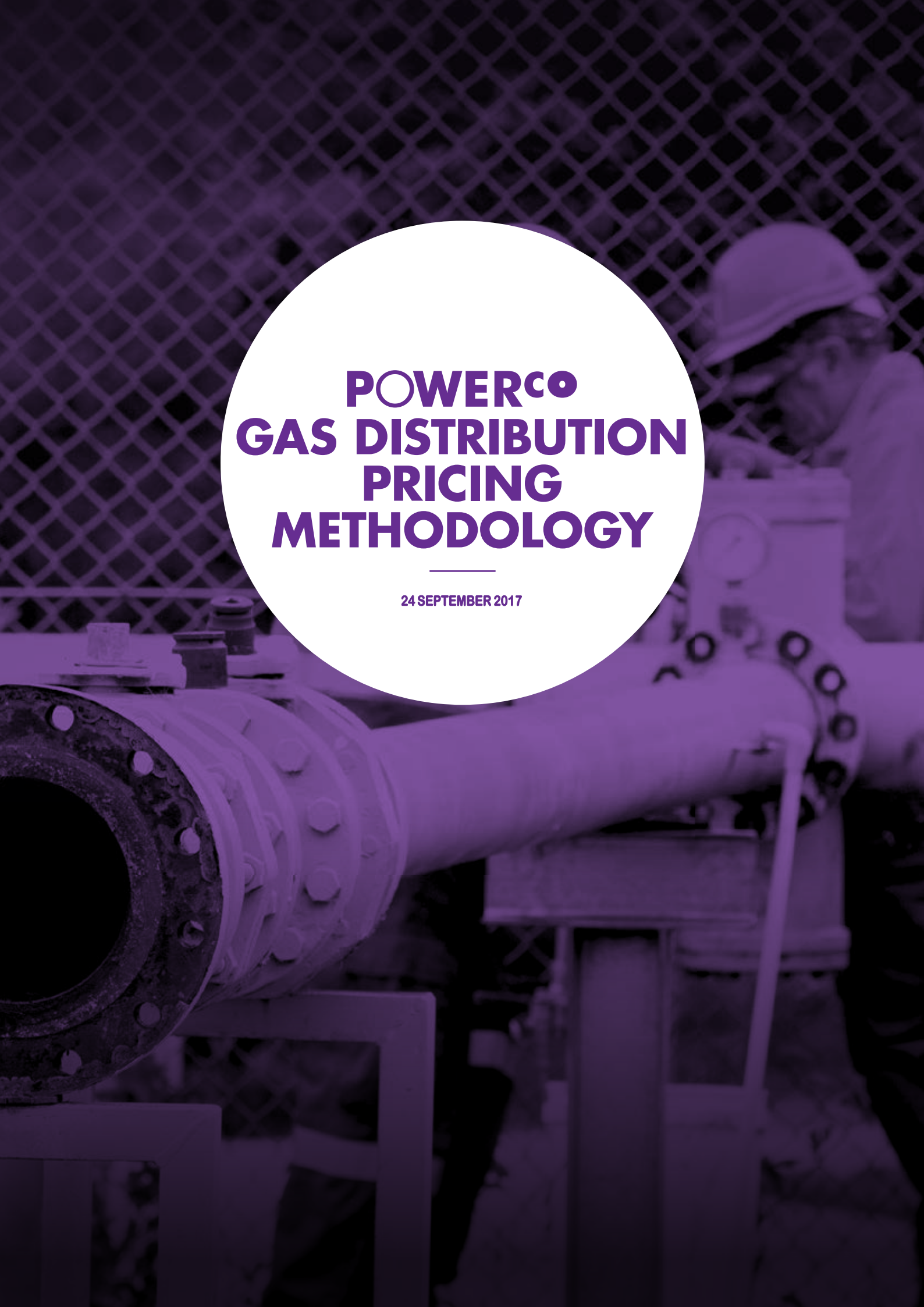

POWERCO GAS DISTRIBUTION PRICING METHODOLOGY

24 SEPTEMBER 2017

Foreword

This document presents Powerco's pricing methodology for gas distribution services for the 2017/18 pricing year. It has been prepared in accordance with the requirements of the Commerce Act (Gas Distribution Services Input Methodologies) Determination 2012 and the Commerce Act (Gas Distribution Services Information Disclosure) Determination 2012.

In brief, this document contains a summary of the factors that Powerco considered when developing its pricing strategy and pricing methodology, an overview of the cost allocation process, Powerco's 2017/18 target revenue, and the allocation of that revenue, and its medium term pricing strategy.

CONTENTS

COMMONLY USED TERMS IN THIS REPORT

Term	Definition
Demand	Term used to denote the peak consumption of gas
Gas Consumer / Gas Customer	This report uses the term "consumer" when discussing general characteristics of consumers of natural gas in the New Zealand market; "customer" specifically refers to a party who is connected to Powerco's gas network and to whom Powerco provides gas distribution and/or metering services.
GDB	Gas distribution business.
Gigajoule (GJ)	A quantity measure of the energy content of gas. Residential gas tariffs often measure gas usage in terms of equivalent kilowatt hours (kWh); however, Powerco measures gas consumption in terms of gigajoules.
ICP	Installation Control Point or individual connection to the gas network. The term ICP is used to denote a specific gas customer.
Load Group	A category of Powerco distribution customer, with a defined capacity and annual consumption that receives a specific distribution tariff.
Mass Market	Load groups to which standard, published tariffs apply; the bulk of Powerco's customers are considered mass market. By contrast, non-standard customers have special requirements and individual pricing arrangements.
Standard cubic meters per hour (scmh)	Flow rate of natural gas through a pipeline or a meter. The "standard" refers to the temperature and pressure conditions under which the flow rate is measured.
Volume	Term used to denote consumption over a period of time, such as a day or a year.

