Industry Insight.

Petroleum, chemicals and polymer products.

February 2020

Contents.

Contributing authors.

Paul Clark, Industry Economist
+64 9 336 5656

Summary.

This report focuses on New Zealand's petroleum, chemicals and polymer products sector, which is concerned with the supply and/or manufacture of refined petroleum products, basic chemicals and the many products derived from them. These range from petrochemicals and pharmaceuticals to fertilisers and pesticides. They also include a diverse range of polymer and rubber products, from plastics and paints to adhesives and synthetic rubbers.

This sector is big by New Zealand's standards. In 2019, turnover stood at about $20bn, representing just over 18% of total manufacturing sales. Refined petroleum products accounted for just under $10bn of this, while sales of basic chemicals and basic chemicals products added another $5.3bn. The manufacture of polymer products contributed a further $4.7bn, with just over half of this coming from plastics.

It also has many moving parts. The refining of petroleum is dominated by three major oil firms, which refine fuel through New Zealand's only crude oil refinery at Whangarei. Most refined petroleum sold in New Zealand is refined locally, although some is imported.

For basic chemicals and basic chemical products, importers and distributors dominate the commercial landscape. Some basic chemical manufacturing takes place in New Zealand, although that is limited to a few selected products such as methanol and urea. Ditto for most basic chemical products – almost all petrochemicals used to produce polymer products in New Zealand are imported. However, a range of other basic chemical products, such as pharmaceuticals, toiletries, and fertilisers are produced locally, competing head-on with imports.

New Zealand does have a thriving polymer product sub-sector, with manufactured plastic products being the largest contributor to revenues. Firms operating in this sub-sector also face significant competition from imported products.

The fortunes of the sector are being shaped by structural as well as cyclical factors. Prominent is the impact of technology, which is transforming almost every aspect of every industry, disrupting value chains and the numerous end markets that this sector services.

At the same time, technology is changing how consumers view the sector and the products it supplies. What was blissful ignorance has now been replaced with consumer activism. Consumers, increasingly distrustful of the industry, want to know what chemicals are in the products they consume. They also want to know whether these products are contributing to climate change and what impacts they have on the natural environment.

Nowhere is this truer than for polymer products, especially non-biodegradable plastics. Ongoing media coverage of plastics polluting the oceans and killing all manner of wildlife is shaping public sentiment. At the same time social media platforms have given a voice to consumers and advocacy groups concerned about environmental issues more generally.

These pressures will help shape the sector over time. In the near term though, the fortunes of the sector are more closely aligned to how the economy is performing. The sector sells into every industry in New Zealand, but particularly important are the construction, manufacturing, agriculture and downstream consumer sectors.

While activity in the construction and agricultural sectors has helped to drive demand for chemicals and plastics in recent years, the same cannot be said for downstream manufacturing which has struggled to compete in an increasingly competitive global marketplace.

The success of individual firms operating in these industries is really a function of the many micro-factors that underpin the purchasing decisions of buyers. Traditionally these have tended to focus on relative prices, the performance characteristics of competing products and the availability of supply. To a large extent that remains the case, but nowadays environmental considerations are also a factor.

Supplying into downstream markets can be challenging for firms operating in this sector, irrespective of whether they are involved in import/distribution activities or local manufacture. They all face labour shortages, particularly skilled labour, and periodically some may struggle to acquire the raw materials they need. Technology is not a strongpoint either, with most slow to adopt new digital technologies already in play offshore. These technologies are not only being used to better assess downstream demand but also improve operating and supply chain efficiencies.

Slowness on the technology front reflects the fact that many firms operating in New Zealand are importers. The relatively small size of the New Zealand market compared to those offshore is also likely to be a contributor.

Competition differs markedly between market segments. There is, for example, very little wholesale competition between the three major oil refining firms that operate in New Zealand. Competition in the retail space, however, is a bit more intense. Resellers compete on price and increasingly, innovations such as fast lanes, coffee ordering apps, improved service offerings, discounting and loyalty programmes.

Competition in basic chemicals and basic chemical products is a different beast altogether. The fact that prices for basic chemicals and most basic chemical products like polymers are set in international markets means that there is little scope for price differentiation. Firms compete largely on their ability to deliver the right quantity and quality of product within specified timeframes. They are also looking to boost margins by offering additional services, from advice to co-developing product specifications and even backwardly integrating into their customers business.

The same is true for manufacturers and suppliers of basic chemical products like fertilisers, pharmaceuticals and personal healthcare products, although arguably there is more scope to compete on price in this market segment. Some firms, especially international ones with local import/distribution capabilities, compete through effective brand management.

Competition in the polymer products market segment is mostly between manufacturers. They tend to be small outfits producing short production runs. They don't compete on their ability to generate economies of scale, although improving operating efficiencies remains a key focus. Like basic chemical suppliers, they compete on their ability to deliver the right quantity and quality of product within specified timeframes. Advisory is increasingly important and the ability to work with customers is a critical success factor.

Outlook.

Ongoing global uncertainties and a weaker outlook for the world's economy suggest that prices for many basic chemical and basic chemical products imported into New Zealand are likely to remain soft in 2020. Although risks abound, petrochemicals should benefit from flat to softening oil prices and the possible expansion of production capacities in major producing countries in Asia, the US and Europe.

At the same time, economic activity in New Zealand is expected to lift, in part due to a temporary pickup in house prices, which should gain further momentum in the early part of 2020, as well as a ramp up in government spending. A resulting increase in household expenditure is likely to mean stronger demand for end consumer products and the various chemicals and polymers that go into them. Still-elevated construction activity is also likely to support demand, while a stronger economy overall is likely to lead to a higher consumption of refined fuels, which will be needed to address growing transport needs.

Softer chemical prices and improved domestic demand in 2020 should mean higher sales volumes for many local firms, although product margins are unlikely to affected. In large part this reflects the commoditised nature of basic chemicals and petrochemicals and the structure of the sector in New Zealand, which is full of small importers/distributors with little influence over price setting. This means that lower costs will have to be passed onto customers.

We expect these conducive market conditions to repeat in 2021, albeit with some subtle differences. The global economy is set to tilt higher in 2021, with India and Asian countries other than China likely to provide some added impetus. This should push up basic chemical and petrochemical prices, effectively raising the input costs for firms operating in New Zealand. Happily though, domestic demand is likely to remain elevated with the New Zealand economy set to get a further leg up in 2021, and so it's likely that importer/distributors of basic chemicals and basic chemical products will be able to pass on any higher costs that they incur. Again, and for the same reasons given above, sales volumes are likely to increase, but product margins not so much.

That said, we still expect many firms in this sector will improve their profit margins over the next couple of years as more of them transition towards providing additional services to their customers. Irrespective of whether a firm is an importer of basic chemical products or a manufacturer of downstream plastics, competition in the future will increasingly be about who is able to provide the most value to their customers. Tailoring of solutions will increasingly become the norm and those that still deal in product will at best be confined to the margins. Some, especially those with strong distribution capabilities or expertise in specific products may well find themselves becoming targets for acquisition. Others still are likely to go out of business.

Longer term, we would expect the number of firms operating in the sector to fall. Those that remain will be multidisciplinary and will tend be larger than those that currently exist.

However, operating in the value end of the market where intellectual property is king raises several challenges. Firms operating in this sector will not only have to have the import/manufacturing/distribution infrastructure necessary to service customers, they are also going to need people with the technical skills capable of delivering added value. The problem is, such skills have always been in short supply in New Zealand and this likely to remain the case as the current base of technical skills heads for retirement and our best and brightest replacements move offshore to work for the large global behemoths that dominate the production of chemicals and polymer products.

At the same time, many firms operating in this sector are likely to come under increased pressure to reduce their carbon footprint as well as minimise the impact that their products have on the environment. However, in the absence of any game changing technology or a big ramp up in renewably generated electricity, we think that they will be hard-pressed to significantly reduce their CO_2 emissions over the next couple of years. The portents are slightly more positive on the environmental sustainability front, where increasing societal pressures and legislative changes are likely to result in many polluting plastics being replaced by biodegradable alternatives.

Firms are also likely to face increased competition from offshore suppliers. Local importers/manufacturers/distributors already face competition from products imported by downstream consuming industries. We would expect this to increase as new technologies, such as blockchain and artificial intelligence, take hold and offshore suppliers start to work more closely with local customers to develop solutions tailored to their needs.

Most local firms don't have the resources to keep up with offshore firms that have invested in technologies such as artificial intelligence, remote sensors, robotics and automation to improve operational and supply chain efficiencies. Nor are they able to invest heavily in new products, especially those that will have to comply with increasingly stringent environmental regulations in the future.

However, New Zealand is a very small market globally speaking, and that is not going to change anytime soon. For most offshore firms, it's not economically worthwhile to be directly involved, other than on an occasional basis. For the most part, we don't see this changing. For them, it is much better to have supply agreements in place with local partners, especially those that are moving into the value end of the market.

This suggests some big changes. Although the timing is difficult to pin down, we can foresee a situation where local firms operating in New Zealand start to collaborate more closely with offshore providers, leveraging off their technology and intellectual property to deliver value added solutions to local customers.

Introducing the Industry.

Dimensioning the industry.

Globally, the petroleum, chemical and polymer products sector is huge. It hosts some of the world's largest firms operating across and along value chains, to convert raw materials, such as crude oil, natural gas, air, water, metals, and minerals into more than 70,000 different products.

In New Zealand, the sector is also large, but not nearly as important to the local economy as it is globally. Indeed, New Zealand imports much of what its needs from its global counterpart. Manufacturing activity is restricted to the refining of crude oil into petroleum products and the limited production of a few basic chemicals and basic chemical products. The sector does, however, have a thriving polymer and rubber products manufacturing sector which relies heavily on imports for its raw materials.

Scope of this report.

This report focuses on New Zealand's petroleum, chemical and polymer products sector. It focuses specifically on the supply of:

Petroleum and coal products.

Primary activities include:

- The refining of imported crude oil into petrol and diesel products. Other activities include the production and importation of aviation fuel and liquified petroleum gas (LPG), the manufacture of fuel gas and heating oil, and the blending of petroleum with ethanol.
- The further refining of heavy and light oil components using oil and grease base stocks, as well as synthetic organic compound base stocks. Specific activities include the distilling of coal tars and the manufacture of coking coal, petroleum jellies, lubricating oils, solvents and bituminous products (including asphalt) from refined petroleum or natural gas.

Firms operating in New Zealand also import refined petroleum and coal products directly from abroad.

Note: This report does not focus on the exploration for and the production of crude oil in New Zealand, which is exported overseas. This report uses the terms "**petroleum**" and "**petroleum refining**" when referring to both petroleum and coal products. Specific references to coal products are only be made where there is a need to distinguish such products from refined petroleum products.

Basic chemicals.

Primary activities include the manufacture, importation and distribution of:

- Basic chemicals that are produced in bulk and sold within the chemical industry where they are processed further into downstream products. Basic chemicals are the building blocks for many basic chemical products (see below).
- Basic chemicals are classified as being organic or inorganic. Historically organic chemicals are derived from living organisms, but more recently the term refers to chemicals derived from carbon, such as crude oil, natural gas, ethylene, butylene and methanol. By contrast, basic inorganic chemicals are substances that originate from minerals and include inorganic dyes, pigments, sulphide, calcium chloride, acids, industrial salts, soda ash and chlor-alkali products.

Basic chemical products.

Primary activities include the manufacture, importation and distribution of:

- Synthetic or man-made polymers, mostly derived from petrochemicals, an organic basic chemical which is produced when refining crude oil. Polymers come in a liquid, powder or pellet form. Depending on their chemical composition they can be flexible, semi-rigid or rigid. Although a diverse range of synthetic polymers exist, only a few dominate the market because they can be produced in high volumes at relatively low cost. They include polyethylene (PE), polyethylene terephthalate (PET), polypropylene (PP), polystyrene (PS), polyurethane (PUR) and polyvinylchloride (PVC).
- End-use products made from basic chemicals, including fertilisers, pesticides, human/veterinary pharmaceuticals, cleaning compounds, personal care products, cosmetics and toiletries. They also include food additives, construction chemicals, elastomers, flavours, and surfactants.

Note: This report uses the term "**polymer**" when referring to synthetic polymers.

The production of end-use basic chemical products involves relatively simple manufacturing processes, such as mixing, blending and heating.

Polymer and rubber products.

Primary activities include the manufacture, importation and distribution of:

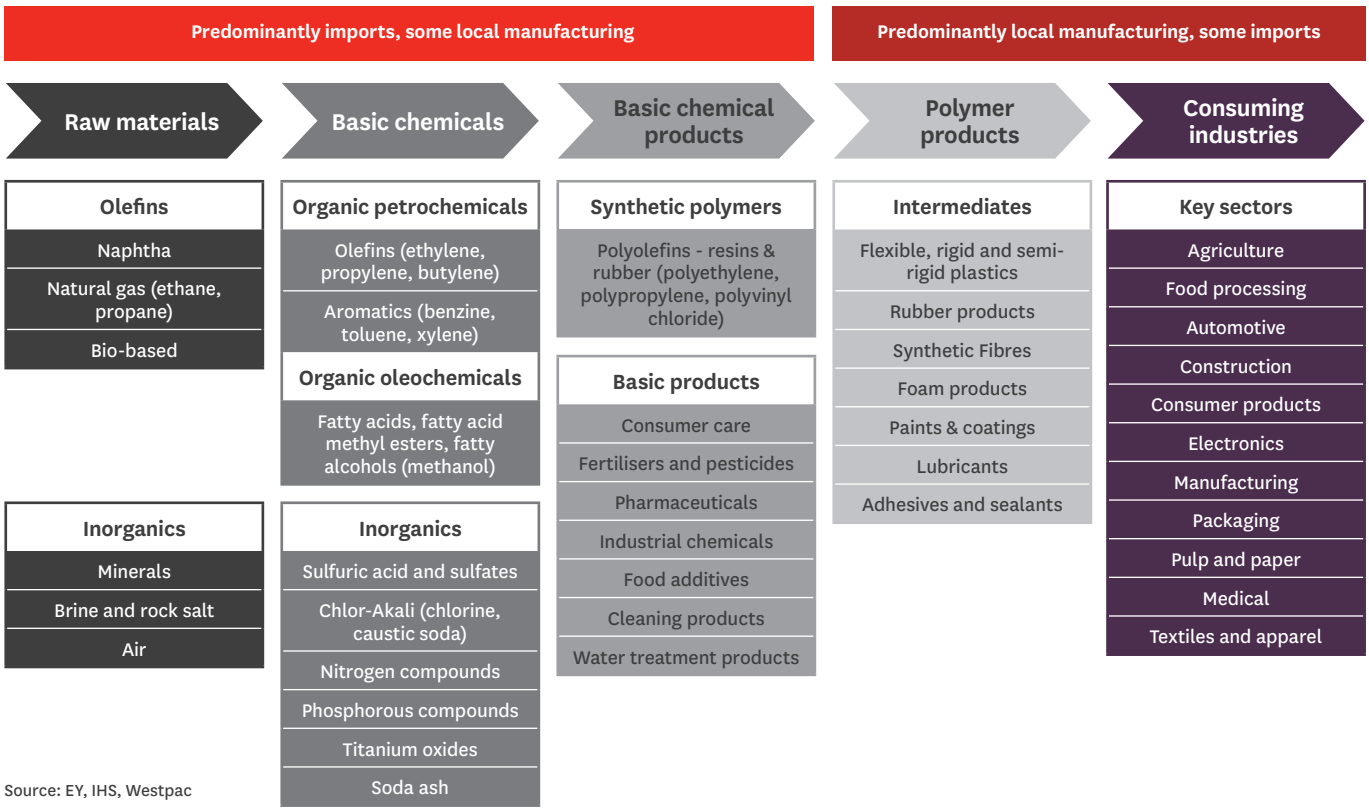
- Unsupported polymer film or sheets and packaging materials that are made from synthetic polymers. Products range from plastic bags of various thickness to bubble-wrap packaging, plastic film, and garbage bags.

