By Law I need to include this part. David Trotter. 16/08/2022

Hale & Twomey Limited is an energy consultancy specialising in strategic issues affecting the energy sector. With a comprehensive knowledge of local and international energy markets, we provide strategic advice, comprehensive analysis and services across the entire sector.
Hale & Twomey prides itself on being able to analyse and interpret the detail, then translate the implications into strategic directions for our clients. We provide expertise to a broad range of companies and government departments. Hale & Twomey has established a strong reputation in the sector by producing timely, high quality, value-adding work.

Highlights.

- ✓ An increased cost of compliance to meet the IEA membership requirement to hold stocks covering at least 90 days of New Zealand's daily net import requirement;

- ✓ No ability in New Zealand to correct product that is significantly off-specification which needs to be taken into account with stock level decisions;

- ✓ Possible issues with jet import availability if it all needs to meet a lower sulphur specification for transport via RAP;

- ✓ No local supply of sulphur for fertiliser; replacement supply needed for CO_2;
- ✓ Loss of technical processing expertise; and
- ✓ Loss of ability to process New Zealand crude in a major supply emergency (global meltdown or pandemic where New Zealand might be isolated for a time).

Most of the rest of the refinery's output (~40%) is shipped by coastal tanker to the 10 ports around the country. This task is run by Coastal Oil Logistics Limited (COLL), a joint venture owned by RNZ's customers (BP, Mobil and Z). For this task they operate two Medium Range (MR) sized tankers (capable of carrying around 40,000 tonnes or 50 million litres each)[7].

Most of the crude processed through the refinery is imported, with the Middle East (mainly United Arab Emirates) the main supplying region. However, some indigenous crudes and condensates are processed (~2%) and these are transported to the refinery on the same coastal tankers used for product distribution.

3.0 Conversion to a terminal

Should the refinery be converted to a terminal our expectation is the following:

- ✓ An import terminal at Marsden Point would still be needed as that is the logical and most efficient supply route to Northland and Auckland;
- ✓ RNZ tankage capability would allow it to receive imports directly from Asian refineries (and further afield if the economics were favourable);
- ✓ As an import terminal it would handle two/three grades of petrol, jet fuel and diesel;
- ✓ Whether a bunkering facility (imported bunker fuel) was maintained is open to question (given the lack of these facilities in Auckland post Americas Cup changes and the possibility of increased port activity in Northport[8]);
- ✓ The facility could act as a bitumen import terminal should there be customer demand;
- ✓ All other ports would be fully serviced by direct imports; and

✓ There would be no need for a regular shipping task from Marsden Point to other ports, so the two ships currently on the coast would no longer be required.

Given these changes a terminal at Marsden Point would service about 40% of New Zealand's demand - 30-35% for petrol and diesel and 75-80% for jet fuel. Therefore, terminal throughout would be around 55-60% of current refinery output.

4.1.1 Port

Marsden Point is a deep water port suitable for loading crude tankers to 14.7 metres draft. This is sufficient for fully loaded Aframax tankers and partially loaded Suezmax tankers. Product tankers that currently come to New Zealand are much smaller (~40,000 tonnes) so have no problem coming into the refinery (many now call at the refinery to deliver petrol blendstocks and, at times, pick up product for onward distribution).

As a deep water port, RNZ would be able to receive product imports on larger LR1/LR2[9] tankers. These can carry up to 120,000 tonnes and have a significant cost advantage over MRs as measured in cost per litre of delivery. However, LR delivery requires the facility to have more storage and the company delivering the product to hold higher levels of stocks. Product delivery on larger LR tankers is now a structural feature of the import terminals that were formally refineries in Australia.

4.1.2 Jetty

RNZ has two major jetties, both capable of handling tankers from MR through to Suezmax size. The jetties are capable of both importing product (currently product imports include petrol blendstocks, jet fuel and during shutdowns, petrol and diesel). They are also capable of loading all products (as currently happens on coastal tankers).
Following conversion, the crude import facilities would be redundant and there may be value in limited conversion of those facilities to product service to improve the discharge speed of large product imports. Other than that, we would not expect major work to be required on the jetties.

4.1.3 Storage (tankage)

Current refinery storage falls into three general categories:

The capacity of the storage needed for a terminal would be significantly less than the current refinery storage. This is because there is no longer any need for crude and intermediate product storage, and because the throughput of the facility is likely to drop to around 60% of the previous level as noted in Section 3.0.
However, more product storage would be required as there is no longer the continuous rundown of intermediate product from the refining processes. Exactly how much is required would depend on import delivery patterns (particularly size of import ships), whether imports are single or multi-grade, co-ordination between different customers (number of customers) and customer requirement for minimum stock levels (what level of buffer or safety stock is required).
These decisions would need to be worked through with the terminal's customers. In Hale & Twomey's (H&T) analysis of the prospective conversion of Australia refineries to terminals we calculated that the refineries would typically need their product and intermediate tankage all converted to finished product tankage to provide sufficient terminal capacity[11]. This high-level assumption was seen as reasonable by the Australian fuel industry.

