# Retail competition in the LPG market

September 2018

GAS INDUSTRY COMPANY LIMITED

# Executive Summary

The purpose of this paper is to review the retail market arrangements for liquefied petroleum gas (LPG).

Gas Industry Co committed to this review in response to stakeholder concerns about potential barriers to competition in the retail LPG market. The paper begins with an overview of what LPG is and how it is used; canvasses the relevant characteristics of the retail LPG market, including market shares and price competition with other fuels; and assesses whether there are barriers to LPG competition.

Note that this paper was being finalised when the agreement by First Gas to purchase Contact's Rockgas LPG business was announced at the end of July 2018. That sale had not been finalised at the time of this paper's publication. As such, the commentary and analysis contained in this paper reflects the retail market prior to the Rockgas transaction. It is, in effect, a snapshot of the LPG market at a particular point in time. Doubtless the LPG market will continue to evolve as the Rockgas transaction and other factors shape its future direction.

## Overview

Liquefied petroleum gas (LPG) is a fuel that is in some ways similar to natural gas. Both are hydrocarbons, meaning that their molecules contain hydrogen and carbon, and they are produced from the same gas fields in New Zealand. Both fuels are used in their gaseous state to produce heat for cooking and space and water heating.

New Zealand consumes about 8 PJ of LPG annually – about 1.5% of total energy consumed. The bulk of the LPG is produced domestically, with a small amount of imports and exports to keep supply and demand balanced. The price of LPG can make it a cost-effective choice for cooking and space and water heating, depending on a customer's location and energy demand.

## Retail market competition

There are four major LPG retailers: Contact Energy, OnGas, Genesis Energy, and ElGas. Each has a slightly different focus in the LPG market, due to differences in the development of their LPG businesses and in their market strategies.

Consistent with our Gas Act 1992 (Gas Act) and Government Policy Statement (GPS) objectives, Gas Industry Co is concerned to identify any barriers to competition that may exist in the LPG market.

One way to define a barrier to competition is as a cost or impediment that not all retailers face. Such a barrier to competition could be an exclusive supplier agreement or a tariff that favours specific suppliers. Gas Industry Co has not identified any such barriers to competition in the LPG market.

The costs involved in entering a market and the existence of economies of scale are sometimes seen as barriers to market entry and thus competition, even though they are aspects of a market that all competitors have to face. Regardless of whether economists would consider them to be barriers to competition per se, their existence nevertheless may act to impede the entry of smaller competitors into the market. Gas Industry Co has looked into how economies of scale

and capital costs can apply to the LPG market and examined how the industry has addressed those aspects.

### Economies of scale

LPG distribution is an area where one would expect economies of scale; that is, for the average cost of delivering LPG to fall as the volume of LPG deliveries increases. There are a lot of assets devoted to LPG transport to and within New Zealand: ship tankers, road tankers, import terminals, storage depots, LPG delivery vehicles, bottle filling facilities, and the like. On the face of it, a new entrant LPG retailer would need to supply a large number of customers to justify the cost of establishing a standalone LPG distribution network.

However, the existence of Liquigas, an open-access LPG distributor, and the ability of retailers to enter into distribution agreements with other parties mean that retailers do not individually need to meet the costs of standalone distribution systems. LPG retailers can enter and compete in the market without having to establish their own LPG distribution and delivery infrastructure. So while economies of scale are a feature of the LPG market, they do not appear to create undue barriers to entry or competition because of the way that the industry is organised and operates.

### Capital expenditure

In terms of the costs of entering the LPG market, aside from the issue of LPG distribution, LPG retailers need a way to provide LPG to their customers, either through LPG bottles or through reticulated systems, and these items can have a significant cost. For 45 kg and forklift bottles, there is a bottle return protocol, which can help retailers recover their bottles more quickly, thus minimising the amount of time before bottles can be returned to service. In this way, retailers can use their bottles more efficiently, potentially minimising the number of bottles a retailer needs to purchase.

LPG bullet tanks and reticulated networks are the other ways that retailers provide LPG to their customers. There is no formal protocol for third-party acquisition of bullets or access to reticulated networks, and Gas Industry Co has not seen any evidence that such protocols are necessary. Customers who are served by bullets can still switch retailer, and customers on reticulated systems can choose to receive LPG a different way or to switch to a different type of energy, so there does not appear to be a barrier to competition. Further, there would be technical and practical impediments to implementing arrangements for bullet transfer and reticulated system access.

### Essential infrastructure

Reticulated LPG networks represent only a small fraction of the overall LPG market (which itself is small compared to other energy markets, such as liquid fuels, electricity, and natural gas), and customers on those networks have alternate energy choices. Gas Industry Co does not consider that the reticulated LPG networks have a significant influence on the national economy, nor do we think that third party access would promote a material increase in LPG competition. It is also questionable whether third party access would be in the public interest, taking into account the costs that an LPG registry and allocation system would entail. Overall, Gas Industry Co does not see a case, in these circumstances, for considering them essential infrastructure under the Gas Act and GPS.

### Retailers' views

Gas Industry Co has spoken with five LPG retailers in the course of preparing this paper: Contact Energy, ElGas, Genesis Energy, Nova Energy (previously an LPG retailer), and OnGas. All have different attributes: different histories with LPG retailing, types of customers, degrees of vertical integration, and so on. Each retailer has its own strategy for growing its LPG business.

A number of retailers emphasised the competitiveness of the LPG market; they compete on customer service as well as price. When asked about possible barriers to competition, retailers reported that they felt able to compete in the current environment. They considered that any regulatory intervention would make the market less fair – even when those interventions could benefit them individually.

## Conclusions

Gas Industry Co has not identified of any barriers to entry in the LPG market; that is, any costs or impediments that are not faced by all LPG retailers. There do appear to be economies of scale in the distribution of LPG, and the industry has evolved ways to rationalise the LPG delivery infrastructure, potentially allowing competition by retailers who would otherwise be unable to compete in the market.

LPG retailers do face costs in terms of LPG bottles, bullets, and reticulated systems, but these costs are faced by all retailers, not just new entrants. There is an industry protocol for the return of LPG bottles, which may help to minimise the number of bottles (and therefore the cost) that an LPG retailer needs to own in order to service its customers. There are no equivalent protocols for LPG bullets or access to reticulated systems, but Gas Industry Co does not perceive that there is a need or a justification for such arrangements, and, further, there would be practical difficulties with putting such arrangements in place.

Taking all these factors into account, Gas Industry Co does not consider that there are any aspects of the retail LPG market that need to be addressed at this time.

# Contents

# 1. Introduction and purpose

The purpose of this paper is to review the retail market arrangements for liquefied petroleum gas (LPG) from a policy perspective.

Gas Industry Co committed to this review in response to stakeholder concerns raised at a co-regulatory forum[1] and in submissions about possible barriers to competition in the LPG retail market. Two specific concerns were raised:

- Whether arrangements in the retail LPG market favour incumbents over new entrants; and
- Whether the lack of third-party access to reticulated LPG networks presents a barrier to competition.

This paper draws on research on the operation of the retail LPG market, academic literature, and interviews with stakeholders in reviewing and analysing the arrangements in place for the retail LPG market. It begins with an overview of what LPG is and how it is used; canvasses the relevant characteristics of the retail LPG market, including market shares and price competition with other fuels; and assesses whether there are barriers to LPG competition.

Note that this paper was being finalised when the agreement by First Gas to purchase Contact's Rockgas LPG business was announced at the end of July 2018. That sale had not been finalised at the time of this paper's publication. As such, the commentary and analysis contained in this paper reflects the retail market prior to the Rockgas transaction. It is, in effect, a snapshot of the LPG market at a particular point in time. Doubtless the LPG market will continue to evolve as the Rockgas transaction and other factors shape its future direction.

[1] The co-regulatory forum was held on 22 November 2016 in relation to the development of the levy and work programme for FY2018.

# 2. What is LPG?

Liquified petroleum gas (LPG) is a fuel that is in some ways similar to natural gas. Both are hydrocarbons, meaning that their molecules contain hydrogen and carbon, and they are produced from the same gas fields in New Zealand. Both fuels are used in their gaseous state to produce heat for cooking and space and water heating. But while natural gas is typically transported and distributed in gaseous form by pipeline, LPG can be transported in a liquid state, so it can be distributed in containers.