- Rigid or semi-rigid polymer products which are also made from synthetic polymers. They include a diverse range of products, from plastic containers, bottles, and watering cans to bathtubs and toilet fixtures. They also include plastics and rubbers used in vehicle production, equipment and appliance manufacture, general household products, etc.
- Foam products, tyres made from rubber, glues, adhesives and other bonding materials, paints, solvents and coatings, including inks, stains, and varnishes, and polymer composites such as fibreglass, resilient floor coverings, garbage bins, garden hoses, gloves, etc.

Note: The term "**polymer products**" primarily refers to "**plastics**" and is used interchangeably throughout this report.

A more detailed overview of the chemical and polymer products sector value chain is shown in Figure 1 below. However, it excludes the refining of petroleum from crude oil.

Figure 1: Chemical and polymer products value chain



Source: EY, IHS, Westpac

Size of the sector.

The petroleum, chemical and polymer products sector is large by New Zealand standards. At an individual level it is dominated by petroleum refining. Manufacturing sales of basic chemical products and polymer products follow far behind but are still significant.

Manufacturing sales.

New Zealand's petroleum, chemical and polymer products sector is large. We estimate that the sector generated revenues of just under $20bn in 2019, accounting for about 18% of total manufacturing sales in New Zealand.

Table 1: Manufacturing sales – Petroleum, chemicals and polymer products

Sector	Sub-sector	Manufacturing sales ($bn)
Petroleum refining and coal products	Petroleum refining	9.6
	Coal products	0.3
Basic chemicals and chemical products	Basic chemicals (organic/inorganic)	1.5
	Basic chemical products	3.8
Polymer (plastic) products and rubber products	Plastic products	2.6
	Paints (and associated products)	0.6
	Rubber products	0.3
	Miscellaneous products	1.0
Total ($bn)		**19.7**

Source: Stats NZ, Westpac

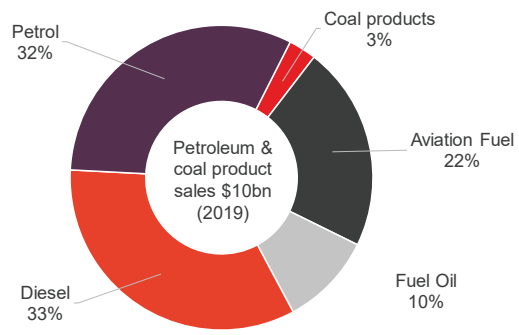
Petroleum refining and coal products.

Sales of manufactured petroleum and coal products amounted to just under $10bn in 2019.

Of this, we estimate about $9.6bn was generated from the sale of component products refined from crude oil imports, mostly petrol, diesel, aviation and fuel oil. Refining activities take place at the Marsden Point refinery in Northland, which is configured to process high sulphur content crude oil imported mainly from the Middle East, with significant quantities also coming from Russia and Asia. Estimates from Stats NZ suggest that $4.5bn of crude oil was imported in New Zealand for refining purposes.

This sub-sector is also likely to have made $0.3bn from the sale of manufactured coal products, specifically bitumen, lubricants, solvents, waxes, petroleum coke, white spirit and other liquid fuels. Of this, we estimate that $0.2bn came from bitumen sales. An industry source suggested that about 160k tonnes of bitumen is consumed annually in New Zealand, about a third of which is imported directly from countries in South East Asia.

Figure 2: Manufacturing sales – petroleum and coal products



Source: Stats NZ, MBIE, Westpac

Basic chemicals and basic chemical products.

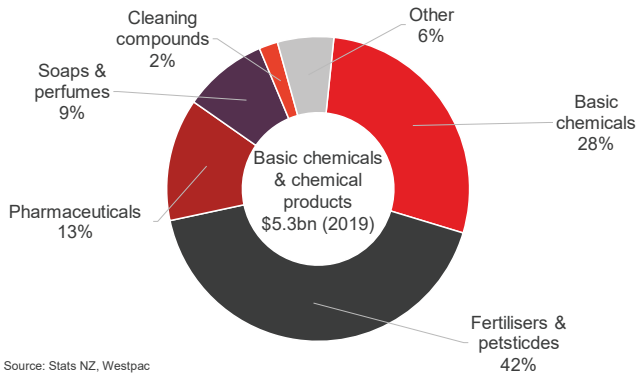
Sales of basic chemicals and chemical products amounted to $5.3bn in 2019.

We estimate that revenues generated from basic chemicals was in the region of $1.5bn. Most of this was likely to have come from methanol which is produced from oil and natural gas extracted in Taranaki and exported to Asia. Methanol is widely used to produce textiles, paints, building products and plastics. It is also used as a fuel additive and as a replacement fuel for coal in boilers. Basic chemicals also include ethanol, which in New Zealand is mostly produced from casein, a dairy protein, and ammonia, which is used to produce urea fertiliser.

Other than these, New Zealand manufactures very little in the way of basic chemicals and relies heavily on imports, mostly from China, but also from countries in South and South East Asia. In large part this reflects the small size of the market in New Zealand. Internationally, basic chemicals are produced in huge volumes and compete almost entirely on price. Massive economies of scale in production mean they tend to be cheap.

We estimate that revenues generated from the sale of basic chemical products was in the region of $3.8bn. Of this, about $2.2bn came from fertilisers and pesticides manufactured locally. Most raw materials used to produce these basic chemical products are sourced from overseas, not just Asia. We estimate that a further $1.6bn was generated from the sales of other basic chemical products with manufactured pharmaceuticals accounting for about $0.7bn of this, soaps and perfumes an additional $0.5bn, and cleaning compounds, about $0.1bn. Local manufacturers face some competition from imports, although this is not the case for patented medicines and perfumes that might trade off their global brand names.

Figure 3: Manufacturing sales – basic chemicals and chemical products



Source: Stats NZ, Westpac

Polymer product and rubber products.

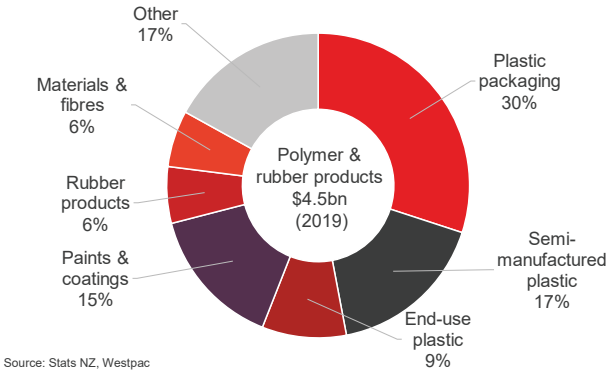
A further $4.5bn was generated from the manufacture of plastic, rubber and other products made from imported polymers.

Of this, we estimate that plastic products accounted for about $2.5bn, with packaging making up roughly $1.4bn. A further $0.8bn was generated from sales of semi-manufactured plastic goods, to be further processed and/or incorporated into other goods, while another $0.4bn was made from locally produced end-use plastics.

Sales from paints and coatings, a polymer product, made locally were also sizeable, amounting to $0.7bn in 2019, while sales of rubber products are estimated to have been in the region of $0.3bn. Sales of manufactured materials and fibres used in clothing, amongst others, added another $0.3bn.

Firms in this sub-sector also produced a range of other products, from sporting goods and games/toys to special purpose equipment. Collectively these added up to about $0.8bn in 2019.

Figure 4: Manufacturing sales – polymer and rubber products



Source: Stats NZ, Westpac

External trade.

New Zealand imports large quantities of crude oil and refined petroleum fuels. It also imports most of the basic chemicals it needs and virtually all the polymers that it requires to produce polymer and rubber products. It also imports many other basic chemical products which compete head on with locally manufactured products.

Exports, by comparison are relatively small. New Zealand, does, however, export a significant amount of basic chemicals, mostly methanol and ethanol produced from casein, a dairy protein.

Petroleum refining and coal products.

The Marsden Point refinery is not large enough to meet the needs of the whole New Zealand market, so firms operating in this sub-sector also import refined product directly. Imports of petroleum and coal products amounted to about $2.7bn in 2019. Of this, imported diesel accounted for about $1.4bn, while petrol imports made up another $1.3bn. Most of this was sourced from refineries out of Singapore. Small quantities of other products were also imported into New Zealand, including kerosene, some residual fuel oil, lubricants, and coal products such coke.

Note: This excludes the $4.5bn of crude oil and $2.6bn in waste oils imported into New Zealand for the purposes of refining.

Basic chemicals and basic chemical products.

Imports of basic chemicals and basic chemical products amounted to about $6.4bn in 2019. Apart from the production of methanol and ethanol and some specialised polymer resins, virtually all basic chemicals and basic chemical products are imported. In large part this reflects the sheer size of some of the chemical manufacturing plants in other countries which can take advantage of economies of scale, lower labour costs and in some cases, less stringent enforcement of environmental protections.

Imports of basic chemicals amounted to $1.2bn in 2019, while imports of basic chemical products were in the region of $4.5bn. Of this, pharmaceuticals, mostly from the US, Australia, Germany and Ireland, accounted for about $1.4bn, fertilisers added another $0.8bn, cosmetics and toiletries, mostly from the US, China, France and Thailand, a further $0.7bn while imported soaps added $0.4bn.

In addition to these end-use products, New Zealand also imported about $0.8bn worth of polymers in 2019, mainly from Asia and North America. Of these, polyethylene imports accounted for about $0.3bn while polyacetals, and other polyesters added another $0.1bn. According to an industry source, New Zealand imports about 300 000 tonnes of virgin polymer resin each year, about 60% of which is used to manufacture packaging.

Polymers are imported into New Zealand in bulk where they are then used to produce value added polymer and rubber products. The vast majority are imported by specialist importers/distributors or directly by downstream manufacturers. Again, this reflects the small size of the downstream market and the fact that there are no strategic advantages for manufacturing these products in New Zealand.

Exports of basic chemicals and basic chemical products are also significant, amounting to about $2.2bn in 2019, with starches, glues and enzymes, mostly derived from casein, a dairy protein and albumins derived from eggs and milk, accounting for just under half of this. New Zealand also exports just over $0.4m worth of pharmaceuticals, about half of which are human, animal blood and immunological products modified or obtained through chemical processes, as well as medicaments, which consists of products for therapeutic or prophylactic use.

Polymer product and rubber products.

Imports of polymer and rubber products amounted to $2.2bn in 2019. About $1.5bn of this was for plastics, while rubber products accounted for the remainder. Plastic plates, sheets, film, foil and strip collectively contributed $0.5bn, while plastic packaging added another $0.4bn. Imports of plastic tubes, pipes, hoses and fittings added another $0.1bn. China is the major source of competitive plastic imports for downstream manufacturers in New Zealand. Manufacturers in China benefit from lower labour and overhead costs and pass these cost savings onto their customers through lower prices.

Imports of rubber products were dominated by vehicle tyres which accounted for about $0.4bn, while articles of vulcanised rubber added another $0.1bn. While many rubber products are imported, they are typically of low value.

Exports of plastic products are sizeable, amounting to about $0.5bn in 2019, with tableware, kitchenware, plastic packaging and storage and other miscellaneous items being the main contributors to this total. Exports of rubber products are tiny in comparison, amounting to about $50m in 2019. Exports have risen in past years because of the improved competitiveness of local production, which has been underpinned in no small part by the performance of the New Zealand dollar.

Shape of the sector.

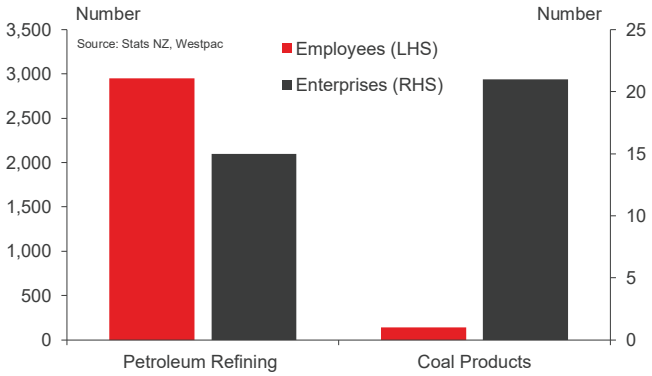
Most firms operating in the petroleum, chemicals and polymer product sectors are small. They include the local subsidiaries of some of the world's largest conglomerates, which mostly import and distribute branded products that have been manufactured in other countries. About 20% of the enterprises operating in this sector are majority foreign owned.

