

# Fuels Brief - International Supply Chain Benchmarking Sectoral Assessment

Report for the Department of Infrastructure, Transport, Regional Development and Communications

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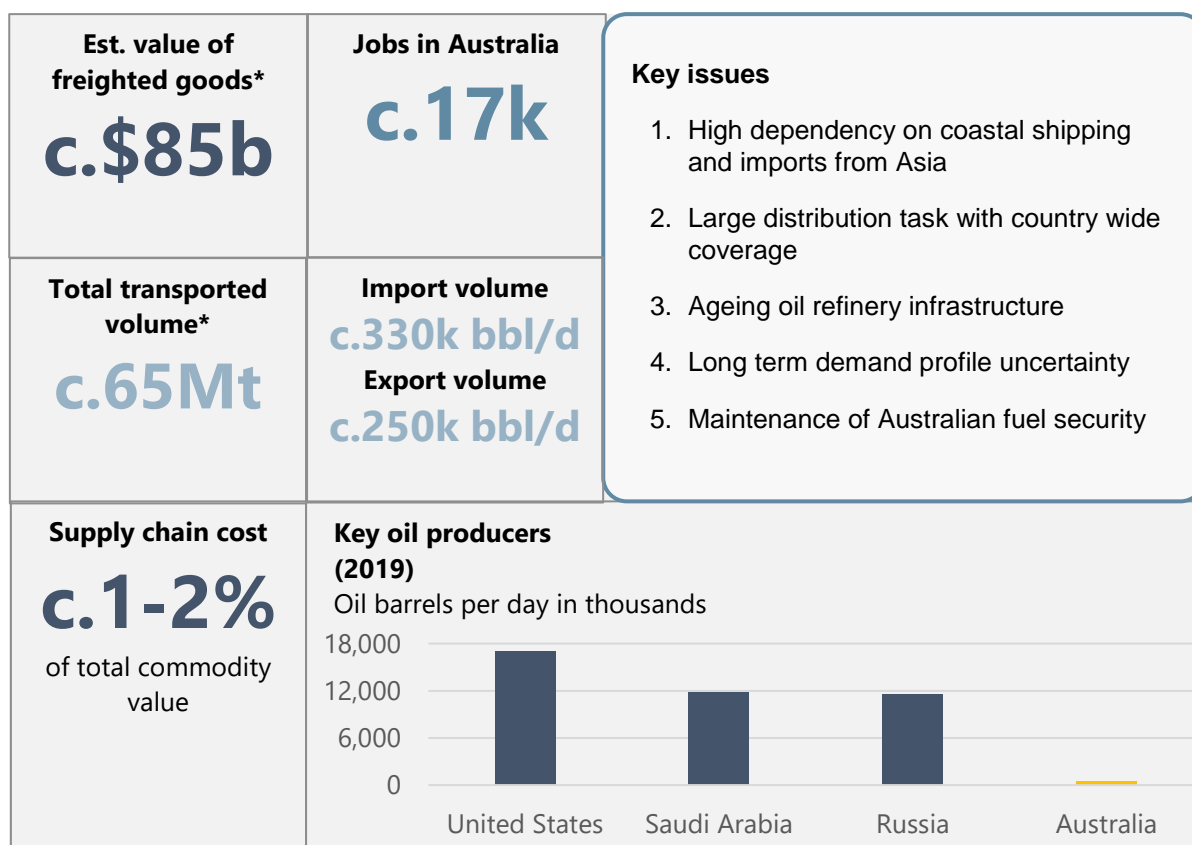
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## Executive Summary



\*Value and volume only include unleaded fuel, diesel fuel and LPG. These figures only address the downstream import market, but upstream figures will be added by CSIRO at the end of 2021.

Fuel supply chains can be split into two key components. The upstream component covers the exploration, identification, extraction, and production of raw fuels, while the downstream component covers refining and importing, wholesaling, and retailing. The main products within the fuel supply chain are fossil fuels and include unleaded fuel, diesel fuel and LPG/LNG.

Currently, the CSIRO modelling only shows the downstream import market (i.e. importing, refining, wholesaling and retailing). CSIRO plans to further expand the model to include upstream operations (exploration, identification, extraction, production and exports) by early 2022.