Our expectation (without doing a full analysis of likely import deliveries) is that the refinery would need its finished tankage as well as converting at least half of its intermediate product tankage to product storage. It is very costly to convert crude tankage to product tankage, so we expect most of these tanks to be written off[12]. It is likely all fuel oil/bitumen tanks would be written off if the refinery does not handle bunker fuel/bitumen as these would not be suitable for white products without major investment (based on relative product throughputs this could cover nearly 15% of finished product storage).

We expect both these assets to be operated in a similar way to current operations, although it is possible additional products could be added to the mix once the facility operates as a terminal (e.g. another grade of petrol).

4.1.5 Summary of physical changes

In summary the major physical refinery changes required would be with tankage to provide the necessary product storage to operate as an import terminal. We expect most crude tankage, all black product tankage and refining units to be redundant as far as the requirements of a product import terminal

Some refineries have chosen to mothball facilities initially but in general, once mothballed it is rare to see the refineries restarting

Inventory levels would reduce with the change to terminal operation roughly in line with the assumptions on product tankage.

This is a substantial reduction in inventories, although the level of finished (ready to use) product in the country would rise.

4.3 Rest of New Zealand's import infrastructure

The 10 coastal distribution fuel ports[14] (this will reduce to nine once Auckland Wynyard wharf storage is removed later this year) are currently served by both product from the refinery and direct imports. If the refinery is converted to a terminal our expectation is these ports would be 100% supplied by imports in the base case. Import tankers are similar in size and capacity to the coastal tankers so there are no port restrictions limiting this change, other than many of the smaller ports are draft restricted. The draft restrictions means these ports can only be visited once the ships have discharged some of their cargoes (this applies to coastal tankers as well).

The change to 100% import delivery may require some changes to the terminal infrastructure.

Under a full import delivery model this would be much more challenging, particularly for the smaller ports which are currently largely serviced by coastal tanker from the refinery.

H&T's view is there is not sufficient storage at many ports to be efficiently serviced by direct imports

Fuel companies would need to invest in more port tankage in many ports to manage the change in supply system;

- ✓ Fuel companies would incur much higher import delivery costs (multiple drops) with increased risk of stock shortages that would need to be covered by trucking from other ports (where feasible); or
- ✓ Use RNZ import storage as a back-up for the rest of the system, as effectively happens now with coastal distribution

The storage back up option at RNZ is effectively similar to current operation, where much of the finished product stock required to support the distribution system is held at the refinery. With Marsden Point converted to an import terminal, companies may choose to hold higher stocks at the facility, which they could call on if necessary to give them a buffer to the overall system. They could call on that buffer when needed either by shifting demand from Tauranga to Wiri or by getting import tankers (once discharged) to lift product from the refinery on occasions for delivery to smaller ports (this could make sense to provide balanced cargoes to smaller ports and because the delivery to the refinery using LR tankers gives a cost advantage versus normal MR supply).

Note. [14] Note the three Wellington port locations are treated as a single port for the purposes of this discussion.
[15] We note that the Commerce Commission raised concerns about the current terminal infrastructure provision in its recent market review. Executive Summary recommendation X89 "We consider that infrastructure sharing arrangements may be diluting incentives to invest in infrastructure, contributing to tight supply conditions at many ports. This is reflected in insufficient investment being made in shared storage terminals over the past decade, despite increased demand for fuel from the majors". Pg. 25)

4.4 Price impact

H&T's report for Refining NZ into the Competitiveness of the Processing Agreement[17], shows that at times processing through the refinery can be more cost effective than importing and at others less.

5.0 Likely resulting issues

As noted in Section 4.2, total inventories in the country would drop significantly with conversion of the refinery to a terminal. However, days of finished product in the country are likely to go up which would partially offset this drop. This change is likely to have both positive and negative impacts on supply security.

With more finished product in the country, New Zealand will have more immediately useable product on call.

- ✓ Disruption caused by upsets/issues to the local refinery (as explored in the Petroleum Supply Security Reports[18]) would no longer be an issue
- ✓ There would be more product stock on the water for delivery to New Zealand
- ✓ There would be less stock in the country and while some of the current stock is not useable (minimum refinery operating stocks), ultimately this would provide less cover overall
- ✓ Total stock on the water would be reduced (product voyages are shorter than crude on average)

This is a large reduction and would reduce New Zealand's total commercial petroleum stocks by 25-30%.