1. EXECUTIVE SUMMARY

This document presents Powerco's pricing methodology and proposed gas distribution prices for the 2017/18 pricing year. The document has been prepared in accordance with the requirements of the Commerce Act (Gas Distribution Services Input Methodologies) Determination 2012 and the Commerce Act (Gas Distribution Services Information Disclosure) Determination 2012.

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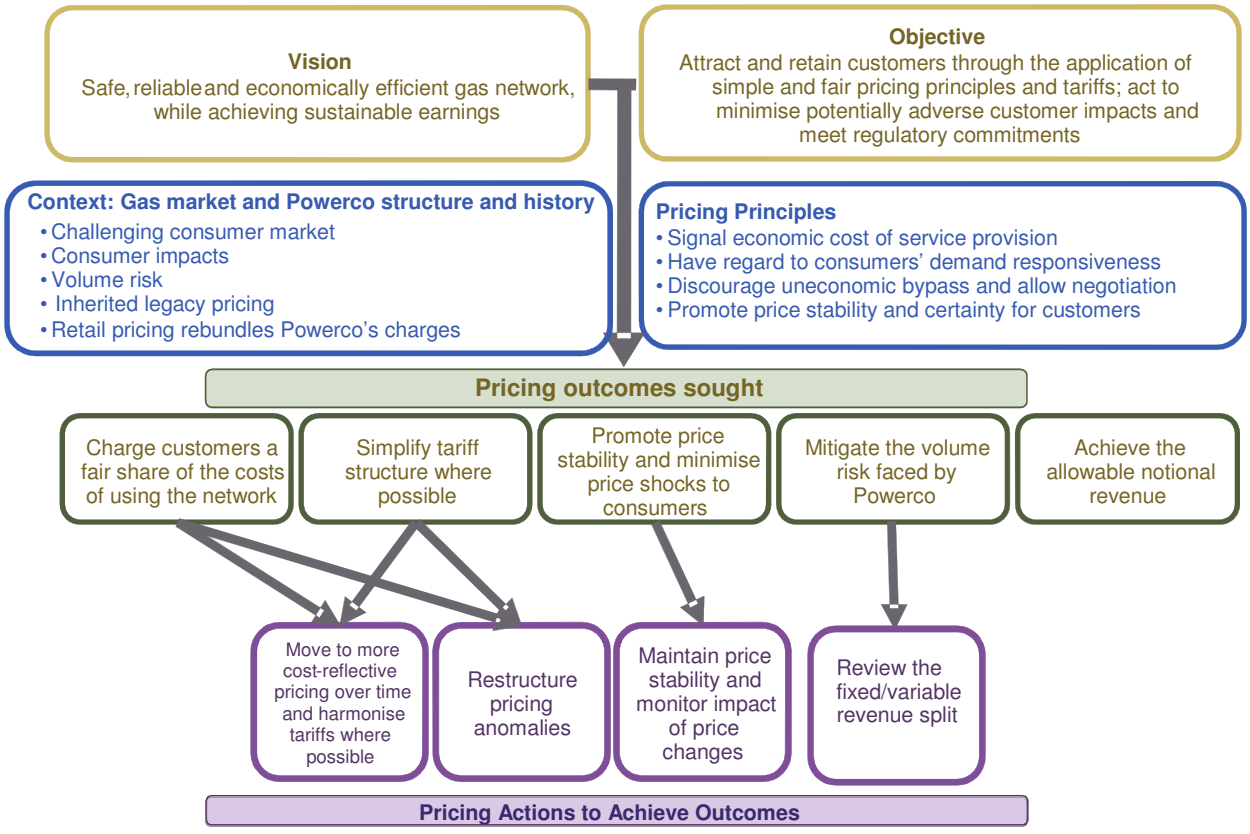
1.1 PRICE SETTING POLICY FRAMEWORK

Powerco's pricing methodology framework begins with its vision for its gas business: to provide safe, reliable, and economically efficient gas network distribution services while achieving sustainable earnings. The pricing framework aims to attract and retain customers through the application of simple and fair tariffs while meeting its regulatory commitments.

When developing its pricing methodology, Powerco has considered a number of contextual factors as summarised in the diagram below.

Schematic of Price Setting Policy Framework



Price Setting Considerations

There are a number of contextual factors that have helped shape the development of Powerco's pricing methodology; these are summarised below:

- Challenging consumer market: The consumption of natural gas is currently either stable or increasing very slowly. Promoting an increase in connection numbers and an increase in gas consumption would be in Powerco's commercial interest but would also be helpful to consumers, as it would help reduce the average cost of distributing gas. Greater use of gas would also be consistent with the government's energy and climate change strategies, as natural gas, when burned directly, is a very efficient source of energy with a smaller carbon footprint than other fossil fuels.
- Consumer impacts: Customers' investment in gas appliances represents a commitment to use gas in the future. As a quid pro quo, Powerco believes it has a commitment to help keep future gas prices as stable as possible.
- Volume risk: Annual gas consumption can vary due to weather patterns. Two part pricing can help to manage this risk.
- Pricing structure: Powerco's current gas distribution prices are largely a product of history; in many cases, prices have perpetuated legacy pricing structures. Where possible, this pricing methodology aims to promote greater harmonisation and simplification of prices.
- Retail pricing issues: Distribution prices represent approximately 30% of retail gas tariffs, and gas retailers may not have the incentives that Powerco has to attract and retain gas customers. These differences present challenges in terms of delivering distribution pricing signals to end-use customers.

Pricing Outcomes Sought

When developing and implementing its pricing methodology, Powerco has sought to:

- achieve its target revenue in order to sustain the gas network and provide for future investment;
- charge customers a reasonable share of the costs of using the network;
- promote price stability and minimise price shocks to customers;
- simplify tariff structures where possible; and
- mitigate the volume risk faced by Powerco.