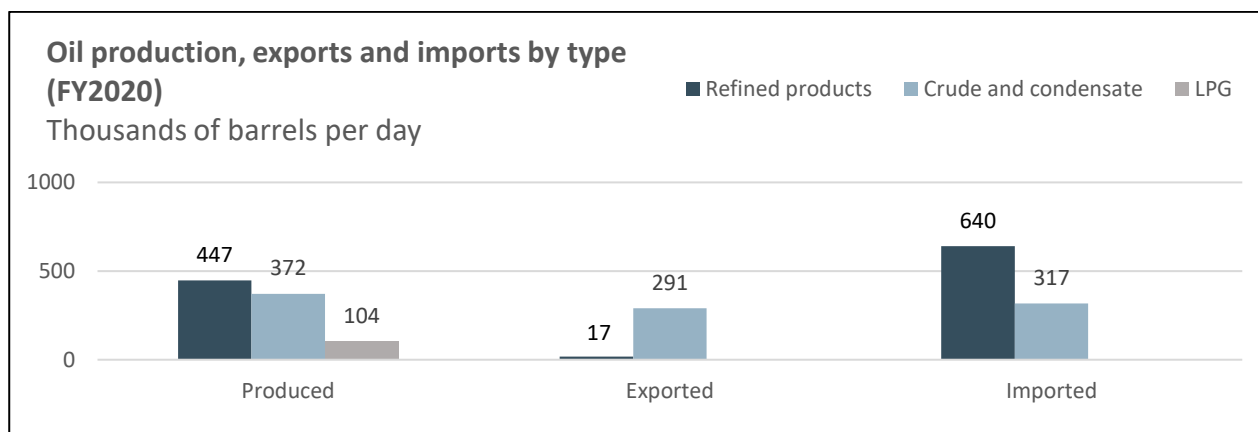
Australia is a relatively small player in the supply of oil, containing c.0.3% of the world's oil reserves and c.0.3% of oil production globally. Freight costs are only a small proportion of the total sale price of oil. The high volumes moved within Australia within the domestic distribution network make fuel supply chains a critical cost input to all logistics and transport.

A key issue in Australia's fuel supply chains is a high dependence on imports from Asia and coastal shipping to meet domestic needs, as a result of a rationalisation of domestic refining in recent years. Furthermore, Australia's population is concentrated in coastal clusters, separated by substantial distances requiring a costly truck dependent distribution effort to move fuels around Australia.

## Fuel Supply Chains in Australia

The fuels sector employs c.17k people in Australia.<sup>i</sup> Freight costs and wharfage are estimated at 1-2% of the terminal gate price for imported fuel.<sup>ii</sup>

Australia has its own crude oil and LPG resources throughout the country and also imports oil from overseas for local refining. The key refineries are the Geelong (Viva Australia) and Altona (Mobil) refineries in Victoria, the Lytton (Caltex) refinery in Queensland, and the Kwinana (BP) refinery in Western Australia.



Australia's fuel supply chain has the following key issues:

1. The number of oil refineries in Australia has been 'rationalised', with three refinery closures in the last seven years, increasing Australia's reliance on imports, placing increased pressure on port infrastructure and a global supply of refined petroleum.<sup>iii</sup>
2. Australia's population is concentrated in coastal clusters separated by substantial distances and distribution networks require long distance haulage to move fuels around Australia. This increases the logistical cost of moving fuel and has a flow on effect to other goods that use fuel as an input.
3. As an island nation, Australia's fuel supply chain is more dependent on shipping than the global average, with an estimate c.93% of supply dependent on shipping.<sup>iv</sup>

## International Supply Chain Comparison

Fuel is an important global strategic resource, with the bulk of fuels being produced by a small number of countries. Members of the Organisation of the Petroleum Exporting Countries (OPEC) produce c.40% of the world's crude oil and hold c.80% of the world's proven oil reserves, giving them substantial global market power. OPEC aims to achieve a stable market for oil and member countries raise or lower oil production to match supply with demand.

Fuel, particularly oil, is imported by most developed countries in order to power consumer and commercial transport, heating, manufacturing (particularly plastics) and in other industrial processes. Any change in the user-cost of fuel therefore has a large effect on the wider economy.






A shift toward renewable energy, particularly through a move to electric vehicles, is expected to reduce overall demand for traditional hydrocarbon-based fuels, which poses a significant threat to economies like Saudi Arabia which depend on fuel exports. Additionally, alternative fuels such as hydrogen, ethanol, biodiesel and biogas are gaining popularity.