However, the sector also hosts some large firms. Some are foreign owned and tend to focus on export markets. Others are locally owned and dominate production in specific market segments.

Petroleum refining and coal products.

According to Stats NZ, 36 enterprises are involved in petroleum refining and coal product manufacturing in New Zealand and these employ about 3,100 people. Activity is dominated by three major oil companies, Z Energy, BP and Mobil Oil, who collectively account for more than 80% of the fuel retailed in New Zealand.

Figure 5: Firms and employment – Petroleum refining & coal product manufacturing



The largest of these is Z Energy, a New Zealand based firm formed from the assets of Shell NZ purchased by Infratil and the NZ Superannuation Fund in 2010. In 2016, Z Energy also acquired Chevron New Zealand, which included Caltex branded retail sites and products. The firm focuses primarily on the distribution and retailing of refined fuel products in New Zealand through a network of retail sites that they own and operate, dealer owned retail sites that carry the Z Energy and Caltex brands, and/or independent distributors, which in turn supply their own dealers and/or retail sites.

Mobil Oil and BP New Zealand are subsidiaries of some of the world's largest multinational conglomerates with interests in crude oil exploration, extraction, refining, petrochemicals and fuel retailing. Much like Z Energy they focus on the distribution and retailing of refined fuel products in New Zealand. However, unlike Z Energy, Mobil and BP internationally have major chemical interests.

In addition, there are several smaller operators that have purchasing arrangements with these large firms. These include Challenge and GAS, as well as petroleum companies like Allied Petroleum, Waitomo and Nelson. Gull, which is owned by Caltex Australia, operates independently and competes head-on with larger firms in the New Zealand market.

Petroleum retailers control the supply of fuel to more than 1,300 retail sites under 20 different retail brands.

Most of the fuel retailed in New Zealand is refined by Refining NZ at its refinery in Whangarei. The refinery processes about 43m barrels of crude oil a year, although it has the capacity to produce a little more. It imports crude oil from the Middle and Far East, producing petrol, automotive and marine diesel, aviation kerosene, and other fuel oils for the New Zealand market. It supplies up to 70% of the national demand for fuel annually — the rest must be imported directly in refined form.

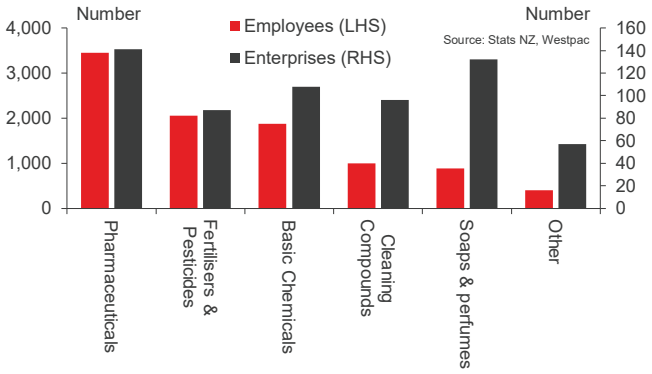
Refining NZ is owned by corporate and private investors as well as the three major oil companies. These firms are not just its main shareholders, they are its only supplier of crude oil and customer of refined product. Supply and take-off volumes for each firm are a function of average market share over the past three years.

Basic chemicals and basic chemical products.

According to Stats NZ, 621 enterprises were involved in the supply of basic chemicals and basic chemical products in 2019, employing 9,700 people. Many of these enterprises are likely to be importers/distributors that service downstream manufacturers. Local manufacturing of basic chemical products tends to be limited to a few firms, some of which are large businesses.

Importers and distributors simplify the supply chain for their customers. They perform a range of value-added services, from the repackaging of basic chemicals into manageable quantities, to the mixing, blending and heating of raw ingredients used to manufacture of a range of basic chemical, plastics and rubber products. They also provide logistics and inventory management services as well as high-touch advice and application support to end customers that often have limited R&D capability and are asset-light. These services are particularly important for smaller end customers.

Figure 6: Firms & employment – Basic chemicals and chemical products



As mentioned above, not all basic chemicals and basic chemical products are imported. Allnex Construction Products, for example, a subsidiary of Allnex, a private equity backed Belgian company, produces a range of polymers and downstream polymer-based products at its Auckland based plant. In addition, it also acts a distributor for BASF products that target the construction sector.

Add to this list the likes of Canadian company Methanex, the world's largest producer of Methanol, and New Zealand's only methanol manufacturer. The firm plays an important role by providing oil and gas producers with a local market for their indigenous gas, and as such contributes to the overall investment attractiveness of the New Zealand market. The firm sells approximately 95% of its methanol production to countries in the Asia Pacific region.

Most firms that manufacture pharmaceuticals in New Zealand are local, the largest being Douglas Pharmaceuticals, New Zealand Pharmaceuticals and Biomed. These companies process basic chemicals and basic chemical products to produce generic medicines not under patent. Although they operate in the same market, they don't really compete head-on with the big pharmaceutical firms which import/ distribute their branded patented drugs through local representative offices.

Other New Zealand firms that produce basic chemical products include Ravensdown and Ballance Agri-Nutriments. These firms source materials from across the globe which they then mix and blend to produce fertiliser for local consumption. Collectively, these firms account for about 98% of all fertilisers sold in New Zealand.

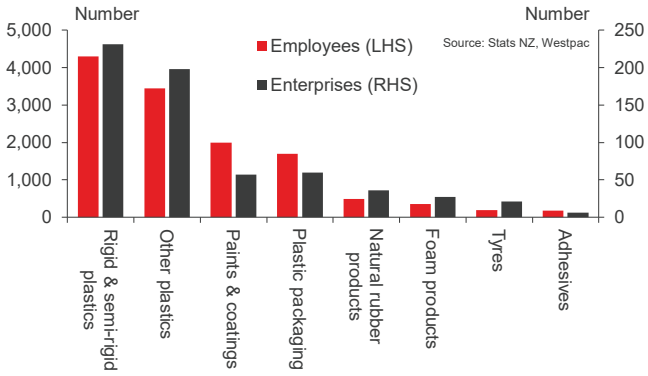
Major cosmetic, personal care and toiletry manufacturers operating in New Zealand include Alaron, a leading private label customer contract producer, Jaychem, Lanocreme, Pauling industries, and Robin Pharmaceuticals. Much like their pharmaceutical counterparts, they compete at the margin with the big international healthcare product firms who distribute branded products through local representative offices.

There are some local firms that manufacture basic chemical polymer products in New Zealand. These include Astron Sustainability Plastics, Rovago, and Comspec (Compounding Specialists), which recycle old plastic materials into new products. Although small-scale, about 80% of all polymers produced in New Zealand are made from recycled rather than virgin material.

Polymer and rubber products.

According to Stats NZ, 636 enterprises were involved in the supply of polymer and rubber products in 2019, employing almost 12,700 people. Many of these are small local manufacturing concerns. although there are some large firms operating in specialised areas such as painting and coatings and plastic packaging.

Figure 7: Firms & employment – Polymer (plastic and rubber) products



Most firms operating in this sub-sector produce rigid and semi-rigid plastic products, are small to medium sized enterprises that focus on narrow product and geographical markets. They include Hangar Holdings, which manufactures plastic products such as food containers, bottles and storage boxes; Asmuss Water systems, which produces plastic systems for the water treatment industry; Custom-Pak Plastic Products, which designs, manufactures and distributes a wide range of plumbing products; Elastomer Products, a polymer and rubber extrusion company; and Marley New Zealand, a manufacturer of extruded and injection moulded PVC and PET products for the New Zealand building and construction. Skellerup, a provider of technical polymer products with vast experience in plastics and rubber manufacturing is also a notable player.

Value chain model.

The value chain describes the range of activities that are required to bring a product from conception, through the intermediary phases of production, to delivery to downstream manufacturers and end-customers.

Petroleum refining and coal products.

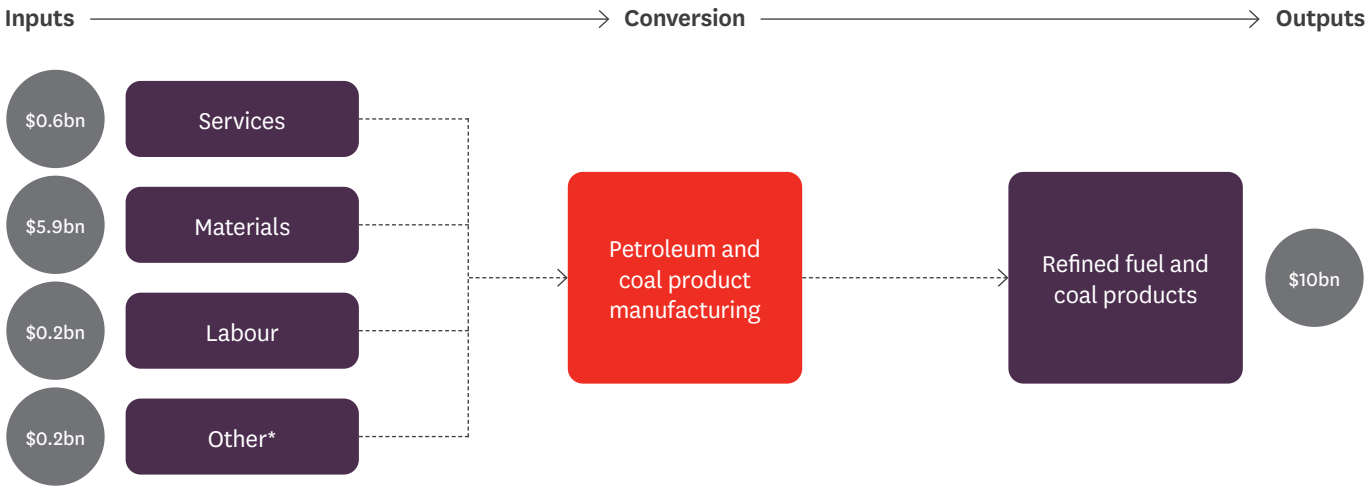
Figure 8 summarises the value of inputs and outputs produced by firms that transform crude petroleum and coal into useable products. As mentioned above, the dominant process is petroleum refining, which involves separating crude petroleum into distinct products. The industry also includes firms that make products such as petroleum lubricating oil and asphalt or bitumen coatings. Because they are expressed in basic price terms, values stated exclude taxes payable, any subsides received and costs relating to transportation.

Materials accounted for most of the costs incurred by firms involved in petroleum refining and the manufacture of coal products. The largest individual cost item was crude oil, amounting to about $4.5bn in 2019. The rest was made up of refined petrol and other petroleum products. Firms also spent about $17m on ready-mix concrete and concrete products.

Firms involved in petroleum refining and the manufacture of coal products spent considerably less on services. According to Stats NZ, they spent about $0.2bn on services incidental to manufacturing, a further $0.1bn on transport services, mostly road freight, about half of that again on utilities, i.e. electricity, water and gas, and even smaller amounts on professional services, notably marketing, advertising, and IT related services.

Labour costs are relatively low, mainly because only about 3,100 people are employed in the sector. As a rule, petrol refining and coal product manufacturing activities tend to be more capital-intensive than those associated with basic chemicals, polymer and rubber products. Indeed, firms operating in this sub-sector have a long history of periodic investment in capital renewal and upgrading projects which inject substantial funds into regional economies, notably Taranaki.

Figure 8: Simplified value chain mapping of petroleum & coal product manufacturing



Note: Inputs and outputs are shown in basic prices for the year ended June 2019. Values are based on basic price data taken from Stats NZ 2013 Input-Output tables, which have subsequently been adjusted for inflation. The basic price of an input or output is the monetary amount received by a supplier plus any subsidies received less any taxes payable. It excludes transport charges invoiced separately by a supplier. * "Other" refers to the depreciation of fixed assets.

Source: Stats NZ, Westpac

Basic chemical and basic chemical products.

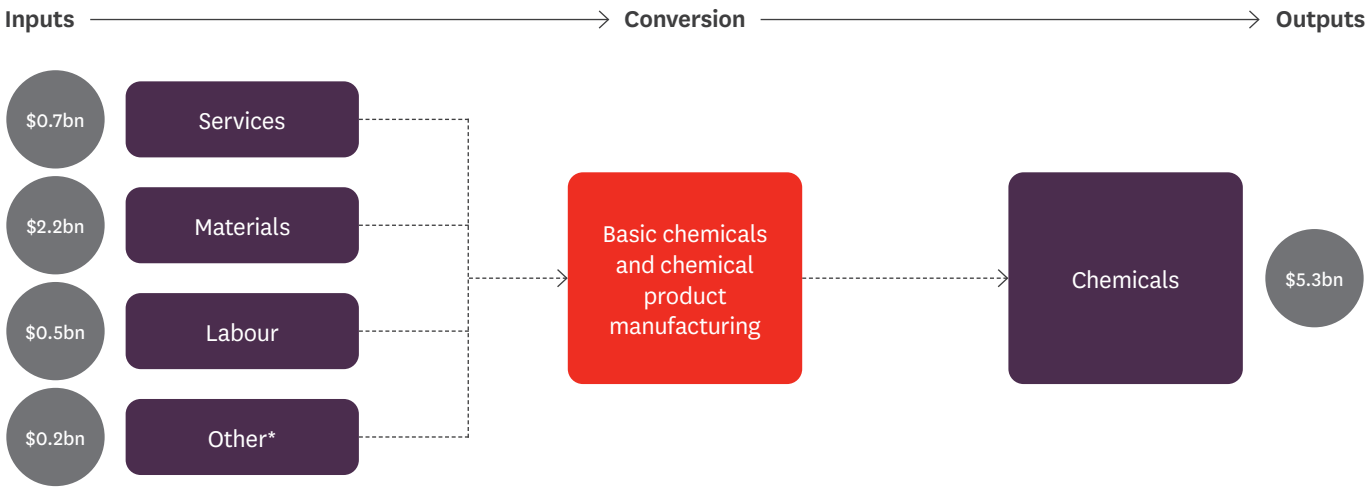
Figure 9 summarises the value of inputs and outputs produced by firms that import/distribute or manufacture basic chemicals and basic chemical products including polymers, fertilisers, pharmaceuticals, cleaning compounds, cosmetic and toiletry preparations. Because they are expressed in basic price terms, values stated exclude taxes payable, any subsides received and costs relating to transportation.