Summary of medium-term pricing strategy

Powerco is developing a new medium term pricing strategy for its gas distribution business, which will over time, remove pricing anomalies between regions and customer load groups and set prices that better reflect the actual costs of supplying those load groups. The first step in this exercise was the development of a refined and updated gas cost of supply model (COSM) which was completed in March 2015. The updated COSM incorporates

clearly defined rules, based on economic pricing theory and generally accepted accounting practice, to allocate costs between fixed and consumption-based charges and, where appropriate, between regions and customer load groups and hence generate indicative final charges that Powerco assesses against existing tariff structures.

As part of its pricing strategy, Powerco is also concerned to ensure that reticulated gas is an attractive fuel option for households, now and in the future. Consequently, Powerco places a high priority on managing the effects of any price changes, with the objective of ensuring that no individual customer's distribution charges vary by more than 15 per cent per annum.

1.2 DESCRIPTION OF THE PRICING METHODOLOGY

The steps Powerco has followed when implementing its pricing methodology are:

1. determine Powerco's gas distribution costs using its cost of supply model;
2. allocate customers to network load groups, based on historical consumption volumes;
3. allocate costs to customer groups using appropriate allocation factors. Powerco's cost of supply model analyses costs within each of its five gas network areas for each of its six standard and two non-standard customer classes;
4. assess prices to determine consistency with the Commerce Commission's pricing principles and Powerco's objectives.

1.3 COMPLIANCE WITH THE PRICING PRINCIPLES

Powerco's compliance with the pricing principles in clause 2.5.2 of the Commerce Act (Gas Distribution Services Input Methodologies) Determination 2012 is summarised in the table below:

Summary of Compliance with Pricing Principles

Principle	Compliance
1) Prices are to signal the economic costs of service provision, by a) being subsidy free (equal or greater than incremental costs, and less than or equal to standalone costs);	The proposed prices fall within the subsidy-free range, as demonstrated by the charts shown in Appendix 1 of the pricing methodology.
b) having regard, to the extent practicable, to the level of available service capacity; and, c) signalling, to the extent practicable, the impact of additional usage on future investment costs.	Coincident peak demand charging was considered, but would be impractical to implement for mass market customers. The ability to store gas in the network ("line pack") also undermines the economic case for coincident peak charging as higher peak demand does not necessarily trigger the need for additional capex. Locational capacity signalling is used in the case of high volume users and subdivisions located away from the existing network.
2) Where prices based on "efficient" incremental costs would under-recover allowed revenues, the shortfall should be made up by prices being set in a manner that has regard to consumers' demand responsiveness, to the extent practicable.	This pricing principle envisages the possible use of Ramsey pricing[1] or some form of coincident peak charging. However, Ramsey pricing is impractical as there is very limited information available on the price elasticity of demand for gas. In any event, distribution charges are invariably smaller than the charges for the energy that is consumed in conjunction with distribution services, so any price signals provided by the distribution charge are bound to be substantially diluted. With respect to coincident peak demand charging see the comment in the cell above. Powerco has tailored the G06 residential tariff to reflect the preferences of small residential customers.
3) Provided that prices satisfy (1) above, prices should be responsive to the requirements and circumstances of users in order to: a) discourage uneconomic bypass, and, b) allow negotiation to better reflect the economic value of services and enable consumers to make price/quality trade-offs or non-standard arrangements for services.	Powerco offers non-standard tariffs to industrial and commercial customers to address the risk of bypass and to enable arrangements that are tailored to customers' needs. These tariffs are reviewed to ensure they do not exceed stand alone cost (as a proxy for bypass).
4) Development of prices is transparent, promotes price stability and certainty for consumers, and changes to prices should have regard to the effect on consumers.	Price stability and the effect of price changes on consumers have been important considerations when designing the pricing methodology and the future strategy. With few exceptions, price increases are less than 15 per cent of yearly distribution charges for all individual customers.

[1] Ramsey pricing requires prices to be set in inverse proportion to the price elasticity of demand for the product concerned.

2. MEDIUM-TERM PRICING STRATEGY

The Powerco gas distribution business has completed a review and updated its gas distribution cost of supply model (COSM), which incorporates rules based on economic pricing theory and generally accepted accounting practice that allocates costs between fixed and consumption-based charges and, where appropriate, between regions and customer load groups. Powerco uses the COSM to establish the supply cost for each load group within each of the five network regions and assesses this against existing tariff structures. The COSM is used to evaluate how current tariff structures recover different categories of cost. This process of verifying tariffs through the COSM is used for all regions of the Powerco gas network.

Powerco's medium-term pricing strategy is, over time, to remove pricing anomalies between regions and customer load groups and set prices that better reflect the actual costs of supplying those load groups, but to do so in a way that:

- maintains compliance with the Default Price-Quality Path (DPP)
- is acceptable to retailers and end use customers
- achieves a reasonable degree of price stability and certainty.

Powerco's commercial team will liaise with customers and retailers to help ensure that customers are obtaining the best value possible from Powerco's services.

