for decades to come.

Medium-term Measures

Stabilisation of the national fuel network alone is insufficient without also addressing the structural blind spots that expose Australia's economy to the cascading failures that would be experienced during prolonged disruption. Stockholding mandates only create real resilience if stocks are positioned where surge requirements and strategic industries are vulnerable to disruption. A comprehensive demand analysis across Defence, freight, agriculture and emergency services, mapped geographically, is essential to identify priority nodes and avoid providing a perception of redundancy. Benchmarking this analysis against International Energy Agency requirements would, at the very least, align national commitments with genuine preparedness rather than meeting minimal compliance standards. Distribution infrastructure also requires systematic investigation, as pipelines, rail networks, sovereign-flagged shipping and road haulage provide the infrastructure for distribution. Without prioritised investment in these links, expanded stocks would remain inert and unable to sustain operations.

Medium-term measures must seek to connect evidence-based planning with targeted infrastructure development to convert redundancy into practical sovereign preparedness.

Short-term Measures

Liquid fuels are, and will continue to be, a fundamental pillar of the Australian economy and a vital enabler of military power for the foreseeable future. Without redundancy, Defence surge requirements and critical services could be paralysed within days, undermining national resilience and economic stability simultaneously. Stabilising this must begin with measures that immediately buffer the system against foreseeable shocks, creating space to plan deeper reforms. Mandating increased diesel and jet fuel stockholdings under the *Liquid Fuel Security Act 2021* is straightforward when supported by transparent reporting and compliance mechanisms to ensure physical redundancy.

> *Extending targeted support for remaining refineries until alternative capacity is secured is equally straightforward and essential, ensuring that Australia's minimal sovereign production capability is maintained.*

These measures can resolve structural dependency and provide crucial insurance against cascading failures that may occur during crises and anchor short-term stability within a longer-term reform pathway.

Towards a Unified National Fuel Strategy

Taken in isolation, none of the prescribed measures address the depth of Australia's fuel vulnerability, which is structural, embedded and multi-dimensional. Increasing stockholdings are crucial buffers but cannot mitigate Australia's structural dependency. Distribution upgrades could resolve bottlenecks but fail to reduce Australia's import dependence. Domestic LCLF production would provide a sovereign supply solution but requires time, investment and social approval. Only by integrating these aspects within a national fuel strategy can preparedness, economic stability and climate responsibility be aligned as inseparable priorities. Such a strategy balances immediate stabilisation with systematic investigation and long-term structural reform and creates coherence across Defence needs, economic security and emissions commitments. The alternative is to continue with fragmented interventions, or do nothing, leaving Australia vulnerable to cascading failures when contested environments inevitably challenge the long-standing assumptions about the market-based approach. Therefore, this integration is not merely a policy preference but a crucial condition for Australia's national resilience in an era of increasing sovereign risk.

> *Australia's heavy reliance on imported liquid fuels, essential for the country's operations, should be regarded as a sovereign capability issue rather than leaving it to commercial markets to resolve. A unified national fuel strategy could embed resilience into legislation, strengthen institutions and coordinate policies across different national priorities.*

In this way, Defence's deterrence-by-denial strategy would be supported by reliable fuel supplies, economic stability would be preserved through resilient freight, mining and agricultural networks and environmental objectives would be advanced via sovereign low-carbon fuel production. This analysis shows that without an integrated national fuel strategy, Australia remains dangerously vulnerable. However, with such a strategy, fuel can become a fundamental part of the nation's capability and capacity. Developing this strategy is both urgent and feasible and requires a framework that balances national security, economic stability and environmental responsibility as interconnected priorities for long-term national resilience.

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About the Author

William Nichols

William Nichols is a senior Australian public servant with almost two decades of experience across Australian Government portfolios, including national security, infrastructure, energy and strategic policy.

His experience in fuel security includes conducting national vulnerability assessments of Australia's fuel network, developing Department of Defence fuel resilience requirements, leading the development of the Defence Future Energy Strategy, contributing to the Clean Energy Acceleration Plan and leading the establishment and progression of the National Fuel Council. He has worked extensively with the Department of Defence, fuel industry partners, peak industry bodies and other Commonwealth, state and territory agencies on fuel security, resilience and national preparedness, including during the establishment and progression of the National Fuel Council.

In 2025, William completed the Defence and Strategic Studies Course at the Australian War College and graduated with a Master of National Security and Strategy from Deakin University. His research focused on fuel security, national resilience and sovereign capability.

He serves as a Director within the Department of Defence Security and Estate Group, working on facilities and infrastructure requirements for new capabilities as well as resilience and force protection measures. His interests include mobilisation, critical infrastructure resilience, energy security and whole-of-nation approaches to national preparedness.

Australia's dependence on imported liquid fuels represents one of the nation's most significant yet underappreciated strategic vulnerabilities. Critical sectors including aviation, freight, agriculture, mining, emergency services, and Defence, remain dependent on liquid fuels, yet domestic refining capacity and strategic reserves have declined under decades of efficiency-driven policy settings. As a result, disruptions to fuel supply would rapidly affect not only economic activity but also national security and societal resilience.

This study by William Nichols, examines these structural vulnerabilities of Australia's liquid fuels ecosystem. Drawing on legislation, strategic reviews, institutional submissions, and industry reports, it investigates how fuel security has been framed within Australian policy and why recognised risks have remained largely unresolved. The analysis identifies persistent institutional gaps that continue to undermine national resilience and expose critical national capabilities to disruption.

Comparative analysis of Finland and Japan demonstrates that fuel resilience can be achieved when treated as a sovereign capability. Both countries have embedded fuel security within broader national preparedness frameworks through strong legal mandates, empowered institutions, strategic reserves, and integrated civil-military planning. While not direct models for Australia, their experiences provide valuable insights into how long-term fuel resilience can be institutionalised.

The study also explores the role of low-carbon liquid fuels as a strategically aligned policy option capable of strengthening national resilience while supporting decarbonisation objectives. It argues that a sovereign low-carbon liquid fuels industry offers Australia the most credible pathway to reconcile security, economic, and climate priorities.

Ultimately, fuel is not merely an economic commodity but a foundational enabler of national power. A coherent national fuel strategy that restores sovereign capability and resilience will enhance Australia's defence readiness, economic stability, and capacity to respond to future crises.

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