Firms involved in these activities spent heavily on materials in 2019. This includes $0.7bn on fertilisers and pesticides and another $0.5bn on other basic chemicals. A further $0.4bn was spent on natural gas. About 51% of the gas produced in New Zealand (of the coast of Taranaki) is used as a feedstock or process gas for producing methanol as well as urea which is used in fertilisers. Mined and/or quarried materials accounted for a further $0.1bn, while a similar amount was spent on a range of plastic products.

Firms operating in this sub-sector spent about $0.7bn on services. The biggest chunk of this was on utilities, which accounted for about $0.3bn of the total. Most of this was for gas and electricity services. They also spent about $0.1bn on transport, mostly on road freight services while a similar level of expenditure was incurred on professional services, mostly advertising, marketing and management consultancy services. An additional $0.2bn was spent on services relating to equipment hire and maintenance, software and intellectual property licensing.

Labour costs are significant in this sub-sector with firms spending about $0.5bn in salaries and wages in 2019. Import/distribution activities, are typically more labour intensive than those in the petroleum refining sub-sector, with firms on average employing about 15 staff each.

Figure 9: Simplified value chain mapping of basic chemicals & chemical product manufacturing



Note: Inputs and outputs are shown in basic prices for the year ended June 2019. Values are based on basic price data taken from Stats NZ 2013 Input-Output tables, which have subsequently been adjusted for inflation. The basic price of an input or output is the monetary amount received by a supplier plus any subsidies received less any taxes payable. It excludes transport charges invoiced separately by a supplier. * "Other" refers to the depreciation of fixed assets.

Source: Stats NZ, Westpac

Polymer product and rubber product manufacturing.

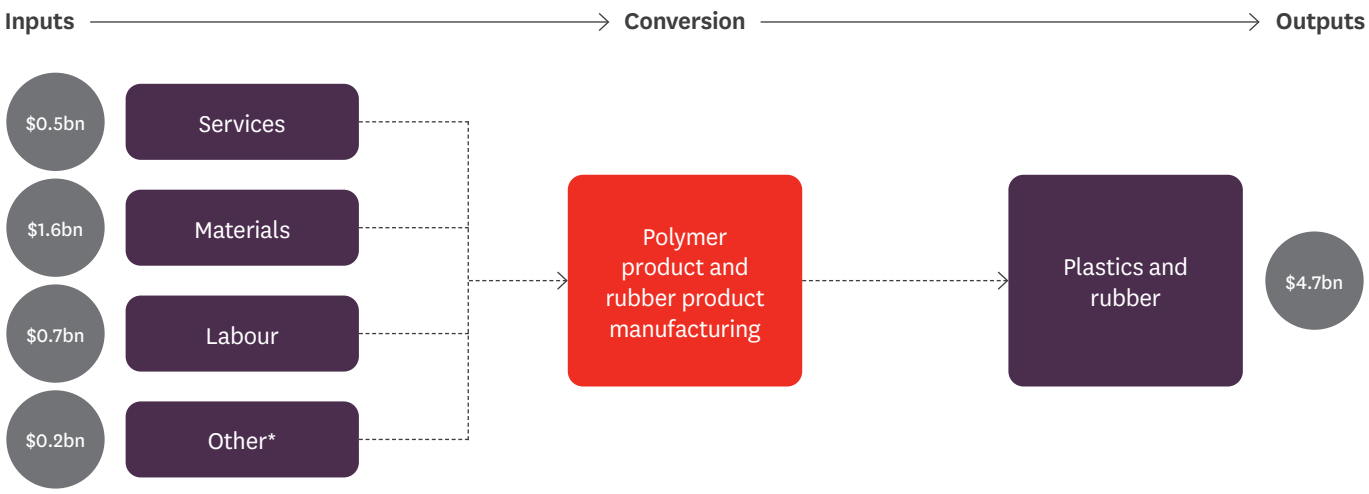
Figure 10 summarises the value of inputs and outputs produced by firms that manufacture polymer products, mostly plastics, but also paints and adhesives, foam and rubber products. In turn, these products are either used as components in downstream manufacturing industries or as end-products. Because they are expressed in basic price terms, values stated exclude taxes payable, any subsides received and costs relating to transportation.

Firms that manufacture polymer and rubber products spent about $1.4bn on materials. Of this about $1.1bn was spent on a range of basic chemicals, mostly polymers, as well as semi-manufactured plastic products destined for further processing. According to Stats NZ, about $0.8bn was spent on polymers alone.

Firms operating in this sub-sector spent about $0.5bn on services. About $0.2bn of this was on transport and freight related services, with road-based services accounting for most of this. Spending on professional services was the second largest expenditure item, with just over $0.1bn being spent on advertising and marketing services. Polymer and rubber product manufacturers also spent significant amounts on equipment hire and commercial property leasing, computer software and intellectual property incensing.

Labour costs are significant, amounting to about $0.7bn in 2019. This is not surprising considering that the industry employs almost 12,700 people. Although slightly larger than their upstream chemical producing counterparts, most firms operating in this sub-sector are small-to-medium sized operators that run small batches to address customer requirements. On average they hire about 20 staff each.

Figure 10: Simplified value chain mapping of polymer product and rubber product manufacturing



Note: Inputs and outputs are shown in basic prices for the year ended June 2019. Values are based on basic price data taken from Stats NZ 2013 Input-Output tables, which have subsequently been adjusted for inflation. The basic price of an input or output is the monetary amount received by a supplier plus any subsidies received less any taxes payable. It excludes transport charges invoiced separately by a supplier. * "Other" refers to the depreciation of fixed assets.

Source: Stats NZ, Westpac

Legislative and regulatory environment.

Like most sectors, regulatory stringency has tended to increase over time, particularly with regards to health and safety. That said, this industry is not subject to particularly onerous sector specific legislation. Firms are however, subject to non-specific legislation and regulations that cover anything from the handling of hazardous substances to broader environmental considerations and quality standards.

Hazardous Activities and Industries List (HAIL).

The Hazardous Activities and Industries List (HAIL) refers to activities and industries that are likely to cause land contamination through hazardous substance use, storage or disposal. Activities such as the manufacture, bulk storage and application of chemicals are on the list.

Regional councils are required under the Resource Management Act (RMA) to keep a record of hazardous activities that could result in the contamination of land. Although there are question marks about its accuracy, the HAIL is used extensively by regional councils to track the history of land that is vulnerable to contamination so that they can effectively manage potential risks to the environment and to people's health.

For firms, the HAIL is likely to encourage operational practices that improve safe handling of hazardous substances.

Hazardous Substances and New Organisms Act 1996.

The purpose of the Hazardous Substances and New Organisms Act (HSNO) is 'to protect the environment, health and safety of people and communities by preventing or managing the adverse effects of hazardous substances and new organisms.'

All hazardous substances, which covers basic chemicals, basic chemical products, polymer and rubber products, manufactured locally or imported for use in New Zealand, must be approved under the HSNO. When a hazardous substance is approved, controls are put in place for their use so that risks can be properly managed.

The HSNO also establishes the Environmental Protection Authority (EPA), which is tasked with assessing and deciding on applications to introduce hazardous substances or new organisms into New Zealand. The EPA is also responsible for the oversight of enforcement and for ensuring the provisions of the HSNO are enforced in all premises where hazardous substances are used.

The EPA is proposing to internationally align New Zealand's hazardous substance classification system by adopting the Globally Harmonized System of Classification and Labelling (GHS). The current HSNO classification framework, implemented in 2001, was based on a pre-published version of the GHS.

If adopted, the EPA expects that a harmonisation of labels and safety data sheets could lead to a reduction in operating costs for firms, greater product choice for consumers, and the earlier introduction of new and potentially safer products. It is also expected to facilitate trade, improve the efficiency of chemicals management and enhance the effectiveness of HSNO.

However, the move to GHS is likely to come at a cost as this will require changes to in-house systems used by firms, the training, and education and workers, and reclassification of chemicals. If adopted, the change to GHS is likely to become law in April 2021 with a transitional period ending in December 2023.

Health and Safety at Work Act - Hazardous Substances Regulations 2018.

The rules around managing hazardous substances that affect human health and safety in the workplace were originally included within the HSNO but were transferred to the Hazardous Substances Regulations under the Health and Safety at Work Act (HSWA) on 1 December 2017.

The purpose of these regulations is to reduce harm from work-related activities involving hazardous substances, such as diesel, pesticides, fertilisers and cleaning solutions. About 150, 000 New Zealand businesses make, handle, use or store hazardous substances.

The regulations require that firms that store, handle and dispose of hazardous substances know what they are, the risks they pose, and put in place measures and controls to mitigate them. This includes making sure that workers are properly trained, emergency plans are put in place and storage facilities are fit for purpose. It also requires that hazardous substances are correctly labelled, that appropriate signage is in place and that protective equipment is used where applicable. Engineering control measures, which sometimes imply changes to production processes, are also important as are administrative controls which reduce the amount of time workers are exposed to hazardous substances.

The cost of complying with these regulations can be substantial and for many firms prohibitive. Indeed, given the relatively small size of the New Zealand market, some large multinational firms have opted to cease their dangerous goods operations in New Zealand and have moved to importing these products from abroad. An industry source cited paint manufacturer Dulux as an example of this. Dow Chemicals is another.

However, according to an industry source, a lack of effective enforcement has meant that there are firms in New Zealand that have yet to fully comply with these regulations. This has put those that have complied, often at substantial cost, at a competitive disadvantage, especially when competing for business on price.

Medicines Act 1981.

The Medicines Act 1981 regulates medicines, related products and medical devices in New Zealand and ensures that medicines, including patented and generic pharmaceuticals (a basic chemical product) and medical products used in New Zealand are safe and effective. Approval is overseen by the Medicines and Medical Devices Safety Authority (Medsafe).

It' important to note that firms can still manufacture, import and distribute pharmaceuticals In New Zealand that have not been approved under the Act. They can also be dispensed by medical professionals.

What also affects purchasing decisions is not just the availability of pharmaceuticals but also their cost, especially those that are still under patent. New Zealand's Pharmaceutical Management Agency (PHARMAC), uses its bulk buying power to reduce the cost of many pharmaceuticals, including those that are lifesaving, but are prohibitively expensive. While there is ongoing debate as to which pharmaceuticals to fund, PHARMAC's activities have directly contributed to an increase in imports as well as the local manufacture of pharmaceuticals.

Agricultural Compounds and Veterinary Medicines (ACVM) Act 1997.

The Agricultural Compounds and Veterinary Medicines Act protects confidential information given in support of an application for the registration of an innovative trade name product for eight years. An "innovative" trade name product is one that contains an active ingredient which has not previously been registered ("non-innovative" products contain a registered active ingredient).

The sale, manufacture, importation or use of agricultural compounds in New Zealand is prohibited unless the compound is either a registered trade name product subject to conditions or exempt under the ACVM Regulations. Non-compliance risks significant fines. The ACVM Act takes a risk-based approach to regulating agricultural compounds and veterinary medicines and recognises that these compounds should be regulated at a level commensurate with the risk they present.

The intellectual property protections afforded under this Act underpins access to the newest advances in agricultural chemicals, which support the competitiveness of consuming industries, specifically agriculture. Not only does this improve productivity, but also supports efforts to improve environmental sustainability and food safety.

The ACVM Act overlaps with both the HSNO and HSWA Acts because many compounds used in agriculture are also hazardous substances. However, the two address separate outcomes. The HSNO/HSWA Acts deal with the health and safety of people and the environment, whereas the Agricultural Compounds legislation is directed towards managing risks associated with the trade in primary produce, animal welfare, and agricultural security, and making sure that the use of agricultural compounds complies with residue limits in New Zealand food standards

Waste Minimisation (Plastic Shopping Bags) Regulation 2018.

The Waste Minimisation (Plastic Shopping Bags) Regulation 2018 was approved in December 2018 and took effect on 1 July 2019. From this date onwards retailers were not allowed to sell or distribute single-use plastic shopping bags to customers for the purpose of carrying or distributing goods sold.

Plastic bag manufacturers (and retailers) were given a six-month period to run down existing stocks and transition away from plastic bags.

The impact on the industry is likely to have been limited. Data from Stats NZ shows only a small drop in the number of firms producing flexible packaging materials between 2018 and 2019. Not only that, but the number of people employed by these firms increased over this period. It seems that although some might have closed their doors as a result of these regulations, most firms have been able to adjust to the new operating realities and have shifted their focus on other areas of packaging which lie outside of the ban, such as producing plastic bags with a thickness exceeding 70 microns.

That said, it's likely that the ban on thin plastic bags is only the start of things to come. Indeed, there have already been calls to reduce other forms of plastic packaging, which are typically used to protect and/or preserve products. Soft plastics used in such products can be recycled but tend not to be because of food/liquid contamination.

Climate change.

The production of methanol, ethanol, urea and the refining of crude oil are energy intensive activities that generate significant carbon emissions. Most firms involved in these activities are part of New Zealand's Emissions Trading System (ETS) but not all receive free allocations. In large part this is because the cost of carbon credits is incorporated into the retail price of refined fuels and is thus picked up by end consumers.

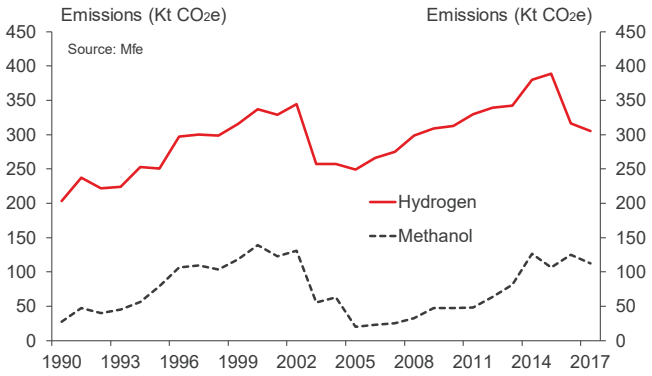
CO_2 emissions.