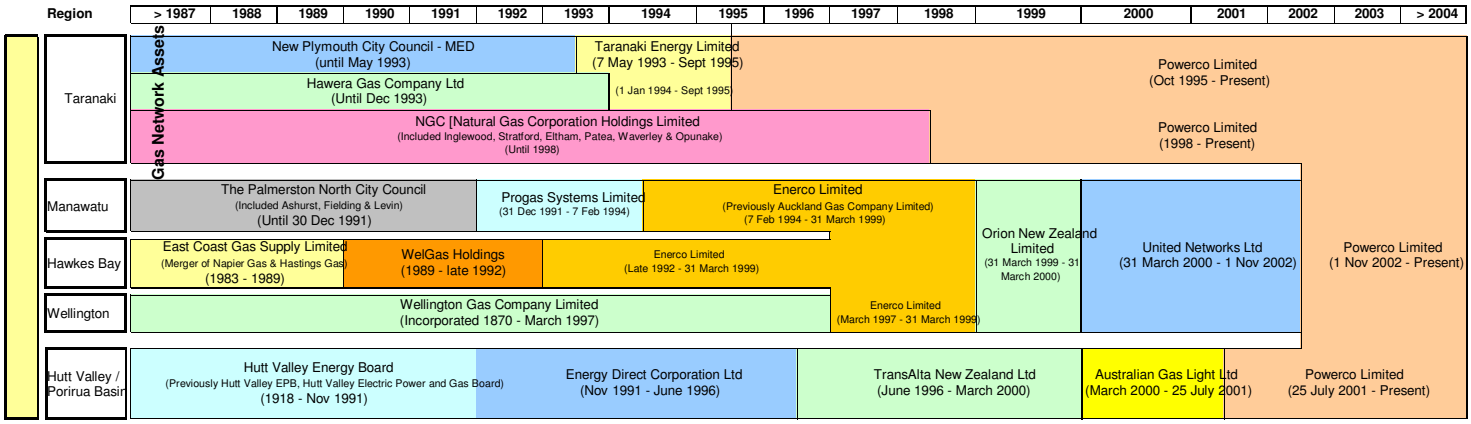
3. POWERCO'S GAS NETWORK SERVICES

3.1 HISTORY OF POWERCO'S GAS BUSINESS

Powerco's gas business comprises regional networks that have been acquired and amalgamated as summarised in the diagram below. The regional networks had disparate tariff and operational structures which have been progressively aligned since amalgamation by Powerco.

The diagram below summarises the formation and amalgamation of Powerco's gas network assets.

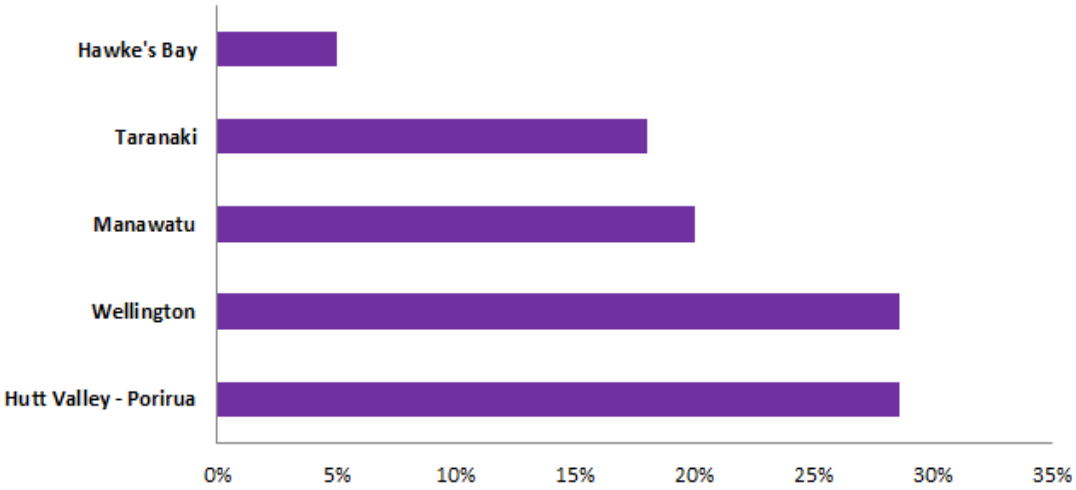
Summary of Powerco's gas business history



3.2 PROFILE OF POWERCO'S GAS BUSINESS

Today, Powerco's active gas distribution networks cover approximately 5,950 km of live pipeline and serve circa 106,000 North Island households, businesses and industries. Powerco provides gas distribution services to five regions in the North Island: Hawke's Bay, Taranaki, Manawatu / Horowhenua, Hutt Valley / Porirua, and Wellington. Hawke's Bay is the smallest region in terms of customer connections; Wellington and Hutt Valley / Porirua are the two largest, as shown in the chart below.

Gas Distribution Customer Numbers by Region



	Hutt Valley - Porirua	Wellington	Manawatu	Taranaki	Hawke's Bay
Customer Numbers	29%	29%	20%	18%	5%

Currently, Powerco maintains six network mass market load groups. These groups are defined by nominal capacity, in standard cubic meters per hour (scmh), and by annual consumption, and they are charged standard published tariffs. Non-standard customers are those that fall outside these definitions, because they are too large to fall into one of the defined categories and/or because individual pricing arrangements apply to them because of the need to address a perceived bypass risk. The load group names and the criteria for allocating customers to these groups are described in the table below.

Load group definitions

End Consumer Load Group	Definition
G06	End consumers with a load size of less than or equal to 10 scm/hr and an annual gas usage of less than 15 GJ in the Central North Island and less than 14 GJ in the Greater Wellington Region. This tariff group is subject to a variable only charge. Consumers that qualify for this group may opt instead to be subject to G11 tariffs (which contain a fixed element).
G11	End consumers with a load size of less than or equal to 10 scm/hr and an annual gas usage equal to 15 GJ or greater in the Central North Island and an annual gas usage equal to 14 GJ or greater in the Greater Wellington Region. Consumers that qualify for this group may opt instead to be subject to G06 tariffs (which are variable only).
G12	End consumers with a load size greater than 10 scm/hr and less than or equal to 25 scm/hr.
G14	End consumers with a load size greater than 25 scm/hr and less than or equal to 60 scm/hr.
G16	End consumers with a load size greater than 60 scm/hr and less than or equal to 140 scm/hr.
G18	End consumers with a load size greater than 140 scm/hr and less than or equal to 200 scm/hr.
G30	End consumers for whom network services are individually priced.
G40	End consumers for whom network services are individually priced and who have a time of use meter.