5.2 International Energy Agency (IEA) membership impacts

Lower commercial inventories would require action to be taken to ensure New Zealand remained compliant with its IEA obligation. Current government policy is to cover the difference between commercial stock holdings and the stock requirement by purchasing tickets. In the absence of any other change, conversion of the refinery to an import terminal would result in an increase demand for and cost of tickets. Based on a loss of 340,000 tonnes of crude and intermediate products, this could cost in the range of NZ$6.5-12.0 million/year based on the range of ticket prices secured in recent tenders[19].

As noted in Section 4.4, direct importers naturally hold lower stock than those using a refining process. One option for the government to consider for oil security should there be a major change in the supply chain such as the refinery shutting, is to introduce minimum stockholding requirements for all market participants. This would need to apply to all market participants equally, not only those who had been using the refinery supply chain for market fairness.

Such a change would increase cost to consumers as this cost would need to be recovered in marketing margins

5.3 No coastal tankers

H&T's view is that it is highly likely that should refinery processing cease, both coastal tankers would no longer be needed.

as the coastal ports would be supplied by direct imports. The coastal distribution cost is also covered by the margin the fuel companies retain from refining, so is also expected to have no impact on market prices

In terms of the resulting changes to the marine activity:

All indigenous crude and condensate production would now be exported on foreign flagged tankers (as the majority already is); and
Should, on occasion, stock need to be transported from the terminal at Marden Point to other ports, this would be done by the same ships (MR tankers) already bringing imported product to the ports.

5.4 No ability to fix off-specification cargoes

On occasions RNZ reprocesses off-specification product for its customers. This may be stock on import ships that does not meet specification when it arrives in the country, or product that has been contaminated in country. Reprocessing is a last resort and most product quality issues are managed in terminals by isolating off-specification product and slowly blending it with on-specification product (at an appropriate ratio) so the resulting blend is on-specification.

However, the loss of the ability to reprocess product would mean where product is well off-specification, cargoes may need to be returned to their source (i.e. back to Asia).

This would increase costs and fuel companies would need to build that risk into their inventory decisions (so the loss of a cargo won't cause stock outs).

5.5 Product quality - jet sulphur

In order to maintain the product quality of petrol and diesel through the RAP, RNZ restricts the level of sulphur in the jet fuel in the pipeline. The refinery produced jet is low in sulphur but imported jet can be substantially higher.

Currently Refining NZ allows jet imports but if they are above a certain sulphur level they are reprocessed to reduce sulphur levels before being distributed through the RAP.

5.6 Other products (Sulphur/CO_2)

The refinery currently produces sulphur and CO_2 as by-products from its process. Sulphur is sold to the fertiliser industry and CO_2 to the carbonated drinks industry. Sulphur can be imported and CO_2 could be generated from an alternative process but it is likely in both cases costs would rise for those industries in the absence of supply from Refining NZ.

5.8 Crude processing

As noted in Section 2.0, RNZ processes a small amount of locally produced crude and condensate (~2% of refinery intake, although around 10% of total locally produced crude and condensate). The refinery only processes the amount its customers assess as economic. In an emergency it could process a lot more and possibly all (that would be 20% of normal capacity)[22]. We understand that the refinery could not run entirely on local crude but in conjunction with existing stocks and other crudes still available on the market, local crude could extend New Zealand's self-sufficiency should an event result in normal international market structures failing such that crude and products can't be imported into New Zealand.
This capability would be lost should refining cease in New Zealand.

5.10 Transition to new fuels

Refining NZ currently produces hydrogen as part of its refinery process. It is also the logical place to blend and manage biofuel introduction to the New Zealand fuels market should these ever reach appropriate scale. It is difficult to make any definitive statement, although there would definitely be a loss of capability and capacity for future market enhancements should New Zealand no longer have a refinery.

We do not know whether a closure decision impacts on Refining NZ's recent decision to invest in a solar power plant.

[22] These higher percentages may require some relaxation in product specifications to maintain feasible operation.

5.11 Supply security impact summary

In summary we expect the following impacts on supply security.

1. A reduction in physical inventories (by 25-30%) that ultimately is likely to impact New Zealand's supply security, even if the impact of loss of refining processing locally is removed.

2. An increased cost of compliance to meet the IEA membership requirement to hold stocks covering at least 90 days of New Zealand's daily net import requirement in the absence of any other change to increase stocks.

3. The loss of the coastal tanker operation and the expertise associated with that (albeit import tankers would increase so there would still be plenty of ships on the coast).

4. No ability in New Zealand to correct import product that is significantly off-specification which needs to be taken into account with stock level decisions.

5. Possible issues with jet availability if it all needs to meet a lower sulphur specification for transport via RAP.

6. No local supply for sulphur for fertiliser; replacement supply needed for CO2.

7. Loss of technical processing expertise.

8. Loss of ability to process New Zealand crude in a major supply emergency (global meltdown or pandemic where New Zealand might be isolated for a time).