The chemicals sector is a significant contributor to CO_2 emissions in New Zealand, most of which are generated when producing basic chemicals like methanol and urea. The refining of crude oil into petroleum products also feature high energy intensive activities, which is likely to explain why Refinery NZ (co-owned by the three major oil firms) is one the New Zealand's largest industrial emitters alongside Methanex.

That said, these firms have made progress on reducing emissions. Between 1994 and 2018 Methanex cut its emission by 36% by replacing its older manufacturing plants with upgraded ones incorporating higher-performance catalysts. The emissions footprint of Methanex's New Zealand production plants is generally smaller than that of similar sized plants abroad, primarily because they use gas rather than coal to produce methanol.

Methanex also has a long-standing relationship with the Energy Efficiency and Conservation Authority (EECA) to identify, implement, and promote energy efficiency and renewable energy opportunities. To this end, it continues to invest in new technologies to improve the operational efficiencies of both its production plants in Taranaki and its shipping fleet, which transports methanol to export markets.

Figure 11: Emission profiles: basic chemicals



However, achieving further big emission reductions is likely to prove challenging for Methanex. In large part this is because it would require the electrification of its methanol production process. Currently Methanex consumes just under 50% of natural gas produced in New Zealand, most of which is used for process heat operations.

A switch to electricity, generated mostly from renewable sources, would not only mean substantial capital investment for Methanex, but would also place significant pressure on New Zealand's electricity grid. Industry sources suggest that a fully electrified process would account for whopping 15% of New Zealand's current electricity supply. Given that New Zealand's electricity market is not producing enough renewable electricity at present, this implies a greater reliance on electricity produced using gas and coal (meaning more CO_2 emissions).

It should also be noted that recent changes to the Crown Minerals Act to ban offshore oil and gas exploration in Taranaki are also likely to act as a disincentive to invest, especially in carbon capture technologies that would target CO_2 emissions.

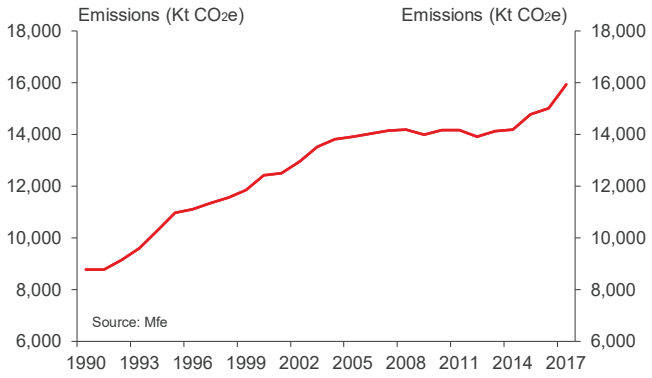
Much like Methanex, Refining NZ has also made some significant gains and has been able to improve energy efficiencies and reduce its CO_2 intensity by about 20% since 2008 through an ongoing program of improvements to the refinery and a series of quick win projects which have not only helped it to recover hydrogen from its refining process, but also shift its reliance towards cleaner natural gas. The firm continues to work with others such as EECA and First Gas to achieve further gains.

Refineries are increasingly adopting carbon capture and storage techniques to reduce CO_2 emission levels.

They are joined by New Zealand's largest fuel retailers, Z Energy (and Caltex), BP and Mobil, who are also large CO_2 emitters via the emissions that are created when consumers use the products they sell. In the case of petrol and diesel, CO_2 emissions are captured at the point of consumption rather than production, and with the transport sector contributing about 20% to New Zealand's total greenhouse gas emissions, these can be substantial.

To reduce emissions, the large oil majors are focused on managing their own operational activities, such as corporate travel, water and electricity use, disposal/recycling of waste, and product distribution (including road travel by hauliers). They are also looking at their procurement practices, with much greater consideration being given to the impact of supplier activities on the natural environment. In cases where substantive gains cannot be achieved, such as in fuel delivery activities, firms like Z Energy are looking to purchase offsetting forestry carbon credits.

Figure 12: Emission profiles: petroleum consumption - transport



But this is low hanging fruit – the real gains to be had relate to reducing CO_2 emissions associated with fuel use. However, progress here has been more difficult – firms like Z Energy have little control over how much fuel is used. Indeed, aggregate fuel use in New Zealand has increased as the population has grown, and the economy has expanded. And although there has been a shift towards more fuel-efficient vehicles, fuel demand at the aggregate continues to rise, as do CO_2 emissions.

That said, firms like BP, Mobil and perhaps Z Energy are not totally without influence. They are still able to leverage off advances in technology to produce lower emission fuels, such as biofuels.

Emission Trading Scheme (ETS).

Most of these upstream firms participate in New Zealand's Emission Trading Scheme (ETS) – a closed system which works off emission credits. In its purest form, emitters are required to pay for their emissions either by surrendering carbon credits or by making direct payments to the Government.

However, not all firms operating within the sector participate. Refinery NZ, for example, is not part of the ETS, despite refining enough crude oil to address about 75% of New Zealand's fossil fuel requirements. Although the company is in talks with the government for inclusion, it was granted an exemption from emission charges in 2003 as part of an agreement under which it would make large-scale investment to reduce the sulphur and benzene content in the fuel that it produces.

By contrast firms like Z Energy, Mobil and BP are participants in the ETS, and as such are required to surrender carbon credits to the Government. Exactly how much depends on the volume of refined fuel they take from the Marsden Point refinery and/or the amount that they import. Private individuals that purchase these fuels at the retail pump are not directly involved, although as consumers, they are affected as they bear the cost of carbon credits surrendered by these major oil firms.

Under current ETS rules, firms classified as being energy intensive and trade exposed (EITE) receive a free allocation of emission credits. Each firm's free allocation is proportional to its production. The free allocation is calculated using *industry benchmarks* for carbon emissions per unit of production. Firms that emit more per unit of production find that their free allocation covers a lower proportion of their actual emissions. These firms must purchase more emission credits from other participants in the ETS at a market determined price which they then surrender to the Government or pay the Government directly $25 per tonne of emissions through a fixed price option. Firms that are a less carbon-intensive find that their free allocation covers a high proportion of their actual emissions and have less need to purchase additional units.

This set-up gives firms an incentive to reduce their carbon footprint by reducing the emissions intensity of their production. However, it gives them no incentive to limit their carbon footprint by reducing production itself.

Across whole industries, the free allocations are equal to 60% or 90% of benchmarked emissions, depending on the emissions intensity of activities that they undertake. High emission intensive producers, such as Methanex, which produces methanol, and Ballance Agri-Nutrient, New Zealand's only producer of urea, receive an allocation that covers 90% of the emissions. By contrast, Z Energy (Caltex), Mobil and BP do not receive free allocations because they are not trade exposed and are able to pass the costs of their ETS obligations onto their customers

The price of carbon credits is determined by the forces of supply and demand. There is no set limit on prices, although the fixed price option referred to above which is charged in lieu of surrendering emission credits does currently act as a cap in the secondary market.

The stated rationale for providing a free allocation to firms such as Methanex and Balance Agri-Nutrients is two-fold.

Firstly, it is difficult as well as expensive for energy intensive firms like Methanex to reduce their emissions given that this would require a shift from gas to renewably generated electricity. It's also likely to place a significant strain on the electricity system. Indeed, like other EITE firms, Methanex, makes it clear that domestic policy settings forcing it to switch to electrification could result in it closing its doors in New Zealand. However, this argument misses the point of an ETS, which is to promote activities that provide the biggest reduction in overall emissions.

Secondly, without free credits, these trade exposed firms would be at a competitive disadvantage relative to imported products produced by firms in other countries that are not subject to the same ETS requirements. This is particularly true for a firm like Ballance Agri-Nutrients, which faces significant competition from imports. Without protection, there is a chance that firms like Ballance Agri-Nutrients could relocate to other countries that do not have similar climate change policies, and this could rise could lead to a rise in emissions worldwide.

The Government has announced a series of reforms to the ETS, including a gradual reduction in the free allocation of emission credits over time. The plan is to begin phasing down industrial allocations at 1% per year from 2021 to 2030, then at 2% from 2031 to 2040, and at 3% per year from 2041 to 2050. This suggests that by 2050, firms such as Methanex and Ballance Agri-Nutrients will be still be receiving 30% of their its credits for free. Indeed, it could be more, but that depends on recommendations made by New Zealand's new Climate Change Commission which was established as part of the Climate Change Response (Zero Carbon) Amendment Act 2019.

EITE firms have lobbied hard to maintain their protected status arguing that if they had to pay fully for their emissions, they would effectively go out of business.

Under the Act, the Climate Change Commission is required to monitor/report on progress towards reducing net greenhouse gas emissions (except methane) to zero by 2050 as well as provide advice to Government on ways to prevent temperature increases, and how to adapt to those that have already occurred.

Summary of competitive forces.

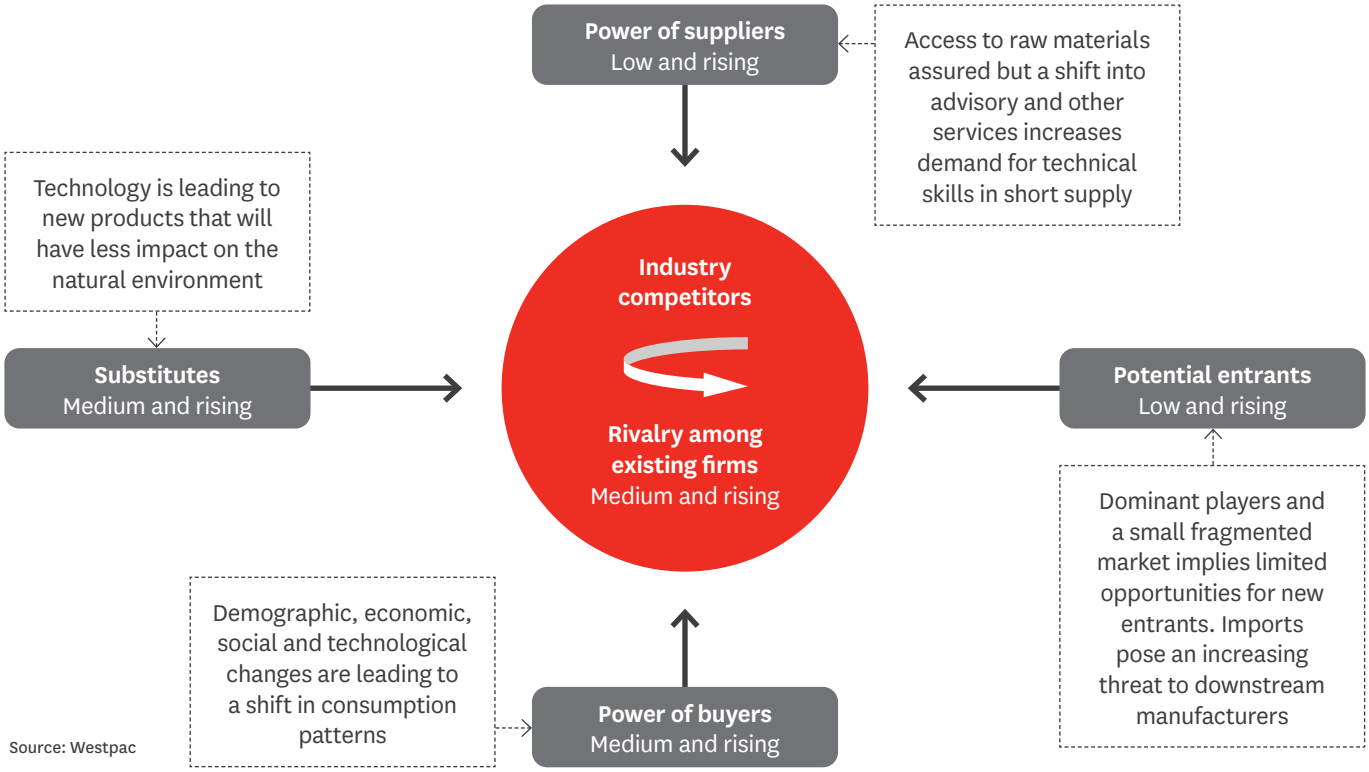
The competitive forces affecting the petroleum, chemicals and polymer products sector are intensifying due to growing environmental awareness among consumers, the transformative effects of new technology, and growth in imports.

This sector has many moving parts. While competition among the major oil firms at a wholesale level is almost non-existent because of the cosy sharing arrangements that are in place, the same cannot be said at the retail level, where firms compete mainly on levels of service provided. For firms that supply basic chemicals, competition is mainly based on supplying the right quantity, of the right quality as per specified timeframes. The same is true for basic chemical products, although in some market segments patents that protect intellectual property rights and branding provide a point of differentiation. Firms that produce polymer and rubber products also compete by supplying the right quantity, of the right quality as per specified timeframes. However, much like firms that supply basic chemicals, firms that produce polymer and rubber products are increasingly competing on their ability to deliver solutions that meet their customer's exacting requirements.

Figure 13 below summarises the magnitude of the competitive forces shaping the petroleum, chemicals and plastics sector in New Zealand and provides a high-level assessment of where they are headed in the future. Specifically, it assesses where a competitive force currently has a "high", "medium" or "low" impact on firms in the sector and whether this impact will be "rising", "stable" or "falling" in the future.'

The figure uses a framework developed by Professor Michael E Porter from Harvard Business School. It includes three forces that relate to "horizontal" competition: the threat of substitutes, which in this case refers to the emergence of new materials that are less harmful to our natural environment; the level of rivalry between firms; and the threat posed by new entrants particularly in segments that produce basic chemical products and plastics. It also includes two other forces that relate to "vertical" competition: namely the relative negotiating position of those that supply inputs, ranging from raw materials and technically skilled labour which is becoming increasingly important; and the bargaining power of customers, increasingly being influenced by demographic, economic and social changes.

Figure 13: Porters 5-forces – petroleum chemicals and plastics



Source: Westpac

Demand drivers.

Many factors drive demand for refined petroleum products, basic chemicals, basic chemical products and downstream polymer and rubber products. Some are of a structural nature, are slow burning and result in transformational change, while others are cyclical, having large, but often short-run impacts on demand.