a. In the above:

   i. "Central North Island" means [*Those ICPs on the Hawke's Bay, Manawatu and Taranaki gas networks*]

   ii. "Greater Wellington Region" means [*Those ICPs on the Wellington and Hutt Valley / Porirua gas networks*]

3.2.1 Rationale for grouping consumers in this way

The rationale for grouping consumers in this way is as follows:

- larger pipes with greater reinforcing are required by the higher volume commercial and industrial customers;
- most of the low volume connection pipes are required to service residential customers only;
- the delivery of gas exhibits significant economies of scale;
- some large customers may have the option of bypassing Powerco and connecting to an alternative network.

These characteristics mean that, for high volume customers, the fixed infrastructure costs are relatively high, but the per unit cost of delivering gas is low. Conversely, for low volume residential customers, the fixed infrastructure costs needed to service them are relatively low, but the per unit costs of delivering energy to them are relatively high. These differences drive the relative balance of fixed and variable charges that apply to the different customer

groups. For the large consumers, fixed charges are higher and variable charges lower, and the converse is the case for residential customers. Where commercial bypass is a credible risk, individual non-standard charging arrangements may be justified.

The types of customer that fall into each load group are described in the table below.

Typical characteristics of different load group customers

Load Group	Typical Customers
Mass Market Residential Load Groups	
G06	Small residential customers.
G11	Large residential customers. Small cafes, fish and chip shops, pizza shops.
Mass Market Commercial Load Groups	
G12	Restaurants, small apartment / office buildings, small to mid-sized motels.
G14	Hotels, large motels, shopping complexes, swimming pools.
G16	Large office buildings, apartment blocks, commercial kitchens.
G18	Commercial laundries, dry cleaners.
Non-standard Load Groups	
G30 Individually priced customers who do not have a time of use (TOU) meter	Large commercial customers, large hotels. Smaller commercial customers which are at risk of bypass.
G40 Individually priced customers with a TOU meter	Manufacturing and industrial businesses.

The vast majority of Powerco's network customers are standard mass-market customers; about 230 are non-standard customers. Nearly three-quarters of the customer base are in the G11 residential Load Group. In terms of natural gas volumes, the pattern is strikingly different: non-standard customers represent about half of Powerco's annual gas consumption, and the G11 Load Group accounts for less than a third. These differences are illustrated in the charts below.

Comparison of Network Customer Numbers with Gas Consumption

Gas Volume by Load Group

	G06	G11	G12	G14	G16	G18	G30	G40
Total	4%	32%	5%	5%	7%	2%	5%	40%

Customer Numbers

4. OVERVIEW

4.1 DESCRIPTION OF REGULATORY REQUIREMENTS

4.1.1 Post Authorisation Arrangements

Powerco is regulated under the Commerce Commission Gas Distribution Services Default Price-Quality Path Determination 2017 ("the DPP"), which permits its allowable notional revenue, as defined by the DPP, to change in proportion to the movement in the Consumer Price Index (CPI) each year.

Once every five years the regulator resets the DPP by specifying the starting price and allowable notional revenue that will apply from the beginning of the next regulatory period and the minimum quality standards that the gas distribution businesses are required to achieve when operating and maintaining the gas network during the regulatory period. The requirements of the DPP are intended to provide the suppliers of regulated goods and services with sufficient incentives to innovate and invest, while limiting any ability to extract monopoly profits, and also to share with consumers the benefits of any efficiency gains achieved in the supply of the regulated goods and services. These objectives are promoted by simulating the outcomes produced by competitive markets.

The prices applied to the tariff groups on our distribution network are set in accordance with this pricing methodology, which ensures that the notional revenue does not exceed the allowable notional revenue as defined by the DPP.

The price adjustment for the 2017/2018 pricing year is an overall decrease of 7.34% as a result of the Commerce Commission's 2017 Default Price Path reset.

4.1.2 Pricing Principles – Input Methodologies Determination

Clause 2.5.2 of the Commerce Act (Gas Distribution Services Input Methodologies) Determination 2012 defines the following pricing principles:

1) Prices are to signal the economic costs of service provision, by–
   a) being subsidy free (equal or greater than incremental costs, and less than or equal to standalone costs);
   b) having regard, to the extent practicable, to the level of available service capacity; and,
   c) signalling, to the extent practicable, the impact of additional usage on future investment costs.

2) Where prices based on "efficient" incremental costs would under-recover allowed revenues, the shortfall should be made up by prices being set in a manner that has regard to consumers' demand responsiveness, to the extent practicable.

3) Provided that prices satisfy (1) above, prices should be responsive to the requirements and circumstances of users in order to:
   a) discourage uneconomic bypass, and,
   b) allow negotiation to better reflect the economic value of services and enable consumers to make price/quality trade-offs or non-standard arrangements for services.

4) Development of prices is transparent, promotes price stability and certainty for consumers, and changes to prices should have regard to the effect on consumers.

4.1.3 Information Disclosure Determination Requirements

Clause 2.4 of the Commerce Act (Gas Distribution Services Information Disclosure) Determination 2012 states that, before the start of each disclosure year[2], every gas distribution business must publicly disclose a pricing methodology that satisfies the following requirements:

1) Include sufficient information and commentary to enable interested persons to understand how prices were set for each consumer group, including assumptions and statistics used to determine prices for each consumer group.

2) Demonstrate the extent to which the pricing methodology is consistent with the pricing principles and explain the reasons for any inconsistency between the pricing methodology and the pricing principles.

3) State the target revenue to be collected for the current disclosure year.