Natural gas is primarily methane, the lightest hydrocarbon, which has a single carbon atom in its molecule (and so is sometimes referred to as C1). Natural gas sometimes also includes an amount of ethane (C2). Both are very light gases that are difficult to liquefy. In fact, natural gas can only be liquefied by cooling it to around -161° C, and no amount of pressure can liquefy it at ordinary temperatures (Samuelson, 2008) Natural gas generally also includes some inert gases such as nitrogen and carbon dioxide (International Gas Union, 2012).

LPG, on the other hand, is a mixture of two heavier gases, propane (C3) and butane (C4), which readily liquefy under pressure at ordinary temperatures. Propane has a boiling point of -42° C, which means that it will vaporise as soon as it is released from its pressurised container, even in very cold weather. Butane, in contrast, vaporises at about -0.6° C (Grabianowsi, n.d.). In New Zealand, LPG is typically supplied as a 60:40 mixture of propane to butane (Hahn, n.d.), although the proportion can vary, depending on the source of the LPG (production field or import), market conditions, and where the LPG will be used (generally, LPG that has a higher proportion of propane is supplied to the South Island because of its colder winter climate).

Because of their additional carbon atoms, propane and butane molecules contain more energy than methane molecules, but they are also heavier and so contain less energy per kilogram. On an energy per mass basis, the higher the ratio of carbon to hydrogen atoms is in a hydrocarbon molecule, the lower the energy content is (and the higher the amount of carbon dioxide produced) per mass unit (Energy from Fossil Fuels).

**Table 1 Properties of natural gas and LPG**

| | Specific energy (MJ/kg) | Density (at 15° C) (kg/m$^3$) | Energy density (MJ/m$^3$) |
|---|---|---|---|
| Methane | 56.3 | 0.68 | 38.3 |
| Propane | 49.8 | 1.86 (gas)<br>510 (liquid) | 92.6 (gas)<br>25,400 (liquid) |
| Butane | 49.4 | 2.46 (gas)<br>575 (liquid) | 121.5 (gas)<br>28,400 (liquid) |
| 60:40 LPG mix | 49.6 | 2.10 (gas)<br>536 (liquid) | 104.1 (gas)<br>26,600 (liquid) |

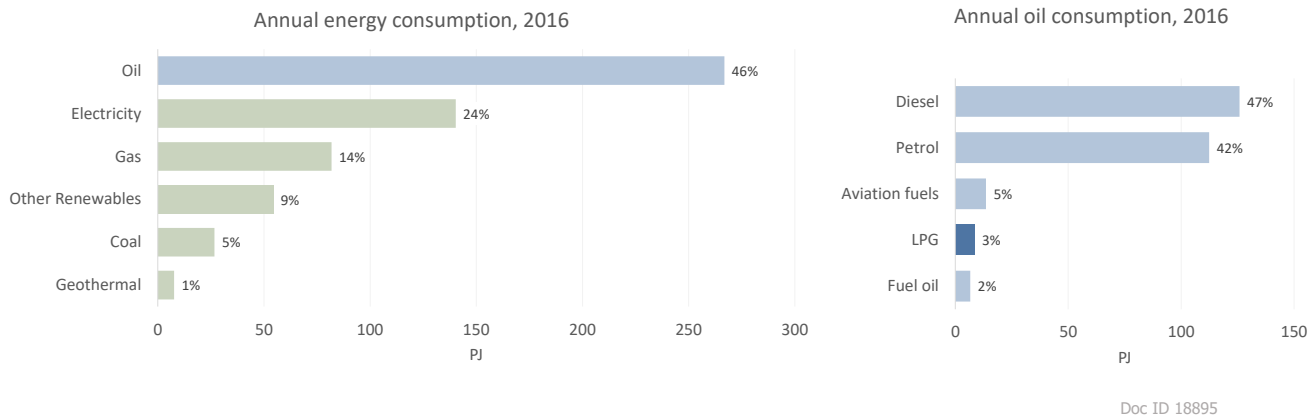
Sources: International Gas Union, 2012; Afrox; Unitrove, 2017

It is worth noting the differences in density between natural gas and LPG. Methane, with a density of less than one, is lighter than air and therefore disperses into the atmosphere if it leaks from a pipeline or gas appliance. In contrast, gaseous propane and butane are heavier than air: if there is an LPG leak, the gas will flow along the ground to the lowest level and will not readily disperse. This difference means that LPG requires special safeguards in its transport and handling to ensure that it is contained safely.

# 3. Annual LPG production and consumption

In the past ten years, New Zealand has consumed between 7 and 10 petajoules (PJ) of LPG, accounting for about 1.3% to 1.8% of total energy consumption. The charts below show that almost half of New Zealand's total annual energy needs are met by oil products, predominately diesel and petrol. LPG accounts for about 3% of oil consumption. (LPG is counted as a subset of oil consumption in New Zealand statistics.)

**Figure 1 Annual consumption of energy and oil**

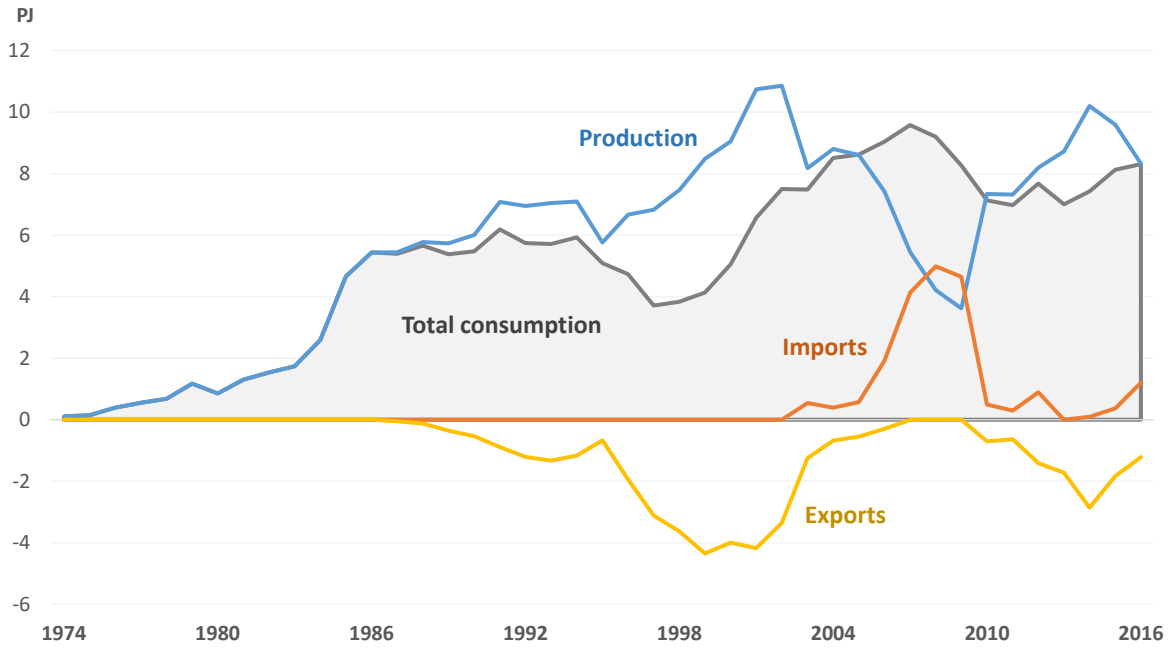



Source: Ministry of Business, Innovation and Employment, 2017

Most of the LPG used in New Zealand is produced domestically as a by-product of crude oil and natural gas production. This means that the amount of LPG produced can vary depending on demand and prices in the oil and natural gas markets. Imbalances between LPG supply and demand are managed through imports, often from Australia, and exports, generally to the Pacific Islands.

The following chart shows LPG production, imports, exports and consumption since 1974. Historically, consumption trends have lagged production trends. Production experienced a peak in 2002, while consumption peaked in 2007. More recently, production of LPG peaked in 2014, while consumption is still on an upward trend. The year 2017 was the first since 2009 where there was a shortfall in production relative to LPG consumption.