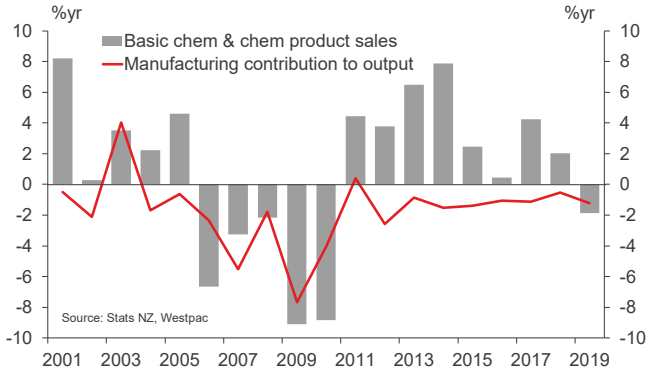
Structural factors.

Prominent structural drivers of demand factors include changes in sectoral contributions to economic output, demographic changes, increasing environmental awareness among consumers, and new technological developments.

Economic structure.

The changing structure of the economy affects the level of demand for petroleum and chemical products and the nature of that demand.

Figure 14: Chemical sales vs manufacturing contributions to output



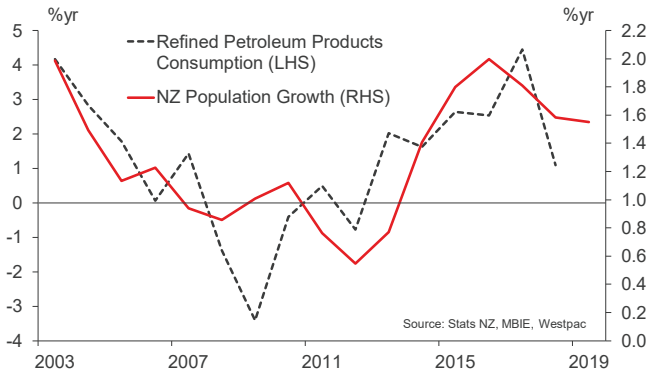
New Zealand has seen its services sector increasingly dominate the economic landscape, primarily at the expense of the manufacturing sector, which has seen its contribution to national output fall. The declining importance of the manufacturing sector in New Zealand over time is likely to have dampened growth in demand for a range of imported and locally produced petroleum, basic chemical, polymer and rubber products.

The opposite is true for fast industrialising countries in South and South East Asia. In these countries, the rapid expansion of manufacturing to service growing domestic and export markets has helped to propel growth in chemicals and chemical product manufacturing. It has also increased demand for imported products, such as methanol, which is produced in large quantities in New Zealand.

Demographics.

Demand for products produced by the petroleum and chemicals sector is also a function of changes in population size.

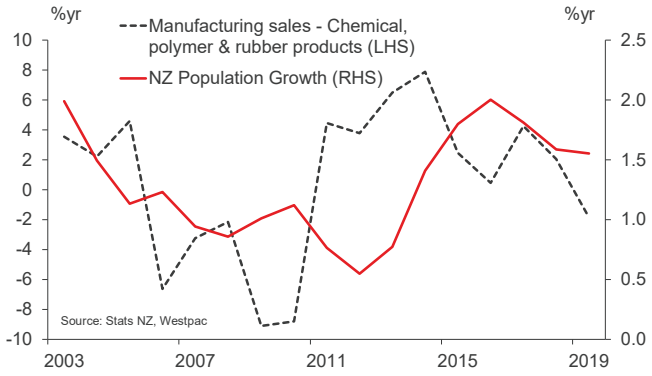
Figure 15: Population change vs petroleum consumption



For example, as New Zealand's population has grown, the need for travel has increased and this has underpinned growth in demand for petroleum products. The key driver here has been road transport, which accounts for about 76% of all petroleum fuels consumed in New Zealand (including both locally produced and imported).

While demographic change provides growth opportunities, it also amplifies risks relating to the manufacture, transport and consumption of chemical products.

Figure 16: Population change vs chemical, plastic and rubber sales



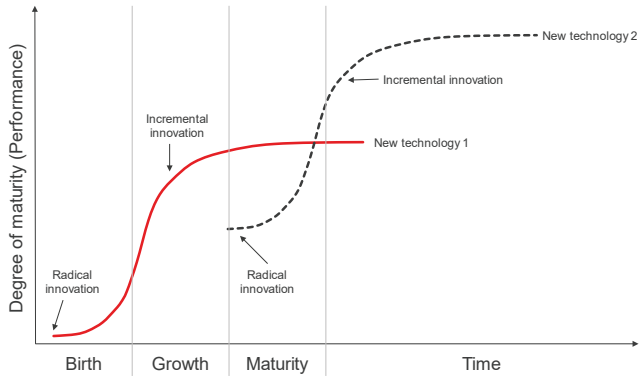
The same is true for basic chemicals, polymers and rubber products. As Figure 16 shows, population growth rates generally follow a similar pattern to manufacturing sales of these products, although not always. The reasons for the significant divergence in the years following the GFC are not immediately clear, although it is noted that exports of basic chemicals and chemical products, mostly methanol, picked up notably over the period.

The impact of demographics is not just about size. Changes in age profile are also having an impact in specific areas. Ageing populations in developed countries, for example, are helping to drive demand for a range of basic chemical products, from pharmaceuticals that promote physical and mental wellbeing, to cosmetics and grooming products that help to address the effects of ageing.

Technology.

Emerging technologies are changing the way we work, live and play. They are also changing the very nature of industries that consume chemical, plastic and rubber products.

Figure 17: Technology pathway



Automation, the Internet of Things (IoT), intelligent connected devices, virtual, augmented and extended realities, artificial intelligence (AI), 3D-printing, data analytics, big data, cloud-enabled ecosystems, blockchain and cybersecurity are all part of the technology explosion that is transforming every aspect of every industry, disrupting value chains as well as the end markets that manufacturers/suppliers of chemical, polymer and rubber products service. This in turn, is leading a shift in consumption patterns.

For example, digital technologies are an obvious factor driving rapid advances in the development of self-driving cars, but the consequences on demand for chemicals, plastics and rubber products that go into them are not so obvious. One unexpected effect on demand for chemicals comes through the enhanced traffic safety that is promised by self-driving cars. With fewer accidents, demand for refinish coatings, for example, is likely to fall sharply, and that will have important consequences for firms that produce coatings and those that provide the ingredients that go into them.

Digital disruptions in automotive, construction, agriculture, and other end-use industries are changing the nature of demand for chemical products.

Another area where technology is having an impact is in the growth of electric and/or hybrid vehicles. The increased viability of these vehicles has been underpinned by big advances in battery and/or hydrogen technologies, supportive government policy initiatives, and deepening concerns about increased CO_2 emissions. As momentum grows, it is likely that demand for conventional transport fuels, such as petrol and diesel, will slow.

The massive migration to online purchasing platforms is also starting to affect demand for chemicals and plastic products. For example, groceries are increasingly being purchased via online platforms, with consumers making their purchase decisions without seeing the physical product and more importantly the packaging it is in. A resulting decline in the importance of packaging as a factor shaping purchasing decisions is likely to affect demand for plastic packaging and the basic chemicals that go into it. With the New Zealand government having already clamped down on the use of single use plastic bags, the portents do not look for those involved in the local packaging industry.

One digital-enabled area that is supporting demand for basic chemicals and basic chemical products is 3-D printing, also referred to as additive manufacturing. Globally, the market for polymers and basic chemicals used in additive manufacturing is growing at about 30% per year. It is possible the market will evolve towards tailored polymers and chemicals for different additive manufacturing systems, which could open up innovation and commercial opportunities for firms that make photopolymers, high-performance thermoplastics, and other chemicals used in these processes.

While technologies like additive manufacturing might create a need for new chemical products, they may also reduce the consumption of traditional chemicals and materials.

Environmental awareness.

Plastics have become so pervasive because they are durable, flexible, inexpensive and lightweight materials that meet the needs of a wide variety of applications. According to the World Bank's 2018 global review of solid waste management, New Zealand is one of the most wasteful nations in the developed world, disposing as much as 0.3kg of plastic waste on a per capita basis each day.

However, an increasing awareness of the impact of human activity on the natural environment worldwide is, at least in part, being reflected in a rapidly growing consumer revolt against plastics and polymer products, especially those that are difficult to recycle. As recently as three years ago, plastic waste was just one of those problems that everyone acknowledged but didn't do much about, whereas now it seems front of mind for many consumers.

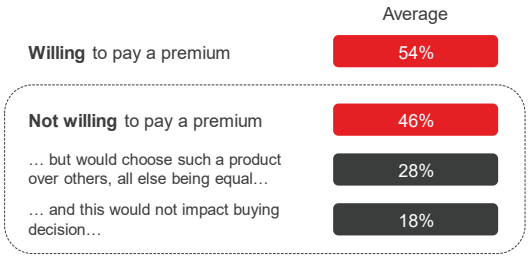
Much of this has been fuelled by ongoing media coverage of plastics polluting the oceans and killing all manner of wildlife. The possibility of micro-plastics entering the food chain is a key narrative. At the same time social media platforms have given a voice to consumers and advocacy groups concerned about environmental issues more generally.

According to the 2018 Colmar Brunton Better Futures plastic is the number one concern for New Zealanders when it comes to sustainability, social and environmental issues.

Not surprisingly, mistrust of firms producing plastics (and other chemicals) has intensified. According to a recent report by Accenture,[1] 72% of consumers expressed little confidence in the information they hear from chemical manufacturers.

Consumers have responded by calling for greater transparency. Buying decisions are no longer just based on price and performance. Indeed, environmental credentials are becoming much more important, with consumers wanting to know a lot more about the products they consume. In addition to health impacts, they want to know how the products (and associated packaging) they consume affect the natural environment over their lifecycle.

Figure 18: Consumer willingness to pay more for sustainable products



Source: Accenture Chemicals Global Consumer Sustainability Survey, 2019

Consumers are also starting to show a greater willingness to pay more for sustainable products and eco-friendly products. Food is a case in point. Revealed preference surveys show that more consumers are more willing to pay a premium for farm produce grown without the use of pesticides or fertilisers. They are also willing to fork out for products that don't have any preservatives. Similarly, consumers, concerned about the effects of CO_2 emissions, are increasingly opting for electrically powered, zero emission vehicles.

Firms are finding themselves more exposed to direct consumer pressure.

Amid growing public concerns, the New Zealand Government has moved to prohibit the use plastic microbeads in personal healthcare and cleaning products, ban single-use plastic bags with handles and announce an investigation into a beverage container return scheme. It has also indicated recently that it will be looking more closely at the use, re-use and recycling of other forms of plastic.

Firms can expect a shift in demand from products that inhibit reuse towards more sustainable alternatives.

1 Accenture Chemicals Global Consumer Sustainability Survey, 2019.

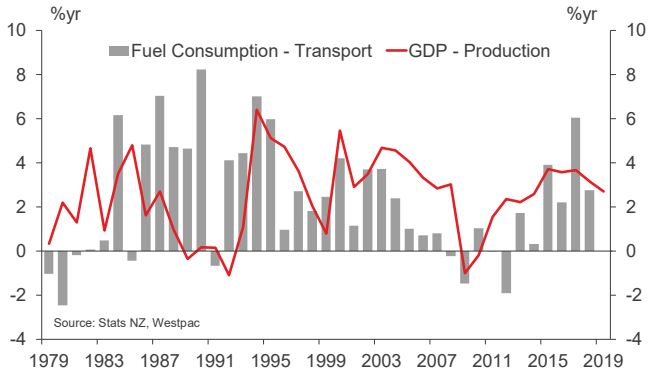
Cyclical factors.

Cyclical factors which can have large but typically short-run impacts on demand for refined petroleum, basic chemicals, basic chemical products and polymer products include economic growth, the performance of consuming industries, changes in household income and even the price of oil.

Economic growth.

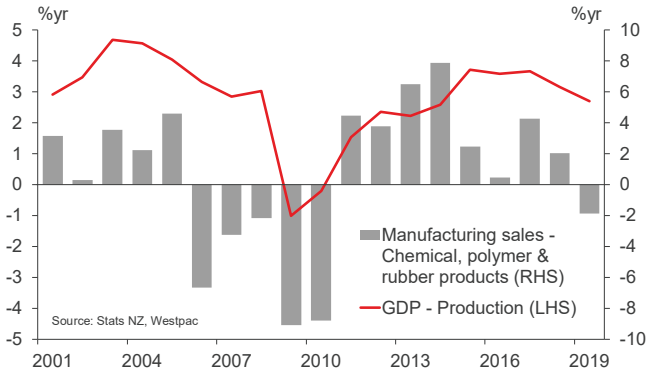
Demand for petroleum products tends to be positively correlated to changes in economic activity. An increase in economic activity typically means more market transactions which involve the movement of people and freight. The key driver here is transport, mostly by road, which accounts for about 76% of all petroleum fuels consumed in New Zealand (both locally produced and imported).

Figure 19: Economic growth and fuel consumption



Similarly, demand for basic chemicals, basic chemical products, polymers and rubber products also moves in sync with the broader economy, although perhaps with deeper troughs and higher peaks. In this case, increases in consumption of end-use products drives output growth in producing industries and demand for basic chemicals, basic chemical products, polymers and rubber products.

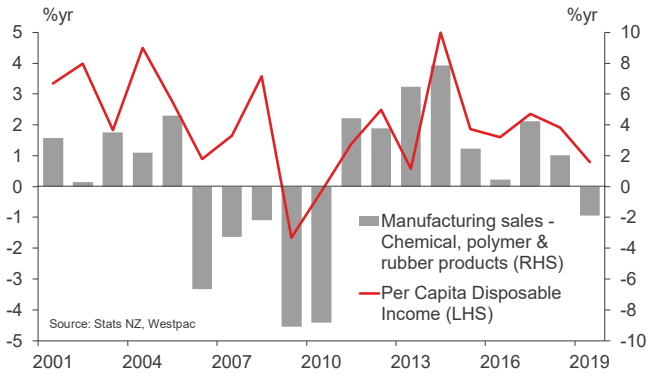
Figure 20: GDP vs manufacturing sales for chemical, polymer & rubber products



Per capita disposable income.

Demand for basic chemicals, chemicals, polymer and rubber products is also a function of disposal income levels. The more income that people have at their disposal, the higher their propensity to spend on products that incorporate chemicals and polymers. This includes plastic packaging which tends to outstrip changes in economic activity and household consumption expenditure.