4) Where applicable, identify the key components of the target revenue required to cover the costs and return on investment associated with the GDB's provision of gas pipeline services. Disclosure must include the numerical value of each of the components.

5) State the consumer groups for whom prices have been set, and describe:
   a) the rationale for grouping consumers in this way;
   b) the method and the criteria used by the GDB to allocate consumers to each of the consumer groups.

6) If prices have changed from the prices disclosed for the immediately preceding disclosure year, explain the reasons for changes and quantify the differences in respect of each of those reasons.

[2] For Powerco Gas Distribution, 1 October – 30 September.

7) Where applicable, describe the method used by the GDB to allocate target revenue among consumer groups, including the numerical values of the target revenue allocated to each consumer group and the rationale for allocating it in this way.

8) State the proportion of target revenue (if applicable) that is collected through each tariff type as publicly disclosed annually. Every disclosure must, if the GDB has a pricing strategy:
   a) explain the pricing strategy for the next five disclosure years (or as close to five years as the pricing strategy allows), including the current disclosure year for which prices are set;
   b) explain how and why prices for each consumer group are expected to change as a result of the pricing strategy;
   c) if the pricing strategy has changed from the preceding pricing year, identify the changes and the reasons for the changes.

9) Describe the approach to setting prices for non-standard contracts, including:
   a) the extent of non-standard contract use, including the number of ICPs represented by non-standard contracts and the value of target revenue anticipated for non-standard contracts;
   b) how the GDB determines whether to use a non-standard contract, including any criteria used;
   c) any specific criteria or methodology used for determining prices for non-standard contracts, and how those criteria or that methodology are consistent with the pricing principle.

10) Describe the GDB's obligations and responsibilities (if any) to customers on non-standard contracts in the event that the supply of gas pipeline services to the customer is interrupted. Disclosure must explain:
   a) the extent of the differences in these terms between standard contracts and non-standard contracts;
   b) any implications of this approach for determining prices for non-standard contracts.

11) Explain whether, and if so how, the GDB has sought the views of consumers, their expectations in terms of price and quality, and reflected those views, in calculating the prices payable or to be payable. If the GDB has not sought the views of customers, the reasons for not doing so must be disclosed.

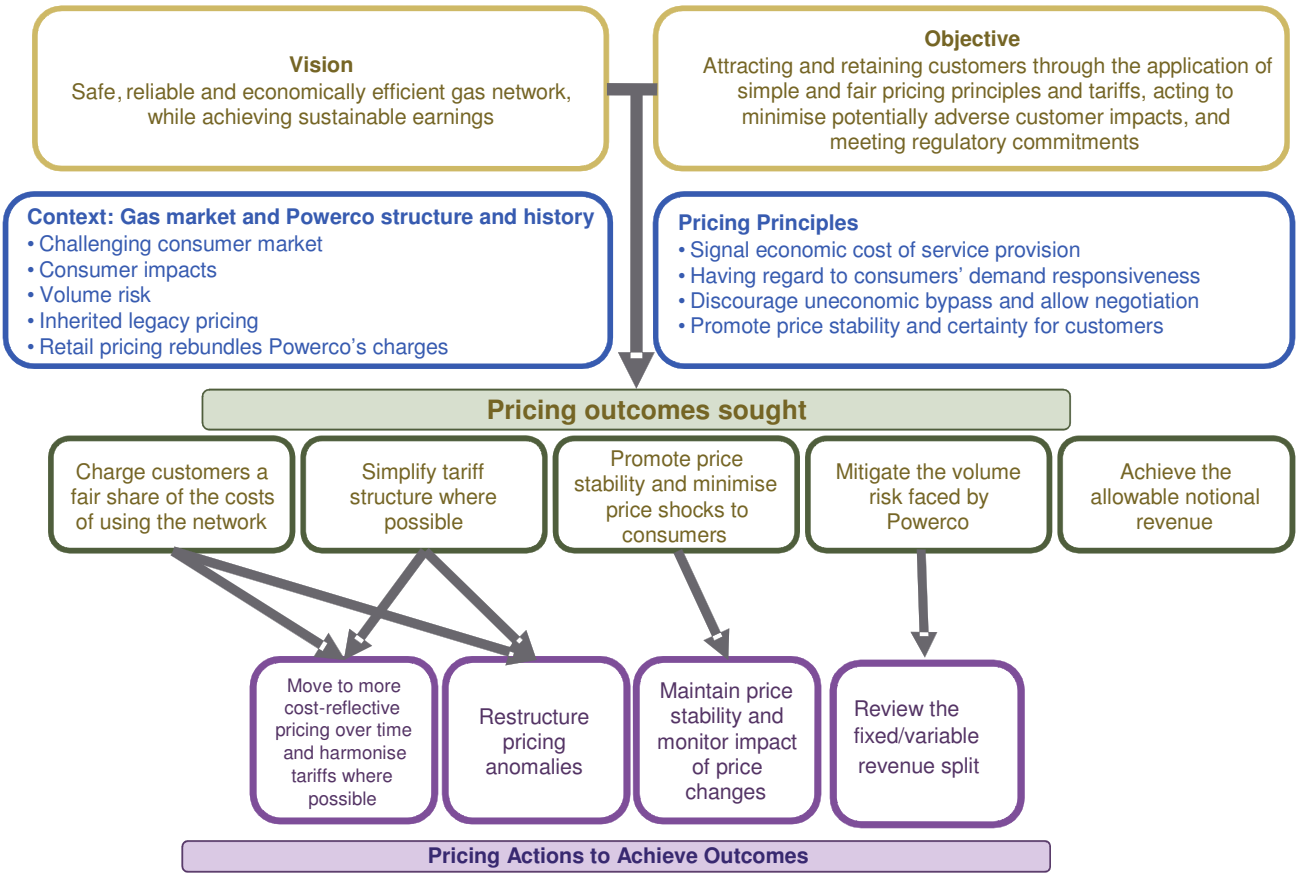
4.2 DESCRIPTION OF BUSINESS' PRICE SETTING POLICY FRAMEWORK, INCLUDING THE OUTCOMES SOUGHT BY THE BUSINESS FROM ITS PRICING POLICY

4.2.1 Overview of the Pricing Methodology Framework

Powerco's pricing methodology framework begins with its vision for its gas business: to provide safe, reliable, and economically efficient gas network distribution services while achieving sustainable earnings. The pricing framework is based on attracting and retaining customers through the application of simple and fair pricing principles and tariffs, acting to minimise potentially adverse customer impacts, and meeting its regulatory commitments.