**Figure 2 LPG production, imports, exports, and total consumption**

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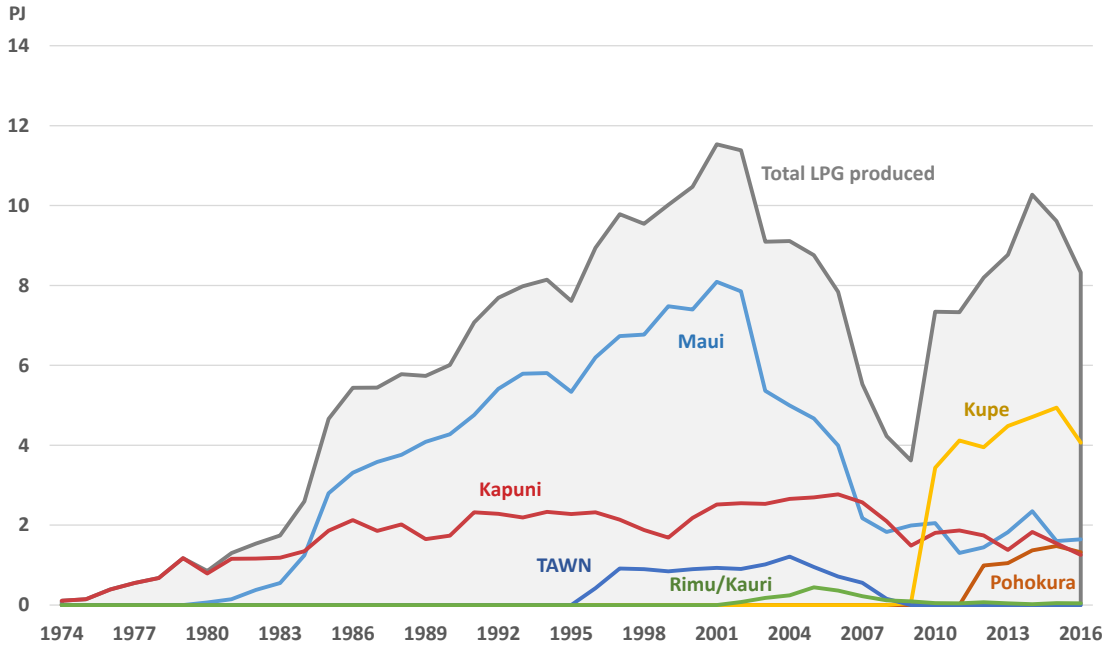
Source: Ministry of Business, Innovation and Employment, 2017

From 1985 to 2007, Maui was the dominant source of LPG. Since 2010, Kupe has been producing about half of New Zealand's LPG, with the rest of LPG coming from the Maui, Pohokura, and Kapuni fields.

**Figure 3 Total LPG production[2]**

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Source: Ministry of Business, Innovation and Employment, 2017

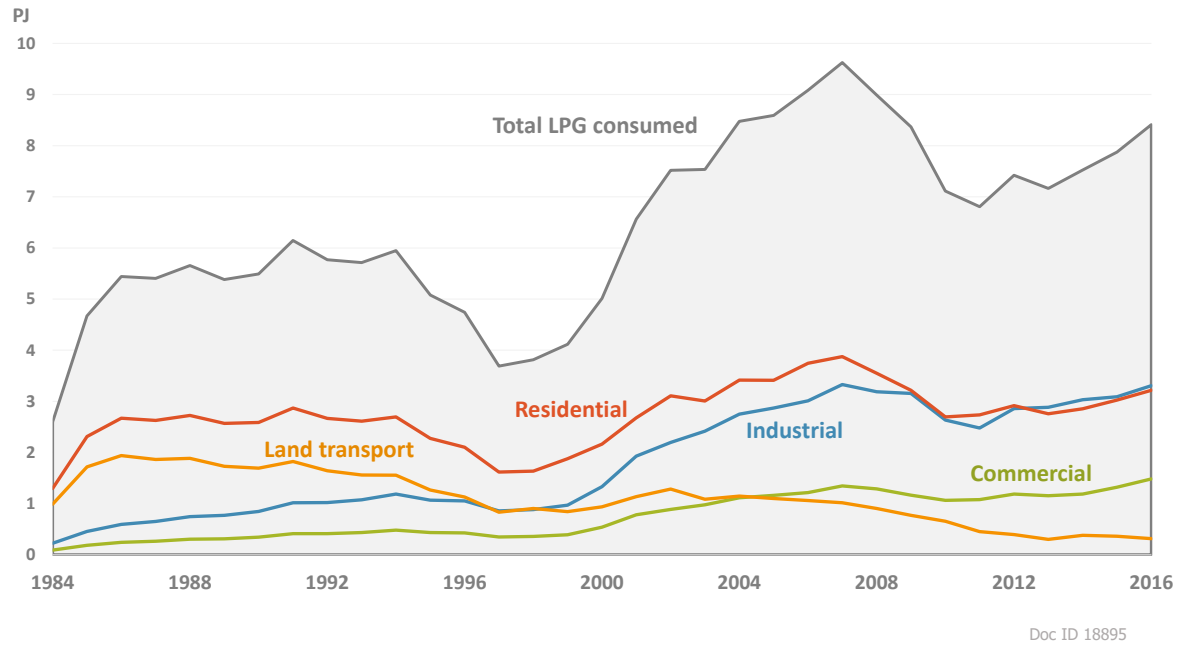
[2] Note that the total of LPG produced may be greater than the amount of LPG supplied: particularly in the period from 1992 to 2006, some of the LPG produced was injected into the natural gas stream.

# 4. Uses and pricing of LPG

## Uses of LPG

The largest use of LPG has historically been by the residential sector. Data from the Ministry of Business, Innovation and Employment show that LPG use by industrial consumers has increased in recent years and in 2013 became the largest use. LPG consumption in the commercial sector is also on an upward trend.

**Figure 4 Annual LPG consumption by sector**




Source: Ministry of Business, Innovation and Employment, 2017

LPG is distributed to consumers either in bottles or via reticulated networks. LPG bottles have different sizes and configurations to suit different uses:

- 9 kg bottles: used for barbecues, caravans, and portable heaters and cookers
- 15-20 kg forklift cylinders: specially designed to power forklift trucks
- 45 kg bottles: used to supply homes and small businesses. Some large industrial and commercial customers are supplied via banks of 45 kg bottles.

Large commercial and industrial LPG customers can also be supplied via dedicated storage tanks (often termed "bullets") located on their premises that are refilled by truck.

Different types of LPG bottles are illustrated in Figure 5. An LPG bullet tank is shown in Figure 6.

**Figure 5 LPG bottle types**


Clockwise from upper left: 9 kg bottle; forklift bottle;
45 kg residential bottles; industrial bank of 45 kg bottles.

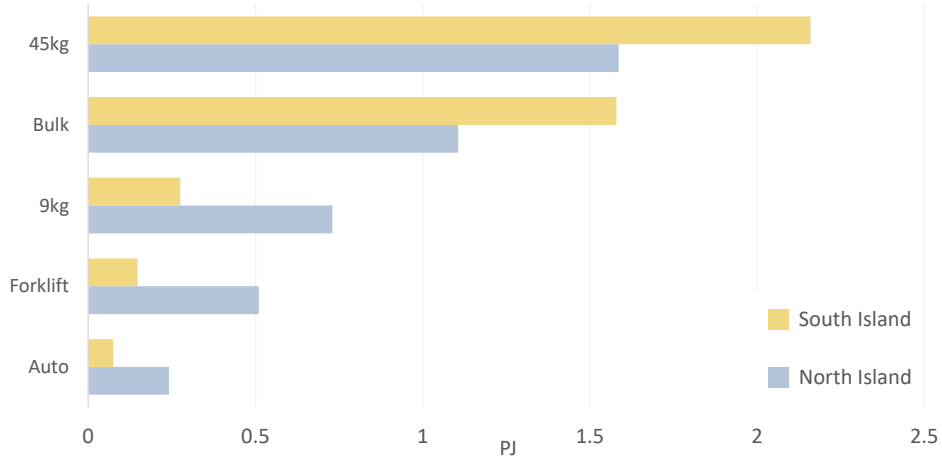
**Figure 6 LPG bullet tank**

Reticulated LPG networks are found in some locations in the South Island. They are similar to natural gas networks in the North Island in that they deliver gas to households and business via underground pipes. LPG networks generally fall into one of two categories: relatively large networks that were built to service industrial and commercial (and some residential) customers in and around a city centre; and networks that were built as part of the infrastructure supporting new residential subdivisions. In some cases, such as the LPG networks in Christchurch and Dunedin, the gas networks were originally built to supply coal gas and have since been converted to carry LPG. Figure 7 shows LPG storage and supply facilities in Woolston that feed Contact Energy's Christchurch network.