## Oil Production by country

	Australia	United States	Saudi Arabia	Canada	New Zealand	United Kingdom
<b>Production (thousands of barrels / day)</b>	490	17,045	11,832	5,651	24*	1,118
<b>Quantity imported (thousands of barrels / day)</b>	328*	9,094	N/A	693*	104*	910*
<b>Quantity exported (thousands of barrels / day)</b>	250*	8,016	8,397	4,683	c.24*	835*
<b>Primary means of production</b>	Offshore drilling	Fracking	Onshore drilling	Oil sands	Onshore & offshore drilling	Offshore drilling
<b>Mode of transport</b>	Coastal shipping, trucks, some pipeline	Waterways, pipelines, trucks, and railroads	Pipelines, road, rail, coastal shipping	Coastal shipping, road, rail, pipeline	Pipeline, road, rail, coastal shipping	Coastal shipping, rail, road, pipeline
<b>Data availability / feasibility for deep dive</b>	N/A	Moderate	Limited	Moderate	Moderate (better data for import focus)	Moderate

\* Value includes crude oil only

## Benchmarking Considerations

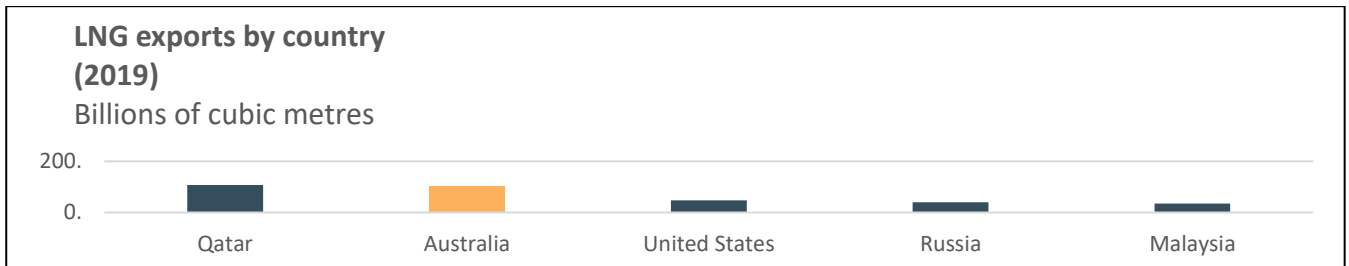
Intl benchmarking considerations	Importance	Fuel Supply chain
<b>Size and growth</b>		The fuel supply chain employs c.17k Australians, and moves nearly c.2m barrels of oil per day
<b>Freight importance</b>		Due to the amount of fuel moved, reducing logistics costs would result in substantial cost savings that would flow to other products and provide a 'multiplying effect'
<b>Export importance</b>		Australia only holds c.0.3% of the world's oil, making it difficult to compete with large producers globally on volumes. While not currently in the CSIRO modelling, LNG exports are significant, though in-country logistics are only a minor part of the supply chain
<b>Geographic scope</b>		Geographically, fuel is refined at key refineries in WA, QLD and VIC, where states refine fuel, but all states have a high demand for fuel
<b>Known efficiency / public interest</b>		From a consumption standpoint, improving supply chain efficiency will have a multiplying effect on the economy and drive down transport costs for consumers.

There is an opportunity to benchmark the supply chain for oil due to the high volumes moved and its importance to many other areas of Australia's economy. Reducing the cost of domestic distribution of fuels for consumption could yield a powerful 'knock-on' economic effect.

New Zealand is a good comparator due to relatively low population density. While fuel used in New Zealand is distributed domestically partially by pipeline, it is predominantly imported via sea initially (both refined and unrefined) and also uses a coastal shipping and rail network to move fuel around.<sup>v</sup> New Zealand also appears to have good data available on the industry, due to a recent Commerce Commission investigation into fuel prices.

While Canada is a far larger oil producer than Australia, it is more similar from a refined fuel consumption point of view. Canada imports a large volume of refined petroleum to service areas where it is uneconomical to move domestically produced oil to (e.g. Quebec and Ontario). Domestically, oil and refined fuel is predominantly transported by a mix of pipes, waterways, rail and road.<sup>vi</sup> Furthermore, like Australia, Canada has a small population relative to landmass.

The CSIRO modelling does not cover LNG, but Australia is a large exporter of LNG, second only to Qatar. Investments in gas and projects such as NSW's Port Kembla Gas Terminal suggests that there may interest in further evaluating supply chain performance.



Another supply chain to consider for evaluation though currently outside the scope of the CSIRO model is biofuels, however Australia only produces limited biofuels (an estimated c.235 million litres of ethanol and 42 million litres of biodiesel in 2020).<sup>vii</sup>

## References

<sup>i</sup> Australian Bureau of Statistics

<sup>ii</sup> BITRE, Impact of COVID-19 on petrol prices in Australia, 2020

<sup>iii</sup> Hale & Twomey, Australia's Maritime Petroleum Supply Chain, June 27, 2013

<sup>iv</sup> Australian Financial Review (article), Refining shake-up mooted as plants wilt, June 19, 2020

<sup>v</sup> Commerce Commission New Zealand

<sup>vi</sup> Canadian Association of Petroleum Producers (CAPP) (webpage), Transportation

<sup>vii</sup> Biodiesel Magazine (article), Report: Australia's biofuel consumption to remain minimal in 2020, September 29, 2020