When developing its pricing methodology, Powerco has considered a number of the characteristics of gas distribution markets and has given effect to the Commission's pricing principles (see the diagram below).

Schematic of Price Setting Policy Framework



The costs of Powerco's gas distribution network are characterised by economies of scale, large and relatively lumpy investments, and long asset lives. From an economic efficiency perspective, prices should reflect the marginal cost of providing customers with access to the gas network. The long run marginal cost approach to pricing achieves economic efficiency by signalling the future cost of the next increment of network asset investment. With this approach, network prices would send an economic signal to customers of the cost of the next increment of load and provide locational signals for future investment (the Commerce Commission's first principle).

However, network pricing based on economically efficient marginal costs will, by definition, not take account of the costs of already-constructed network assets; from an economic viewpoint, these costs are "sunk." Therefore, pricing based on marginal costs does not recover the long run average costs of supply. Where prices based on "efficient" incremental costs would under-recover allowed revenues the shortfall should be made up by setting prices in a manner that has regard to consumers' demand responsiveness, to the extent practicable (the Commission's second principle).

All of Powerco's current tariffs are above the long-run incremental cost of providing the service. The key issue when developing a pricing methodology is how network costs are allocated between Powerco's customer groups. There are a number of issues to consider when doing this, particularly the need for customers to have price stability and certainty (the Commission's fourth principle).

4.2.2 Price Setting Considerations

The pricing methodology framework is guided by the characteristics of the gas market and the structure and history of Powerco's gas services. The development of Powerco's pricing methodology has been informed by a number of considerations, including the context and characteristics of the gas consumer market, historical pricing structures, and the risks and opportunities Powerco perceives in the reticulated gas market.

Challenging consumer market

Reticulated gas is a challenging consumer market in New Zealand. Although overall energy use continues to rise more or less continuously, consumption of natural gas declined for a number of years in the early 2000s. Since 2009/10, gas connections and gas consumption have either held static or increased at a moderate rate. Powerco believes that this turnaround in the demand for reticulated gas is due, at least in part, to improved marketing and a greater focus on the needs and preferences of its customers as revealed by market surveys and focus groups.

A commercially important characteristic of reticulated natural gas is that it is a discretionary fuel. Reticulated gas provides the heat for cooking, water heating, and space heating, but alternatives are available for all of these uses, including electricity, bottled gas, and solid fuels. By contrast, reticulated electricity tends to be considered essential, as few alternatives to an electricity connection exist for such applications as lighting, electronics and motorised appliances. Prospective reticulated gas consumers have a range of choices for their fuel needs, and gas prices need to be structured carefully to attract new customers. This investment decision is reopened each time a gas appliance needs replacing, and gas prices need to be attractive at that point in order to retain customers.

Hence, Powerco's price-setting process for its gas distribution business begins with consideration of its customers' needs and characteristics. Network businesses are largely fixed cost businesses; consequently, for every incremental gigajoule (GJ) or customer added to the system, the average cost per customer or per GJ will decrease (until the point where substantial new investment is required).

From a company viewpoint, growing and maintaining a sustainable gas distribution business that can deliver stable and improving earnings for its investors and lenders is consistent with

Powerco's corporate mission. Maximising the use of Powerco's gas distribution network will also enable the cost of gas distribution to remain competitive with other energy sources.

There are also wider benefits to New Zealand of increasing the use of reticulated gas. Natural gas is an efficient, relatively low-carbon fuel. A report commissioned by Gas Industry Co by Concept Consulting "Consumer Energy Options in New Zealand- 2016 Update" found that increasing the use of natural gas for residential, commercial and industrial space heating, water heating, and cooking could improve New Zealand's energy efficiency and lower its greenhouse gas emissions.[3] Increasing the direct use of natural gas could therefore help New Zealand to decrease net energy usage and improve the country's greenhouse gas emissions profile.

Customer Impacts

Customers that are currently connected to Powerco's network have made an investment that allows them to use natural gas: for residential customers, they have either bought a house that includes gas appliances and fixtures, or they have invested in new gas applications. At the upper end of the residential gas market, such an investment can be substantial; new gas water heating and central heating systems are examples of these types of major household investments. Commercial customers similarly have invested in gas applications for their places of business.

Powerco understands that the magnitude of these customer investments implies a commitment on the part of its customers to reasonably long-term consumption of reticulated natural gas. Customers' investments have taken place in the context of the gas prices that existed at the time of the investment and with the expectation that gas prices would remain about the same in the future. In return, Powerco believes that it has a commitment to its customers to keep distribution prices as stable as reasonably possible.

Powerco's understanding of the effect on customer of changes to gas prices is also informed by previous experience. For example, retail tariffs to residential customers in some of Powerco's gas network regions were at one point completely variable, with no fixed daily charge. When the incumbent gas retailer restructured its prices to include a daily fixed residential charge, Powerco experienced a significant increase in the number of disconnections in the regions.