**Figure 7 LPG storage and supply point for Christchurch network**


Approximately equal amounts of LPG are consumed on an annual basis in the North and South Islands: about 4.2 PJ, as shown in Figure 8 below. Note that the chart refers to "bulk" supply, which in this case includes supply to customers by reticulated LPG network as well as to large commercial customers with dedicated storage cylinders that are refilled by truck.

**Figure 8 Sales of LPG by type and region (2016)**

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Source: Gas Association of New Zealand

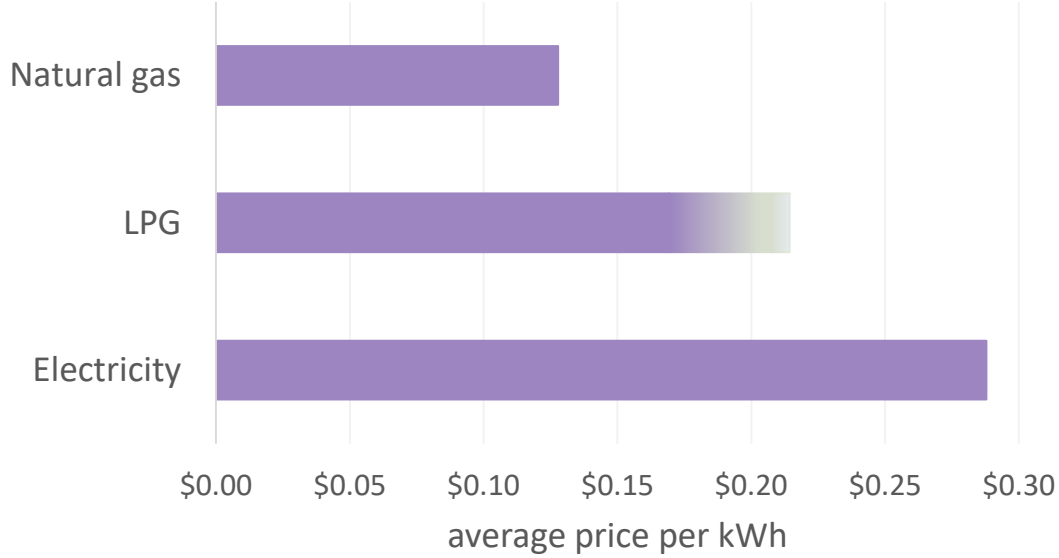
## LPG prices

The delivered price of LPG for residential use tends to fall somewhere between the delivered residential prices for natural gas and electricity.[3] In the following chart, average prices for natural gas and electricity are as calculated by the Ministry of Business, Innovation and Employment and include daily fixed charges (Ministry of Business, Innovation and Employment, 2017).

[3] Prices for commercial and industrial users of LPG are not publicly available so are not included in this discussion.

Prices for LPG are based on publicly available retailer tariffs and assume consumption of eleven 45 kg bottles of LPG.[4] The calculation includes yearly rental charges for the gas bottles. The chart reflects the range of LPG prices found – from about 17 to 21 cents per kWh.

**Figure 9: Delivered residential energy prices (2017)**

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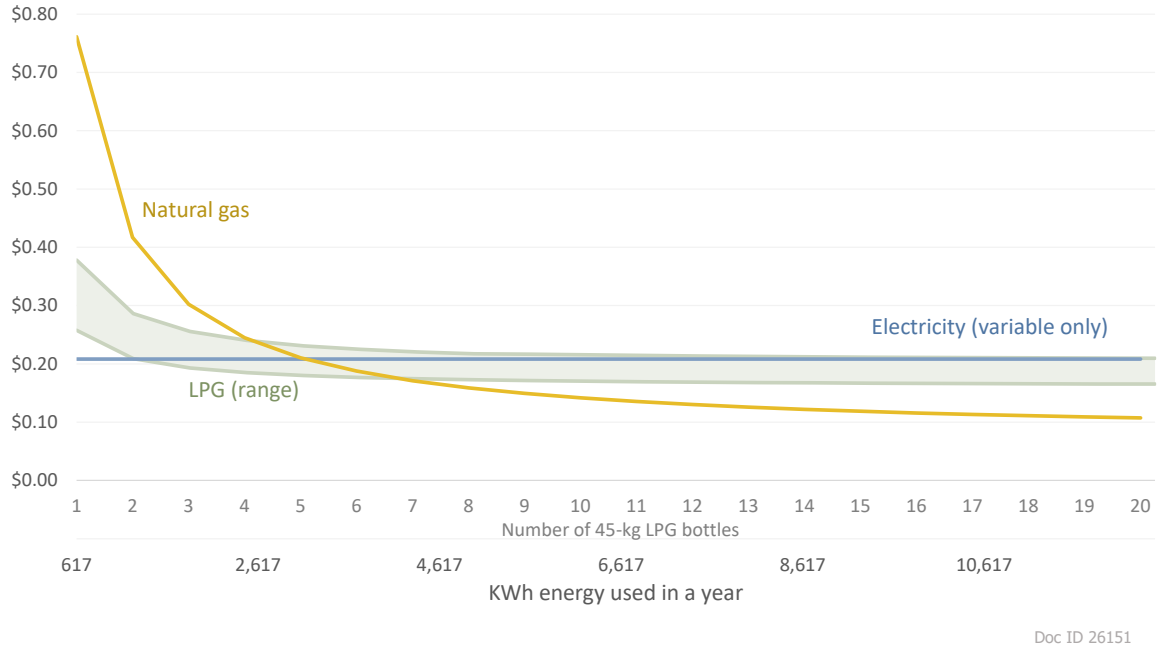
Source: Ministry of Business, Innovation and Employment; and online research[5]

For residential consumers, LPG can be an economical fuel choice, as illustrated in the chart below. For relatively low users of gas (up to about 3,000 kWh per year), LPG can be less expensive per unit than natural gas. For larger gas users, delivered LPG compares favourably on a per-unit basis to electricity. (Note that this analysis assumes that residential consumers are already electricity customers and so already pay daily electricity charges. The prices in the chart below show just the average variable cost of electricity – about 21.3 cents per kWh.)

[4] The average residential gas consumer uses between 20 and 30 GJ of gas a year. One 45-kg bottle of LPG contains about 2.22 GJ or about 617 kWh of energy. Eleven LPG bottles equals 24.4 GJ, so about what an average residential natural gas consumer might use.

[5] The MBIE-reported residential natural gas price is 12.79 c/kWh; the price for residential electricity is 28.79 c/kWh.

**Figure 10: Residential energy prices by annual consumption**




Source: online research[6]

For residential consumers, LPG can provide the energy for space and water heating and for cooking. But it is not the only means of providing heat and cooking energy. LPG competes against electricity and solid fuels such as wood and wood pellets; in some North Island locations, it also competes against reticulated natural gas. LPG has cost advantages for some customers, depending on their annual consumption. For consumers using between about 1,200 and 4,000 kWh per year, LPG can be the most economical choice, compared with both reticulated natural gas and electricity. For consumers who do not have the option of reticulated natural gas, LPG is almost always more cost effective than electricity.

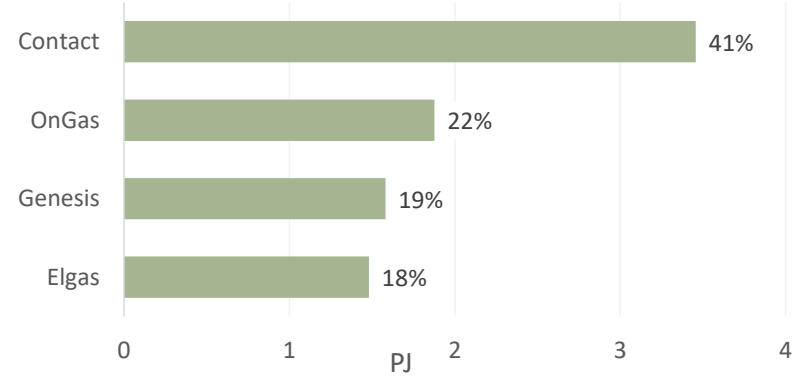
This cost advantage provides LPG's market niche. While LPG retailers are competing against each other, they are also competing against alternative fuel types. All else being equal, this competitive pressure should benefit LPG consumers, as LPG retailers will be incentivised to maintain and grow their market share through attractive prices and responsive customer service.