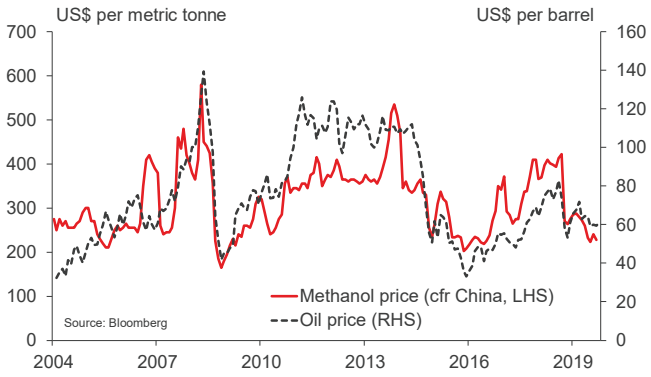
Figure 21: Manufacturing sales vs per capita disposable income



Crude oil prices.

Petrochemical prices are closely correlated to oil prices. They are basic chemicals produced when refining oil, which are then used to manufacture a range of basic chemical products, notably polymers. Polymers are then used to produce a wide range of plastic and rubber products. Consequently, the price of crude oil has an influence on demand at each point along the supply chain.

Figure 22: Petrochemical chemical vs oil prices



Supply drivers.

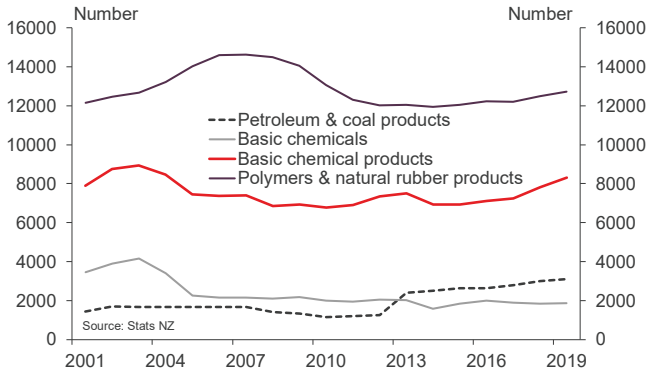
Access to the correct quantity and quality of raw material inputs, technology-driven improvements to supply chains, the impact of recycling and boom and bust cycles are affecting the supply of petroleum, basic chemicals, basic chemical products and polymers in New Zealand.

Material inputs.

Labour.

Like other manufacturing sub-sectors, many firms operating in the petroleum, chemicals and polymer products sector face an ongoing struggle to find suitably qualified staff. This is true for importers/distributors that dominate the supply of chemicals as well as downstream manufacturers of polymer and rubber products, primarily plastic. According to figures from Stats NZ, about 60% of firms operating in the chemicals and plastic sector report finding it hard to fill vacancies. The problem is particularly acute when trying to recruit technical staff.

Figure 23: Employment by sub-sector



Technical staff are important. Not only do they ensure that products supplied meet specified standards, but they also have the technical expertise to provide advice to customers.

For firms that import and distribute basic chemicals and basic chemical products, the ability to provide advice creates a point of difference, allowing them to compete with other importers and distributors on a basis other than price. It also enables them to compete more effectively with products that are imported into the country directly by downstream manufacturers.

Having access to technical skills are also important for downstream manufacturers of polymer and rubber-based products. Having the necessary technical expertise to design and supply products that deliver specific performance characteristics creates a point of distinction and enables firms to compete at a higher price point. It also helps to shut out the threat posed by imported products.

An industry source suggested that although on the job training is available, the sector still faces a technical shortfall. This is exacerbated by the fact that the skilled workforce is ageing.

Difficulties in finding labour is not just confined to technical skills. An industry source that operates in the basic chemical products space indicated that firms often struggle to find suitable low and semi-skilled workers, and even when they do they are seeing wages rise to levels that are difficult to absorb.

Industry sources suggested that when they find suitable workers, they often struggle to convince them that a career path in the chemical industry is a viable option. In part this is because of the perception or working conditions in the industry - the work involves handling dangerous substances and can be physically demanding. An industry source also indicated that absenteeism is high, and this can affect the ability to meet production deadlines, especially for some smaller firms.

Increasingly firms in this sector are relying on migrants to fill skill gaps.

Access to materials.

Access to materials at each point in the value chain is important. And for the most part it's not much of an issue as importers/distributors, chemical product manufacturers and downstream polymer product manufacturers operating in New Zealand are generally able to access the materials they need because they have contractual supply agreements in place with suppliers across the globe. An increasingly global market for basic chemical and chemical products has developed over the past 20 years, providing downstream polymer and rubber product manufacturers with an expanding choice of grades at different prices.

Although the vast majority of materials for producing basic chemicals and many basic chemical products are imported, some, such as water, are locally sourced. Given that these materials are mostly commodities, where they are sourced from is a function of cost, quantity and availability.

However, accessing materials can throw up issues.

One industry source suggested that there have been occasions, especially during times of heightened global demand, where imports of basic chemicals have been delayed coming into the country or have not arrived in the quantities required. In large part this reflects the relatively small size of the New Zealand market for basic chemicals and basic chemical products and a tendency of large offshore manufacturers to focus on bigger, often more profitable markets. While most firms operating in New Zealand

actively manage their inventories, some can be caught short, especially if downstream demand for their products rises sharply.

Supply disruptions can also be come from changing environmental regulations. For example, China, the world's largest producer of basic chemicals, closed dozens of smaller factories in 2019 on environmental grounds following a chemical explosion in Jiangsu province. And there is likely to be more to come with the authorities in that country expected to crack down further on violation of safety rules and a lack of enforcement by local authorities.

Mergers and acquisition activity can also result in supply chain disruptions, resulting in cancelled and unfulfilled orders. The global chemical industry has a long history of mergers and acquisition activity involving chemical manufacturers and/or private equity firms of all sizes.

Another issue with supply is the importation of sub-standard product. This is particularly relevant for competitively priced imports of polymer products, particularly plastics. Industry sources complain that while massive economies of scale underpin the competitiveness of such products, firms will often use cheap basic chemicals of dubious quality to manufacture them. This is particularly true of plastic products from China.

With the rise of social media and stricter consumer protection programs, the negative connotations of failing quality controls and having to initiate product recalls have never been higher.

Technology.

Manufacturing operations present one of the biggest areas of opportunity for employing digital technologies. While globally this tends to cut across all segments of the sector, in New Zealand this largely applies to firms involved in refining of petroleum products, the production of methanol, the manufacture of some chemical products like fertilisers and pesticides, and the manufacture of plastic and rubber products made from polymers.

Most of these firms generate an enormous amount of data but according to one industry source few in New Zealand do anything with it. Globally, about 40% of chemical firms use advanced analytics to interpret this data in order to boost output levels, improve operating efficiencies, lower energy consumption and improve the effectiveness of plant maintenance.

Other digital technologies that can create significant value in manufacturing processes and even import/distribution activities include the use of process robotics, automated guided vehicles, such as self-driving forklifts, and the use of robots to fill big bags. These advances help to reduce costs and improve process stability and safety performance. At the same time, deploying automated and centralised plant performance-management systems also make it possible to steer operations better and react faster when corrections are needed.

Opportunities for using digital technologies extend well beyond production to include the entire supply chain. The adoption of advanced analytics is making it possible to provide better forecasts of demand, leading to improvements across the entire sales- and operations-planning process, as well helping to improve transparency/traceability – an increasing demand of consumers.

Embedding digital connectivity throughout the chemicals supply chain enables new levels of end-to-end visibility, traceability, transparency and data-driven insights.

There are also opportunities to use technology to address regulatory restrictions, for example on single-use plastics and micro-plastics, which are currently banned in New Zealand. Chemical suppliers in New Zealand are working with downstream polymer product manufacturers to introduce new products, invest in recycling technologies, as well as incorporate renewable and recyclable material in their growing product portfolios.

However, the use of advanced analytics among importers/distributors, basic chemical product manufacturers, and downstream producers of polymer and rubber products in New Zealand is limited. In part this reflects the relatively small size of the local market. According to an industry source, demand forecasts are largely based on existing contractual arrangements rather what is happening in buyer markets in general. For example, importers/distributors of basic chemicals and chemical products in New Zealand will estimate demand from the contracts they have with their downstream manufacturers and will share this with offshore suppliers of basic chemicals with whom they have contracts.

There are also opportunities in research and development (R&D) to create higher-value-added, higher-margin products at a faster pace, in specific niches. Although not commonplace in New Zealand because of how reliant the industry is on imports, chemical manufacturers globally are increasingly using digital technologies to optimise the operational performance of chemicals. An industry source that supplies road marking coatings in New Zealand indicated that technology is changing the nature of their products so that they last longer.

Firms are also starting to deploy advanced analytics and machine learning to simulate experiments, use the predictive

power of digital technology to systematically optimise formulations for performance and cost, and to data-mine information available from past successful and failed experiments. Increasingly firms are identifying the best possible resource allocation to enhance the performance of R&D teams and the innovation pipeline. Many of these practices are already established in the pharmaceutical industry but were largely unaffordable for other chemical firms. However, with the emergence of low-cost computing and increased computing power, this is beginning to change.

Digital initiatives such as advanced-analytics-enabled pricing systems, and algorithms to predict churn at the individual-customer level and then suggesting countermeasures to mitigate this, are also supporting marketing and sales efforts. The impact of these initiatives can be significant. For example, a global specialty-chemical company used advanced analytics to reset prices for hundreds of thousands of product-customer combinations in seven core countries, based on individual risk and willingness to pay.

Increasingly, downstream chemical products, polymer and rubber product and other manufacturers are opting for digital channels when re-ordering product rather than interacting directly with sales teams. Combining a digital channel with process digitisation is not only creating an improved customer experience, it is also lowering service costs for suppliers. An industry source suggests that although the use of Business-to-Business (B2B) is growing in New Zealand, it comes with its own challenges. Online ordering requires the purchaser to use the vendor systems, which can become problematic when using several different suppliers.

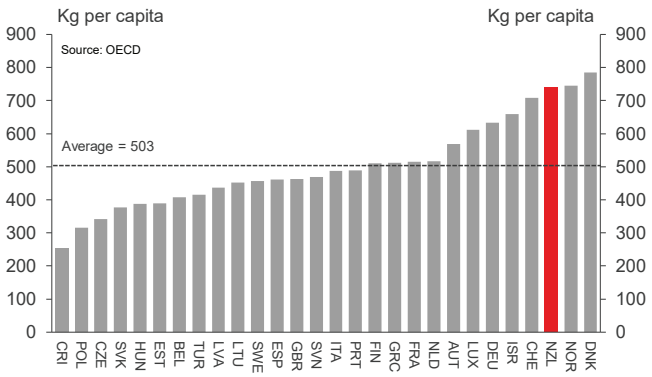
Digital technologies are likely to speed-up innovation, enabling a more efficient "idea-to-market" process that results in faster industry responses to market and customer demands.

Circular economy.

Historically the emphasis on recycling has largely focused on products for end consumption. However, that is beginning to change as the circular economy moves centre stage and the spotlight shifts towards recycling and reusing products at each point along the production value chain.

Plastic Waste.

Figure 24: Comparative municipal waste per capita



New Zealand is ranked 3rd among OECD countries and 10th globally for municipal waste generated on a per capita basis. In large part this is because New Zealand has a small and widely dispersed population, which makes it difficult to establish the waste processing infrastructure needed to recycle all the various plastics used in New Zealand.

As a result, quite a bit plastic waste in New Zealand is exported to other countries. China is a case in point, although since 2017, exports of plastic waste to that country have dropped quite dramatically after restrictions were introduced by the Chinese authorities. This resulted in a surge of waste plastic, much of it contaminated, being exported to low income countries. However, with moves now afoot to limit this practice internationally, it's likely that in the future, New Zealand will have to deal with it's own difficult-to-recycle plastic.

The extent to which plastics can be recycled is largely determined by its physical properties, i.e. the degree to which it responds to heat; its chemical composition; the source of the materials from which it is made, be they biological or fossil fuels; and whether other materials, colours and additives has been included during production. An industry source indicated that plastics can be recycled up to eight times, although each time they are recycled some performance degradation occurs.

Clean plastic film shrink and shroud wrap account for about 60% of all recycled plastic in New Zealand.

According to an industry source, plastic manufacturers in New Zealand find themselves between a rock and a hard place. Not only are they being pressurised by government and consumers to produce products that can be recycled, they also find themselves under pressure from big brand downstream manufacturers and retailers, both of whom have pricing power, to produce competitively priced plastics that make their products more attractive to end consumers. Unfortunately, many of these plastics are not recyclable, while those that are recyclable tend to be more expensive.

Industry response.

Several global/international and local firms have signed the New Zealand Packaging Declaration which commits them to use 100% reusable, recyclable or compostable packaging in their New Zealand operations by 2025. They include Amcor, Danone, L'Oreal, Mars Nestle, Pepsico, Coca-Cola and Unilever as well as local firms such as Countdown Foodstuffs, Frucor Suntory and New Zealand Post. The declaration is closely aligned to the New Plastic's Economy Global Commitment, led by the Ellen MacArthur Foundation in collaboration with the United Nations.

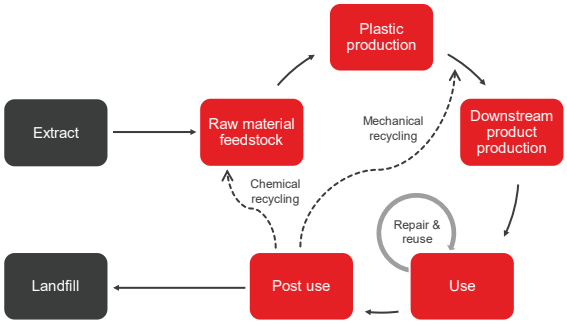
Commitments to increase the use of recyclable materials is a big challenge for firms that extensively use chemicals and chemical products.

Some innovative firms are responding to these pressures by leveraging off digital technologies to develop new materials and products that are biodegradable or more easily reused and recycled. For example, blockchain and other distributed ledger technologies are helping to improve transparency by enabling the tracking of plastics at each step in the value chain, from production and processing to consumption, recycling and reuse.