[6] Figures shown based on internet research. Natural gas average daily charge of $1.16, 7.28 c/kWh; electricity 20.81 c/kWh; including payment discounts. LPG charges range from $99 to $110 per bottle, and yearly bottle rentals from $60 to $120, depending on retailer and geographical area. All prices include GST.

# 5. Retail LPG market

There are four major retailers of LPG in New Zealand: Contact Energy, through its Rockgas brand; Vector, through its OnGas brand; Genesis Energy; and Elgas. Together, they sell about 8.4 PJ of LPG per year. In some cases, LPG is distributed or sold on behalf of other LPG retailers.

**Figure 11 LPG market share by volume**

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Source: Kidd, 2018

As shown previously in Figure 8, the largest segment of the LPG market is for 45 kg bottles, accounting for nearly half of all LPG sold. According to the LPG Association, there are about 150,000 45 kg bottle customers in New Zealand. For all of the LPG retailers, servicing this part of the market constitutes a large part of their operations.

Aside from their common focus on 45 kg consumers, each retailer has a slightly different focus in the LPG market, due to differences in the development of their LPG businesses and in their market strategies.

## Contact Energy

Contact is the largest retailer of LPG by virtue of its acquisition of Rockgas in 2007. Rockgas was originally founded in the 1930s as an LPG importer (Gaynor, 2015). The acquisition of Rockgas brought Contact an extensive network of regional Rockgas franchises and over 200 kilometres of reticulated networks in Christchurch, Queenstown, Wanaka, and other locations. (Contact Energy Limited, 2007).

Christchurch is the largest of Contact's reticulated networks; spanning over 180 km through Christchurch city centre and suburbs and serving about 1,800 customers. (Contact Energy Limited, 2015). The Queenstown reticulation network is approximately 140 km long and serves about 1,500 customers (Contact Energy Limited, 2016). Smaller reticulated networks exist in Arrowtown, Wanaka, Luggate, Lake Hayes and Walnut Grove, and Butel Park (Gas Association of New Zealand, 2006). Overall, less than 5% of Contact's 80,000 LPG customers are served through reticulated networks (Contact Energy Limited, 2013) (Contact Energy Limited, 2017).

## OnGas

OnGas is the retail LPG brand of Vector Limited. Vector became involved in the distribution and retailing of LPG when it acquired OnGas as part of the takeover of NGC Holdings Limited in 2005. At the time, OnGas supplied bulk and cylinder LPG through BP service stations (Vector Limited, 2005). In 2011, Vector acquired Kwik-Swap, a 9-kg LPG bottle swap operation (Vector Limited, 2011).

Today, OnGas is the second-largest retailer by volume, retailing LPG from over 800 bottle swap outlets across the country (Vector Limited, 2016). OnGas also has a focus on the market for LPG bottles for forklifts.

OnGas retails LPG on a number of reticulated systems in the South Island, including Wanaka, Tekapo, and Christchurch suburbs.[7]

## Genesis Energy

Genesis entered the LPG market due to its involvement in the development of the Kupe oil and gas field. The Kupe gas project was a joint venture between Genesis, Origin Energy, New Zealand Oil and Gas, and Mitsui (Genesis Energy Limited, 2005). Genesis entered the retail LPG market in 2008 (Genesis Energy Limited, 2008), and commissioning of the Kupe production station was completed in 2010 (Genesis Energy Limited, 2010).

In 2015, Genesis moved to acquire the LPG business of Nova Energy, which brought with it the capability to distribute bottled LPG and a significant increase in customer market share (Genesis Energy Limited, 2017). Genesis also took over Nova's two reticulated LPG networks located in Dunedin city and a new subdivision near Christchurch.

## ElGas

ElGas is a subsidiary of BOC Limited, an industrial gases company. ElGas is the largest retailer of LPG in Australia (PR Wire, 2016); in New Zealand, it is the fourth largest. In 2007, BOC acquired the LPG portfolio of Shell New Zealand Limited, including customer contracts, LPG depot and trucking equipment, and supply agreements. ElGas competes in the commercial and residential LPG sectors, and it also has the Swap 'n' Go brand of 9 kg LPG bottles. ElGas retails LPG on three South Island reticulated networks.

## Other retailers

There are a number of retailers who supply LPG via agreements with other LPG suppliers, including Trustpower, King Country Energy, and Pulse Energy.

[7] There is a list of locations on the OnGas website at https://www.ongas.co.nz/your-home/bottled-or-piped-lpg-supply

# 6. Are there barriers to LPG competition?

Part 4A of the Gas Act 1992 (Gas Act) and the Government Policy Statement on Gas Governance (GPS) both include, among Gas Industry Co's objectives:

*Barriers to competition in the gas industry are minimised;* and

*The facilitation and promotion of the ongoing supply of gas meets New Zealand's energy needs, by providing access to essential infrastructure and competitive market arrangements.*

The GPS further adds *Competition is facilitated in upstream and downstream gas markets by minimising barriers to access to essential infrastructure to the long-term benefit of end users.*

As the definition of "gas" in the legislation includes LPG as well as natural gas, Gas Industry Co is concerned to identify any barriers to competition that may exist in the LPG market. (Extracts from the Gas Act and GPS are set out in the Appendix.) This chapter provides an overview and analysis of aspects of the LPG industry that could pose barriers to competition in the LPG market, and it considers whether any of the assets involved in the distribution of LPG can be considered "essential infrastructure".

Our research for this chapter has been augmented by interviews with LPG retailers. We are grateful to the individuals and organisations involved.

## What is a barrier to competition?

Economists often refer to *barriers to entry*; that is, particular aspects that protect incumbent firms and restrict entry into a market by competing firms, thereby allowing incumbents to earn above-normal levels of profit. One widely-accepted definition holds that a barrier to entry is a cost that must be incurred by new entrants that incumbents do not or have not had to bear (Culbertson & Weinstein, 2004) – or, expressed slightly differently, an impediment to operating in a market that incumbents do not or have not had to face. Examples can include exclusive supplier agreements or tariffs that favour specific suppliers.

Gas Industry Co has not identified any such barriers to competition in the LPG market.

Other market attributes have been suggested by some economists as posing a barrier to entry, although they describe conditions facing all firms in a market. Of these, this paper mentions the two that are potentially most applicable to the LPG market.

Economies of scale is one such attribute. The idea is that the necessity of a firm to be large relative to the market in order to obtain productive efficiency creates a barrier to entry. This is because a prospective new entrant into such a market is faced with two unappealing options: operate at less than the efficient scale (and therefore face higher per unit supply costs than its competitors); or operate at or above the efficient scale, thus causing market supply to exceed demand and the industry selling price to fall below profitable levels. (McAfee, Mialon, & Williams, 2003).

Another posited barrier to entry is the need for large capital expenditure in order to enter a market, since the existence of large capital costs can magnify the risks of entry (potentially reinforcing other entry barriers) (McAfee, Mialon, & Williams, 2004). This is particularly the case with sunk costs. To enter a market, the entrant turns otherwise liquid capital into a frozen asset; in contrast, the incumbent's funds are already committed and exposed to the vagaries of the

particular industry. It is the risk of losing unrecoverable entry costs can be perceived as a barrier (Baumol & Willig, 1981).

However, both economies of scale and capital costs are market attributes that all firms in the LPG market face. Although they would factor into the calculations of a potential new entrant, they may not constitute barriers to entry per se:

> A common mistake …[is] to identify as barriers to entry costs that all firms have to pay, or delays that all firms have to endure, to enter the market. To enter almost any market takes time, requires investments in equipment and buildings, and involves costs and delays for hiring specialized employees. If these costs are a barrier to entry, then virtually every market has barriers to entry, and the concept of barriers to entry is useless for the purpose of identifying markets in which anticompetitive conduct could cause long-term harm to competition and consumers. (Culbertson & Weinstein, 2004)

Regardless of whether economists would consider them to be barriers to competition per se, the existence of economies of scale and capital costs nevertheless may act to impede the entry of smaller competitors into the market. The remainder of this chapter identifies how economies of scale and capital costs can apply to the LPG market and examines how the industry has addressed those aspects.

## Economies of scale

The market for LPG is growing, both in terms of customer numbers and overall demand. According to industry data, sales of LPG in 2017 were the highest in at least a decade (Gas Association of New Zealand, 2018).

But as attractive as LPG is for energy retailers, it can also be a difficult fuel to manage. LPG is a hazardous substance and it needs careful handling and specialised equipment. New Zealand's LPG supply comes principally from Taranaki, and there is cost and complexity in the logistics of transporting it to consumers across the North and South Islands – both in the bulk distribution of LPG to supply depots, and then in its distribution to individual customers.

This is an area where one would expect economies of scale; that is, for the average cost of delivering LPG to fall as the volume of LPG deliveries increases. Indeed, there are a lot of assets devoted to LPG transport to and within New Zealand: ship tankers, road tankers, import terminals, storage depots, LPG delivery vehicles, bottle filling facilities, and the like. On the face of it, a new entrant LPG retailer would need to supply a large number of customers to justify the cost of establishing a standalone LPG distribution network.

In reality, though, these economies of scale do not appear to pose a barrier to competition in the New Zealand market. LPG retailers do not need to meet the costs of standalone distribution systems, due to the existence of Liquigas and the ability to enter into distribution agreements with other retailers.

### Liquigas

Liquigas is New Zealand's largest handler of bulk LPG. Originally established as an LPG wholesaler, the company is now a provider of LPG infrastructure and provides its services on an open access basis to the rest of the LPG market[8]. Liquigas distributes and stores LPG for the domestic market at its terminals in Auckland, Port Taranaki, Christchurch and Dunedin. When it is needed, Liquigas coordinates the buying, import and distribution of LPG from the international

[8] Liquigas's shareholders include Vector, ElGas, Nova Energy, and Rockgas (a subsidiary of Contact Energy). In accordance with a 2003 settlement between Liquigas and the Commerce Commission, the prices of Liquigas's goods and services are set by a pricing committee chaired by an independent director. See "Commission settles with Liquigas" at https://www.comcom.govt.nz/dmsdocument/1842

market to ensure a continuous and uninterrupted supply to New Zealand customers (Liquigas Limited, 2015).

**Distribution agreements**

At times, retailers enter into delivery agreements with other retailers. This could be to service a market niche or geographical area where one retailer does not have the capacity to provide the service itself. Examples include Contact Energy undertaking bulk transportation of LPG on behalf of OnGas (Contact Energy Limited, 2017) and Elgas distributing LPG on behalf of Genesis Energy. Other examples include white label retail services that allow other energy retailers to be involved in the LPG market.

The existence of Liquigas and the ability to enter into distribution agreements mean that LPG retailers can enter the market without having to establish their own LPG distribution and delivery infrastructure. So while economies of scale are a feature of the LPG market, they do not appear to create undue barriers to entry or competition because of the way that the industry is organised and operates.

## Capital expenditure

The issues of bulk LPG transport and distribution to customers have been addressed above, but LPG retailers still need a way to provide LPG to their customers, either through LPG bottles or through reticulated systems, and these items can have a significant cost.

**Bottle return protocol**

Residential LPG customers are most often supplied with two 45 kg bottles, as shown above in Figure 5. The LPG industry, aided by the LPG Association, now has a protocol in place that governs what happens when a customer switches supplier. Under the protocol, when making the first delivery to a new customer, the incoming retailer collects the previous retailer's bottles, so that they can be returned to the retailer that owns them. Forklift bottles and 45 kg bottles used for commercial customers are also covered under the bottle return protocol.

This protocol accomplishes a number of objectives. It makes the process of switching LPG retailer easier for the customer, since there is no need to coordinate the pickup and delivery of two different sets of bottles. (Under LPG safety requirements, all LPG bottles must be treated as full, and sites with more than 100 kg of LPG need special certification. This means that a residential customer can only have a maximum of two 45 kg bottles on its premises, so without the protocol, the existing bottles would have to be taken away before the new retailer's bottles could be delivered.)

The protocol also allows retailers to use their bottles more efficiently. Without the protocol, retailers' bottles sometimes went missing or took a long time to be returned to their owners. With the protocol, retailers can recirculate their bottles more quickly, potentially reducing the overall number of bottles they need to purchase. In this way, the bottle return protocol acts to minimise the capital outlay required to be spent on LPG bottles.

There are also two aspects of retailing LPG where no formal industry arrangement is in place: LPG bullets and reticulated systems.

**LPG Bullets**

As outlined previously, large commercial and industrial LPG customers are often supplied via bullets, which are dedicated large storage tanks located on customers' premises and refilled by LPG delivery trucks. Bullets are generally owned by LPG retailers, who take responsibility for the periodic maintenance and inspection that the bullets require. It has been suggested from time to time that there should be a protocol governing the possible transfer of these bullets from outgoing to incoming retailer when a customer changes LPG supplier. (At the moment, as Gas

Industry Co understands it, customer contracts generally specify that bulk tanks will be removed at the end of the contract. Retailers have stressed that the industry generally works well together to coordinate switchovers so as to minimise down time for customers.)

From the discussions Gas Industry Co has had with LPG retailers, none are in favour of an arrangement that would require the transfer of these assets, either from the buyer's or the seller's point of view. From the perspective of the incoming retailer, there are two common themes. The first relates to regulatory compliance: it is the responsibility of an LPG retailer to ensure that its assets are compliant with all the relevant requirements. Purchasing a bullet from another retailer carries a risk, as the potential new owner does not know for sure the bullet's provenance or how it has been maintained.

The second reason relates to customer service. If a large commercial or industrial customer decides to switch LPG supplier, it is often because the incoming supplier has proposed a supply configuration that suits the customer better. This could mean a different location for the LPG bottles or bullet, or it could mean a different arrangement that changes the means and frequency of LPG deliveries. In both cases, the incoming retailer would not want to acquire the assets of the outgoing retailer.

Outgoing retailers would not necessarily want to sell their bullets, either. They are valuable assets that can be redeployed at another customer site.

Notwithstanding these concerns, retailers have told Gas Industry Co that sometimes transfers of assets do happen when customers change retailer, and most retailers were at least open to the suggestion. Their perspective seems to be that if a deal can be done that is good for the customer and good for both of the retailers involved, then why wouldn't you do it? But no one would want to be forced to make a deal that would not happen voluntarily.

**Reticulated networks**

As outlined in Chapter 5, there are a number of reticulated LPG networks in the South Island. These networks generally fall into one of two categories: they either service a city centre and its commercial customers such as hotels and apartment buildings (and occasionally industrial customers as well); or they serve a residential subdivision. In either case, the reticulated networks operate from large LPG storage facilities that allow the LPG to vaporise and enter the reticulation system.

At present, the reticulated networks are used exclusively by their owners (or, in some cases, by their operators) to supply LPG to customers. That is, there is no third party access and no retail competition on these networks, and it has been suggested to Gas Industry Co from time to time that this lack of access is a barrier to competition. The competition aspects of reticulated LPG networks are discussed below under *Are LPG networks essential infrastructure?*.

There are also other aspects regarding the reticulated networks that are worth considering, as third party access would entail operational and logistical challenges. First and foremost would be the need to resolve the potential safety and liability issues that would arise if a third party were loading LPG into another retailer's storage tanks. These issues could involve physical access to the storage facilities as well as the specification of the gas that added to the storage tank.

In addition, multiple retailers on a system would necessitate a way of calculating how much LPG each retailer's customers have used and balancing the total with the amount of LPG that each retailer has put into the system. This, in turn, would require a registry that would record the retailer associated with each customer on the reticulated system. As a comparison, the allocation system and registry for the natural gas market cost about $515,000 and $270,000, respectively, per year to operate, after initial development costs of about $1 million for each system. Systems for the reticulated LPG networks would doubtless be less complicated and less expensive (and

possibly could be added to existing systems), but they would still impose a real cost to retailers servicing this part of the market.