These firms are also collaborating with others. For example, Scion, a crown research agency, is working with industry partners to create plastic products from renewable biomass resources, which could help to reduce the reliance of the industry on petrochemicals produced from fossil fuels.

Air New Zealand recently switched to plant-based cups and is now looking to make them edible to reduce the number of cups going to landfill.

Figure 25: Circular economy



Source: Plastics Europe, Prime Minister's Chief Science Advisor

Some are also starting to look at how they might embed circular economy thinking into the design of their products, with a focus on recycling, keeping chemicals and polymers in use, and regenerating natural systems. Thinking in this regard is likely to be heavily influenced by a recent report titled "Rethinking Plastic in Aotearoa New Zealand", produced by the Office of the Prime Minister's Chief Science Advisor. The report makes several recommendations on how to minimise the negative externalities associated with production and consumption of plastic, placing heavy emphasis on the 6Rs- rethink, refuse, reduce, reuse, recycle and replace.

The shift towards a circular economy poses a threat to some. But it is an opportunity to others that invest in new products, new materials, new machinery and new ways of doing business.

Basis for competition.

Firms in the petroleum, chemicals and polymer product sector compete largely on their ability to differentiate themselves from their competition. They achieve this either by expanding the range of services that they provide and/or by tailoring products to their customer's exacting requirement. While the scope for differentiation is arguably larger for firms that manufacture downstream products, cost minimisation remains a key focus across the sector.

Petroleum refining.

There is very little competition between the three major oil firms that refine crude oil in New Zealand into petroleum products such as diesel and petrol.

In large part this is because they share key refining and distribution infrastructure. Sharing arrangements cover everything from the processing of crude oil and the coordinated scheduling and distribution of refined fuel (from New Zealand's only refinery at Whangarei by pipeline and/or coastal shipping) to having access to inventories through shared terminal storage facilities.

That said, the refinery does face some competition from imports of refined petroleum products brought directly into the country from large and often newer offshore refineries that benefit massively from economies of scale. It competes by reducing unit costs of production, either through improvements to existing operations and/or through expansions to existing capacity.

With respect to the processing of crude oil into refined petroleum products, capacity at the refinery in Whangarei is allocated based on a three-year average of market share. This means that for one of these major firms to increase their market share, they would need to increase their imports of refined fuel. However, this would likely be at a cost disadvantage because they would still have to distribute to end markets using infrastructure that exists outside of already established sharing arrangements. All things being equal this implies a squeeze on profit margins.

Another reason why competition is basically non-existent is that the big firms that refine crude oil in New Zealand have well-established long-term wholesale agreements in place to not only to supply their own branded retail outlets, but also high-volume resellers that operate under different brands. It's common for these supply agreements to include terms that make it difficult for resellers to switch between suppliers. There are also non-contractual aspects of the relationships between resellers and the major firms, such as security of supply, access to fuel card schemes, and the locality of resellers retail sites, that impede the ability to switch.

Infrastructure sharing arrangements and the structure of wholesale supply agreements have also helped to prevent rival fuel importers from entering the market or competing more vigorously against the major firms.

The lack of competition in the wholesale market effectively impedes competition in the retail market. A lack of product differentiation means that downstream resellers, within a given location, will in part compete on price, although given the lack of competition in the wholesale market, the ability to differentiate on this basis is limited.

To address this, resellers compete for the retail dollar through innovations such as fast lanes, coffee ordering apps, improved service offerings, discounting and loyalty programmes, better equipped convenience stores, and unmanned pay-at-the-pump technology.

Basic chemicals and basic chemical products.

Globally, the manufacture of basic chemicals and basic chemical products is characterised by high volumes, limited product differentiation and a price-driven customer purchasing process. Firms operating in this space compete through cost leadership, although this is only sustainable for a few key players. They are driven by operational excellence and their ability to exploit their economies of scale to deliver competitive pricing to downstream customers. This includes some of the larger importers/distributors operating in New Zealand that are able to purchase in bulk. For others, cost minimisation can be achieved through service compression, especially for chemicals that do not require technical services and support. New business models might include online maintenance and low-cost no-frills sales channels.

However as stated above, New Zealand doesn't produce much in the way of basic chemicals and polymers. Competition here is not so much about how local chemical manufacturers compete against each other, but rather how importers/distributors do. Firms operating in this space not only compete against each other, but also against imports directly purchased from offshore by downstream customers.

Importers/distributors purchase basic chemicals and polymers from offshore and onsell these to local customers at cost plus a margin.

Importer/distributors operating in New Zealand don't really compete on their ability to connect offshore firms that manufacture basic chemicals and polymers to downstream manufacturers operating in New Zealand. Niche areas excepted, they will often purchase from the same suppliers and sell to the same local manufacturers. They might purchase and sell under well-established contractual

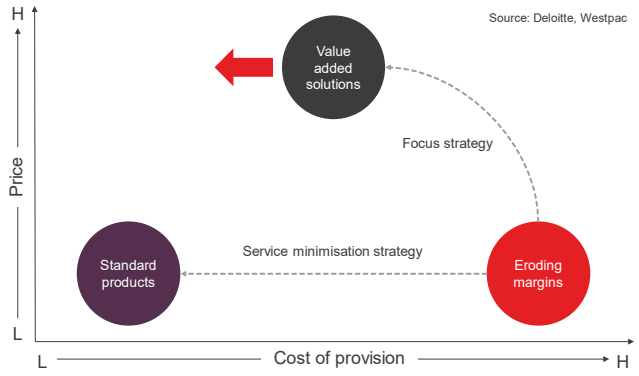
arrangements or they may do so in response to one off requests. Irrespective of what situation applies, the ability to manage the flow of product is key, ensuring that the right quality and quantity of product is delivered within specified timeframes. To do this, importers/distributors must be able to develop and nurture relationships along the supply chain.

They don't really compete on price either. Given the basic nature of the many of the chemicals that are imported there is little scope for price differentiation. Prices may differ slightly, but typically this is less to do with the actual product being imported and more to do with the complex nature of supply chains, the different capabilities of individual firms that operate along them, and the contractual arrangements that might be in place. The performance of the New Zealand dollar looms large in this regard.

Given a limited scope for price differentiation, many importers/distributors operating in New Zealand focus on minimising operating costs in order to preserve margins. Specifically, the focus is on improving the efficiency of their logistics operations through the adoption of new technologies and revisions to factory/warehouse layouts.

A key risk for importers/distributors relates to whether they can pass on the cost of imported product to downstream consumers in a competitive market.

Figure 26: Value add equation



They also look to preserve (and even improve) margins by getting involved in value-added activities, such as mixing, blending, repackaging and heating of chemicals on behalf of their customers. Undertaking simple manufacturing activities like these are probably the reason why Stats NZ suggests that there are 100 or so firms in New Zealand that manufacture basic chemicals and polymers.

Importers/distributors are also looking to add value by providing advisory services. Industry sources suggest that importers/distributors are increasingly working with their customers to develop tailored solutions that not only meet their specific needs, but also comply with the sustainability agenda. This includes the design and formulation of individual products that are able deliver superior performance characteristics on a cost-effective basis. However, only a few importers/distributors can offer such top-end value, mainly because this requires technical skills which are in short supply.

Mass production is starting to give way to mass customisation, delivered through multiple channels.

Some are also looking to add value by venturing further down the value chain, backwardly integrating into their customers businesses. For example, an importer/distributor may take over the quality management of chemicals for its customer. The customer immediately gains from reduced lead times and increased quality and for this the importer can charge a premium, which in turn improves margins and profitability.

Value based pricing starts with a deep understanding of customer value drivers and value attributes.

The competitive dynamics facing the few manufacturers of basic chemicals in New Zealand are slightly different.

Take the methanol industry for example, which consists of a single manufacturer, Methanex, that competes almost entirely in the global export market. Methanol prices are closely linked to crude oil and natural gas prices.

Methanol producers worldwide are effectively price takers. They compete by maximising volumes over a given fixed infrastructure and by minimising variable costs through operational and supply chain efficiency gains. Operational efficiencies are gained through economies of scale, changes to factory layouts and the adoption of new process technologies.

Supply chain efficiencies are achieved by minimising key input costs, such as natural gas, which is purchased in bulk. Most manufacturers look to achieve this by including a variable price component in natural gas contracts and linking this to the price of methanol. This not only helps to improve competitiveness, but also prevents margin squeeze even in the downcycle. Minimising input costs is also achieved by improving distribution efficiencies, including shipping and storage while at the same time ensuring the ability to deliver according to specified timeframes.

Methanol producers largely compete on quantity, quality and the ability to deliver on time.

Circumstances are also slightly different in industries that produce basic chemical products such as fertilisers, pesticides, pharmaceuticals, cleaning compounds, cosmetics and toiletries. Locally based manufacturers compete not just with each other, but also imported products, some of which are big brand names brought into the country by large multinational firms. This is particularly true for pharmaceuticals, cosmetics and toiletries, but perhaps less so for fertilisers and pesticides where manufacturing is dominated by two large New Zealand based firms.

Firms operating in these sub-sectors compete along a spectrum.

At one end are firms that compete on price and achieve cost leadership by maximising economies of scale and/or minimising variable costs through operational and supply chain efficiency gains. Most of these firms are likely to be located offshore, with local branches importing their products into New Zealand. However, some large-scale manufacturing also takes place locally, although this is the exception rather than the rule.

It's important to note that the focus on minimising costs is not just the preserve of large firms, both here and abroad. Many smaller firms that produce basic chemical products in New Zealand also focus on cost minimisation to preserve margins. Although they tend to produce in small batches and so are not able to reap the benefits associated with economies of scale, they are still able to minimise their costs by improving operational and supply chain efficiencies, either through the adoption of new technologies, investment in new machinery, or by improving work organisation methods and revising factory layouts.

In addition to price, these firms compete on sales and service. Service offerings have tended to widen as competition has increased. For example, one major fertiliser firm operating in New Zealand provides advice on how customers can meet regulatory compliance requirements relating to the use of their products.

On the other end of the spectrum are firms that operate in niches, leveraging off their own or the competencies of others. Sometimes, this will involve local firms working with innovative partners from around the world to research, develop, manufacture, market and distribute basic chemical products. This is particularly prevalent in pharmaceuticals, cosmetics and healthcare products where local firms are more likely to manufacture under contract for some of the world's largest brand names. Firms manufacturing in this space can also be exporters that compete on their ability to develop and maintain relationship networks and the ability to deliver to the standards set by the brand owner.

Polymers and rubber products.

New Zealand also has a thriving downstream polymer product manufacturing capability that produces a range of plastic and rubber products. According to plastics NZ there are about 300 plastic manufacturing firms in New Zealand that generate about $2bn in sales. About 60% of this comes from plastic packaging products, including plastic bottles, with semi- and rigid products making up the balance.

Most firms involved in manufacturing plastics and rubber tend to be small operations. Work organisation methods are orientated towards short-production runs, and typically consist of clusters of stand-alone machines that operate independently from each other. They are very different to the sequentially ordered chains like those found in major chemical manufacturing plants overseas.

A key advantage that local firms have over imports are shorter lead times. They are also near to their customers, which helps. Reputations count and trust is a key factor.

Reputation based on past performance is a key point of difference for importers and manufacturers alike.

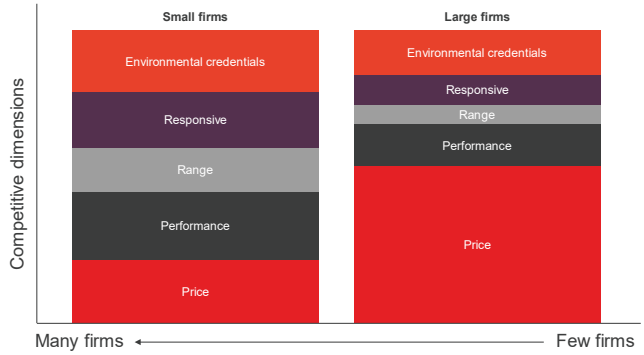
Firms that manufacture plastic and rubber products in New Zealand compete largely on their ability to meet the individual requirements of their customers, and much like their upstream basic chemical and chemical product counterparts, seek to differentiate themselves on that basis. Responsiveness is key, with short lead times providing protection against imports. However, shorter lead times also puts pressure on the industry. According to an industry source, failure to deliver can quickly lead to a loss of business.

A small number of larger firms that produce polymer and rubber products are contract manufacturers. They are volume producers that compete mainly on price and to a slightly lesser extent the performance characteristics of the products they produce. They also compete on their ability to tailor products to meet their customers changing requirements, although less so than their smaller counterparts. Mindful of a growing concern about how polymer products in general and plastics specifically affect the natural environment is becoming a more important consideration for larger firms.

Smaller firms that produce plastic and rubber products compete on the same basis, although there are some big differences. Smaller firms are typically geared towards short-production runs, and so tend to compete more on their ability to respond to their customers changing requirements and tailoring solutions around them. They don't compete on volume and they cannot benefit from economies of scale. They do compete on price but only to an extent.

Other factors, such as responsiveness to changing demand and the ability to deliver the required quantity and quality within agreed timeframes are more important. An industry source suggested that smaller firms are becoming more sensitive to the changing tide of customer sentiment towards plastics and are actively looking at developing new products with additives that make them less harmful to the environment. An industry source suggest that Scion is undertaking research into new plastics and making them more easily recyclable, including recycling and reuse of existing materials.

Figure 27: Basis of competition – plastics and rubber products



Source: Westpac

Contact the Westpac economics team.

Dominick Stephens, Chief Economist
+64 9 336 5671

Michael Gordon, Senior Economist
+64 9 336 5670

Satish Ranchhod, Senior Economist
+64 9 336 5668

Paul Clark, Industry Economist
+64 9 336 5656

Any questions email:
economics@westpac.co.nz

Past performance is not a reliable indicator of future performance. The forecasts given in this document are predictive in character. Whilst every effort has been taken to ensure that the assumptions on which the forecasts are based are reasonable, the forecasts may be affected by incorrect assumptions or by known or unknown risks and uncertainties. The ultimate outcomes may differ substantially from these forecasts.

Disclaimer.