Recognising the difficulties, none of the retailers Gas Industry Co spoke with favoured the idea of requiring open access on the reticulated networks – even the ones that would stand to gain access to a larger portion of the market. Despite this viewpoint, there was a suggestion that there may be scope for sharing network access in some cases. This is consistent with the perspective regarding the selling of storage tanks: if there is a situation that would benefit the customer as well as the retailers involved, then it would be worth considering. But retailers have stated that they would be opposed to having third party access required of them.

## What is essential infrastructure?

Both the Gas Act and the GPS refer to access to *essential infrastructure*, although that term is not defined in either document. Neither does *essential infrastructure* appear to be used in any other piece of New Zealand legislation.

Australia seems similarly to have grappled with the question of access to essential infrastructure. The issue was included in the National Competition Policy: Report by the Independent Committee of Inquiry (also known as the Hilmer report), which was released in 1993. That report considered what it called the "essential facilities" problem:

> Some economic activities exhibit natural monopoly characteristics, in the sense that they cannot be duplicated economically. While it is difficult to define precisely the term "natural monopoly", electricity transmission grids, telecommunication networks, rail tracks, major pipelines, ports and airports are often given as examples. Some facilities that exhibit these characteristics occupy strategic positions in an industry, and are thus "essential facilities" in the sense that access to the facility is required if a business is to be able to compete effectively in upstream or downstream markets. For example, competition in electricity generation and in the provision of rail services requires access to transmission grids and rail tracks respectively. (Hilmer, Rayner, & Taperell, 1993, p. 240)

The findings of that report led to the creation of a regulatory regime in Australia that established a means of regulating third party access to nationally significant infrastructure services. The current legislation prescribes four major criteria, all of which need to be satisfied to require third party access to a particular service (National Competition Council, 2018, p. 17):

- That access to the service would promote a material increase in competition in at least one market (other than the market for the service);
- That the facility used to provide the service could meet the total foreseeable demand in the market and at least cost;
- That the facility is of national significance, having regard to its size, its importance to trade, and its importance to the national economy; and
- That access would promote the public interest.

Of course, Australian legislation is of limited relevance in the context of New Zealand competition issues, but the criteria above do provide a useful reference for thinking about what essential infrastructure might mean within this country. One theme that seems to run through all four criteria is the magnitude of the facility – that it be nationally significant and that access to it would provide a material increase in competition, meet total foreseeable demand, and promote the public interest. It seems reasonable to consider that magnitude might similarly be important in defining essential infrastructure in the New Zealand context.

## Are LPG networks essential infrastructure?

As noted earlier, it has been suggested to Gas Industry Co that the lack of third party access on reticulated LPG networks presents a barrier to competition. Implicit in this thinking is that third party LPG retailers would be able to offer lower prices and/or better service, thus stimulating competition and benefitting consumers.

Do the reticulated LPG networks have sufficient magnitude to be considered essential infrastructure? Gas Industry Co does not have exact figures on the number of customers on each reticulated network, but it appears that Christchurch is the largest, with fewer than 2,000 customers. Other city centre networks may similarly have over a thousand customers. Some residential networks, on the other hand, can be much smaller, serving perhaps a few dozen customers. In contrast, there are approximately 150,000 total residential and commercial customers (including both 45 kg bottle customers and those served on reticulated networks). That is, the Christchurch network represents about 1.3% of customer market share. Overall, there are an estimated 5,000 consumers connected to LPG networks, or 3.3% of the market.

Although open access is the norm[9] for natural gas networks in New Zealand, reticulated networks for LPG are different. One important distinction is that, while natural gas can only be supplied to a customer via natural gas transmission and distribution pipelines, LPG can be supplied in a number of ways, including through reticulated pipelines, delivery of LPG bottles, and delivery by specialised tanker truck into stationary LPG storage tanks. LPG customers who are served via reticulated networks can choose to switch supplier and get LPG delivered in bottles or through other means; or they can choose to convert their appliances to another energy type, such as electricity or biofuels. These options are likely to place competitive pressures on reticulated LPG prices. It also means that third party access to reticulated networks may be unlikely to have a material effect on competition, since retailers are already competing via alternate delivery methods and other forms of delivered energy.

LPG retailers have chosen to invest in reticulated networks as a way of distributing LPG to their customers, in the same way that some LPG retailers have invested in fleets of delivery trucks and inventories of LPG bottles. In this way, reticulated LPG networks can be considered analogous to the distribution networks owned by Nova Gas Limited, on which Nova Energy is the sole retailer.[10] (Note that the similarity is not exact, since many of the consumers connected to Nova Gas's networks do not have the option of an alternate supply for their natural gas.)

In short, reticulated LPG networks represent only a small fraction of the overall LPG market (which itself is small compared to other energy markets, such as liquid fuels, electricity, and natural gas), and customers on those networks have alternate energy choices. Gas Industry Co does not, therefore, consider that the reticulated LPG networks have a significant influence on the national economy, nor do we think that third party access would promote a material increase in LPG competition. It is also questionable whether third party access would be in the public interest, taking into account the costs that an LPG registry and allocation system would entail. Overall, Gas Industry Co does not consider that the reticulated LPG networks would be

[9] On the transmission system, open access is codified under the Maui Pipeline Operating Code and the Vector Transmission Code. While there are no regulatory requirements for access to the natural gas distribution systems to be open access, most distribution networks are operated on an open-access basis. The overwhelming majority of natural gas consumers are on open access networks. The exception are the distribution networks owned and operated by Nova, which distribute natural gas to fewer than 250 consumers – about 0.08% of the market.

[10] In the Gas Control Inquiry Final Report, the Commerce Commission compared Nova Gas's natural gas networks to other distribution networks: "Compared to the incumbent network operator, Nova Gas has a network which is very much smaller, it does not have an unbundled distribution charge, it does not make its network available to other retailers, and its principal activity is gas retailing. The Commission recognises that Nova Gas has a reputation as a 'maverick' in the market. These factors significantly reduce the potential for coordinated behaviour in the future" (Commerce Commission, 2004). The Commission concluded that Nova Gas faced competition from other gas pipelines and other fuels and did not recommend that it be placed under price control (as many gas distributors were). Subsequent to the 2003 Gas Pipeline Inquiry, the Commerce Act 1986 was amended to exempt Nova Gas's pipelines from the price/quality regulation in Part 4.

considered nationally significant under the Australian criteria, nor do we see a case for considering them essential infrastructure under the Gas Act and GPS. In these circumstances, we do not, therefore, perceive that there is an economic or competition reason to require third party access on the reticulated networks.

## Retailers' views on barriers to competition

Gas Industry Co spoke with five LPG retailers in the course of preparing this paper: Contact Energy, ElGas, Genesis Energy, Nova Energy (previously an LPG retailer), and OnGas. All had different attributes: different histories with LPG retailing, types of customers, degrees of vertical integration, and so on. Each retailer had its own strategy for growing its LPG business.

A number of retailers emphasised the competitiveness of the LPG market; they compete on customer service as well as price. When asked about possible barriers to competition, retailers reported that they felt able to compete in the current environment. They considered that any regulatory intervention would make the market less fair – even when those interventions would benefit them individually.

## Concluding thoughts on barriers to competition

This chapter has presented a high level overview of the LPG market, drawing on economic literature and discussions with retailers.[11] Gas Industry Co has not identified any barriers to entry in the LPG market; that is, any costs or impediments that are not faced by all LPG retailers. There do appear to be economies of scale in the distribution of LPG, and the industry has evolved ways to rationalise the LPG delivery infrastructure, potentially allowing competition by retailers who would otherwise be unable to compete in the market.

At the same time, LPG retailers do face costs in terms of LPG bottles, bullets, and reticulated systems. A protocol exists for the return of some LPG bottles, which may help to minimise the number of bottles that an LPG retailer needs to own in order to service its customers. There are no protocols for LPG bullets or access to reticulated systems, but Gas Industry Co does not perceive that there is a need or a justification for such arrangements, and there would be practical difficulties with putting such arrangements in place.

As to the question of whether the reticulated networks can be classified as essential infrastructure, they serve a small portion of the LPG market, and customers on those networks have other fuel choices. In these circumstances, Gas Industry Co does not consider that they can be considered *essential*.

In summary, Gas Industry Co has not identified any barriers to competition in the retail LPG market that we consider need to be addressed at this time.

[11] It is worth noting this assessment is not the same as an inquiry or investigation by the Commerce Commission.

# Appendix A Extracts from Gas Act and GPS

## Inclusion of LPG in the definition of "gas"

LPG is explicitly included in the definition of gas in the Gas Act 1992, which defines "gas" in section 2(1) as:

> *Gas means any fuel that is supplied through pipes or in containers and is a gas at a temperature of 15°C and an absolute pressure of 101.325 kilopascals; and includes —*
>
> *(a) biogas, cola gas, **liquefied petroleum gas**, natural gas, oil gas, producer gas, refinery gas, reformed natural gas, and tempered liquefied petroleum gas:*[12]
>
> *(b) any gaseous substance that the Governor-General declares by Order in Council to be a gas for the purposes of this Act:*
>
> *(c) any mixture of gases.*

In other words, LPG is covered by the Gas Act in much the same way that natural gas is.

But there are some exceptions that apply to LPG. Section 3(2) of the Gas Act states:

> *Nothing in this Act (other than sections 54(1)(n)(ii) and 55)*[13] *applies to —*
>
> ***(a) any gas in circumstances in which any of the following enactments, or any regulations made under any of those enactments, apply:***
>
> ***(i) the Crown Minerals Act 1991:***
>
> ***(ii) the Shipping and Seamen Act 1952:***
>
> ***(iii) the Land Transport Act 1998:***
>
> *(b) any gas installation or class of gas installation that the Governor-General declares by Order in Council to be a gas installation or, as the case requires, a class of gas installation to which this Act does not apply:*
>
> *(c) any gas appliance or class of gas appliance that the Governor-General declares by Order in Council to be a gas appliance or, as the case requires, a class of gas appliance to which the Act does not apply:*
>
> *(d) any gas used as a feedstock, excluding any gas being reformed for use as a gaseous fuel:*
>
> *(e) any gas appliance used in metal working and fuelled exclusively by acetylene or any prescribed gas:*
>
> *(f) any gas appliance designed to be fuelled exclusively from a container not exceeding 120 millilitres in capacity:*
>
> ***(g) any container used, or designed or intended to be used, for the storage of gas:***

[12] Tempered liquefied petroleum gas means a mixture of vaporized liquefied petroleum gas and air.

[13] Section 54(1)(n)(ii) authorises WorkSafe to obtain information concerning the production, transmission, distribution, sale, consumption, application, and supply of gas for statistical purposes; section 55 provides for regulations relating to information disclosure.

***(h) any liquefied petroleum gas that is in a liquid form and is in a pipe.***

The exclusions listed in section 3(2)(a) relate to:

- Prospecting for, exploring for, and mining LPG;
- Transporting LPG by ship, both New Zealand ships in New Zealand waters and elsewhere; and foreign ships in New Zealand waters.[14]
- Transporting LPG on land, under the Dangerous Goods 2005 Rule made under the Land Transport Act 1998;

The other exclusions in the Gas Act relate to:

- LPG storage containers, such as cylinders and tanks; and
- Transporting LPG in liquid form in pipes, such as between transport depots and bulk storage facilities.

## Gas Industry Co's statutory objectives

Part 4A of the Gas Act provides for the governance of the gas industry and spells out the matters on which regulations and rules may be made. Section 43ZN sets out the statutory objectives of Gas Industry Co as the industry body:

> The objectives of the industry body, in recommending gas governance regulations under section 43F [for wholesale market, processing facilities, and the transmission and distribution of gas], are as follows:
>
> (a) the principal objective is to ensure that gas is delivered to existing and new customers in a safe, efficient, and reliable manner; and
>
> (b) the other objectives are —
>
> (i) The facilitation and promotion of the ongoing supply of gas to meet New Zealand's energy needs, by providing access to essential infrastructure and competitive market arrangements:
>
> (ii) Barriers to competition in the gas industry are minimised:
>
> (iii) Incentives for investment in gas processing facilities, transmission, and distribution are maintained or enhanced:
>
> (iv) Delivered gas costs and prices are subject to sustained downward pressure:
>
> (v) Risks relating to security of supply, including transmport arrangements, are properly and efficiently managed by all parties:
>
> (vi) Consistency with the Government's gas safety regime is maintained.

Under section 43ZO of the Gas Act, the Minister may set objectives and outcomes for the industry body via a government policy statement. The Government Policy Statement on Gas Governance[15], issued April 2008, extends the policy objectives found in the Gas Act in paragraphs seven through 12:

[14] The Shipping and Seamen Act 1952 has been repealed, but regulations made under that Act continue as if made under the Maritime Transport Act 1994, which replaced it. Maritime Rules: Part 24A: Carriage of Cargoes – Dangerous Goods, promulgated under the Maritime Transport Act 1994, set out requirements for carrying dangerous goods (including flammable gases and liquids) on a ship.

[15] Available on the Ministry of Business, Innovation and Employment's website at http://www.mbie.govt.nz/info-services/sectors-industries/energy/gas-market/documents-image-library/governament-policy-gas-governance-2008.pdf

## Government policy objectives for the gas industry

*7.* The Gas Act 1992 sets out the principal policy objective for Gas Industry Co., when recommending rules or regulations for wholesale market, processing facilities, transmission, and distribution of gas, as follows:

*"To ensure that gas is delivered to existing and new customers in a safe, efficient, and reliable manner."*

8. It is the Government's objective that when recommending rules, regulations or non-regulatory arrangements Gas Industry Co. applies this policy objective to all its work.

*9.* It is also the Government's objective that Gas Industry Co. takes account of fairness and environmental sustainability in all its recommendations. To this end, the Government's objective for the entire gas industry is as follows:

*To ensure that gas is delivered to existing and new customers in a safe, efficient, fair, reliable and environmentally sustainable manner.*

10. It is against this objective that Gas Industry Co. must have regard when making recommendations for rules, regulations or non-regulatory arrangements for any part of the gas industry and against which it must report.

11. The Gas Act 1992 also sets out the following other objectives for Gas Industry Co. when recommending rules or regulations for wholesale market, processing facilities, transmission, and distribution of gas:

    a) The facilitation and promotion of the ongoing supply of gas meets New Zealand's energy needs, by providing access to essential infrastructure and competitive market arrangements;

    b) Barriers to competition in the gas industry are minimised;

    c) Incentives for investment in gas processing facilities, transmission and distribution, energy efficiency and demand-side management are maintained or enhanced;

    d) Delivered gas costs and prices are subject to sustained downward pressure;

    e) Risks relating to security of supply, including transport arrangements, are properly and efficiently managed by all parties; and

    f) Consistency with the Government's gas safety regime is maintained.

12. It is the Government's intent that these other policy objectives should apply to all Gas Industry Co. recommendations for rules, regulations or non-regulatory arrangements for all parts of the gas industry. In addition, the Government adds the following objectives:

a) Energy and other resources used to deliver gas to consumers are used efficiently;

b) Competition is facilitated in upstream and downstream gas markets by minimising barriers to access to essential infrastructure to the long-term benefit of end users;

c) The full costs of producing and transporting gas are signalled to consumers;

d) The quality of gas services where those services include a trade-off between quality and price, as far as possible, reflect customers' preferences; and

e) The gas sector contributes to achieving the Government's climate change objectives as set out in the New Zealand Energy Strategy, or any other document the Minister of Energy may specify from time to time, by minimising gas losses and promoting demand-side management and energy efficiency.

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# ABOUT GAS INDUSTRY CO

Gas Industry Co is the gas industry body and co-regulator under the Gas Act. Its role is to:

- develop arrangements, including regulations where appropriate, which improve:
  - the operation of gas markets;
  - access to infrastructure; and
  - consumer outcomes;
- develop these arrangements with the principal objective to ensure that gas is delivered to existing and new customers in a safe, efficient, reliable, fair and environmentally sustainable manner; and
- oversee compliance with, and review such arrangements.

Gas Industry Co is required to have regard to the Government's policy objectives for the gas sector, and to report on the achievement of those objectives and on the state of the New Zealand gas industry.

Gas Industry Co's corporate strategy is to 'optimise the contribution of gas to New Zealand'.