Powerco therefore intends to manage carefully any change of tariffs to its gas distribution customers, in order to honour the commitment implied by previous prices and to mitigate the risk of customer disconnection.

[3] Concept Consulting - commissioned by Gas Industry Co, *Consumer Energy Options in New Zealand* , 2016 Update .

Volume risk

There are two aspects to the business risk that Powerco faces as a natural gas distribution business. The first is the risk associated with possible customer disconnection. The second is volume risk caused by yearly variation in end-use customers' consumption, some of which will be weather related.

Any pricing framework must therefore have regard to the risk that it might impose on company revenues, consistent with Powerco's mission to provide sustainable returns and growth for shareholders.

Pricing structure

Powerco's experience is that reticulated gas customers, particularly residential customers, do not fully comprehend the way in which retail gas pricing works. Gas pricing, like electricity, is made up of a number of discrete elements that are bundled by gas retailers, and each of these elements can itself be priced in a complex way. Gas transmission charges, for example, can arise from the First Gas MDL pipeline or the First Gas transmission system, each of which has its own pricing arrangements. The Gas Industry Company levy has two components, a per-ICP charge for retail customers and a per-GJ charge for wholesale market transactions; both of these are incorporated into the retail tariffs faced by residential and commercial customers. Gas distribution charges are another source of complexity.

Powerco's current gas network prices are largely a product of history. As Powerco has grown its gas business both organically and by acquiring new gas network regions, a patchwork of different tariffs has developed through the continuation of legacy tariffs and other historical anomalies. One of the goals of the new medium-term pricing strategy will be to reduce pricing complexity and eliminate anomalies to the extent feasible.

Retail pricing issues

On average, gas distribution services represent approximately 30% of a residential gas consumer's total annual gas bill.[4] While this is a significant proportion, it also means that any pricing signals a gas distribution company attempts to convey to end use customers may be modified in the final retail charges. This difficulty is compounded by the fact that energy retailers may have different objectives with respect to end-use gas customers.

For the major gas retailers in New Zealand, gas represents only a relatively small portion of their retail portfolios; electricity retailing tends to be their primary focus. In addition, some

[4] See *The New Zealand Gas Story*, 4th Edition (Gas Industry Company, April2016), Fig.67

gas retailers may also offer liquefied petroleum gas (LPG) services to their customers. Gas retailers are therefore able to offer their customers a range of competing energy options, while Powerco can only provide reticulated natural gas services with its gas pipelines. This difference means that retailers' business incentives may not be in alignment with Powerco's, with a resulting mismatch between business strategies and objectives with respect to natural gas customers.

In particular, energy retailers may be relatively indifferent as to the type of energy they supply to customers. A customer's decision to install natural gas appliances in an existing household will lead to a decrease in the electricity consumed by that household, and the switch may represent no net benefit to the retailer. Equally, a decision by a customer to disconnect from reticulated gas will result in an increase in that household's electricity usage or a switch to bottled gas, and again the retailer may be indifferent between these outcomes.

In contrast, Powerco has a very strong incentive to connect new gas customers and to retain the ones already connected. Simply put, each additional reticulated gas customer on Powerco's network increases the use of our existing gas assets and lowers the cost per customer.

These differences are not merely academic; in Powerco's experience, there are real differences in gas retail and distribution business strategies, particularly with regard to pricing. As an example, Powerco's own experience, supported by market research findings[5], suggests that many households perceive the fixed component of retail gas tariffs to be too expensive: increases in fixed charges have directly led to increased disconnections and fixed charges are frequently cited as a deterrent to natural gas usage by survey respondents.

4.2.3 Pricing outcomes sought

Achieve the allowed target revenue

Powerco's primary pricing objective with respect to its gas network is for pricing to contribute as part of an overall strategy to a vibrant and sustainable gas business; that is, Powerco seeks to recover its allowed target revenue to sustain the gas network business and provide for future required investment.

[5] *Powerco Market Research, Stage 1 Qualitative Research*, July 2011, *Stage 2 Quantitative Research*, September2011 and *Market Research into Disconnections*, April 2017, Peter Glen Research.

Charge customers a reasonable share of the costs of using the network

As far as practicable, customers should be charged a price that reflects the costs of providing the service to them. However, cost reflective charging is not the only objective considered when determining prices.

Professor Alfred E. Kahn wrote:[6]

> "The basic defect of full cost distribution as the basis for pricing is then that they ignore the pervasive discrepancies between marginal and average cost. Those discrepancies may require prices that take into account not just the costs but also the elasticities of demand of the various categories of service if the company is to recover its total costs. Whenever there is some separable portion of the demand sufficiently elastic that a rate below fully-distributed costs for it would add more to total revenue than to total costs, any insistence that each service or group of patrons pay their fully allocated costs would be self-defeating. It would force the firm to charge a price that would result in its turning away business that would have covered its marginal costs – in other words would prevent it from obtaining from customers with an elastic demand the maximum possible contribution to overheads."

Powerco aims to set tariffs that are cost reflective, but equally aims to ensure that customers face prices that they perceive to be a reasonable and fair reflection of the service provided. In particular, Powerco aims to treat low volume residential customers equitably.

Promote price stability and minimise price shocks to customers

Existing customers have chosen to invest in natural gas appliances with an expectation that future prices will be reasonably comparable to past prices. Therefore, any necessary price movements should be implemented gradually over time. Future price movements will be informed by customer reactions to previous changes as well as by customer consultation on prices.

Simplify tariff structure where possible

Simpler price structures can benefit customers, because they make understanding distribution tariffs easier. In addition simple tariff structures benefit retailers through lower administration costs.

Mitigate the volume risk faced by Powerco

Prices should be structured in a way that, to the extent practicable, fairly reflects the extent of Powerco's fixed costs, and consequently mitigates the risk associated with annual fluctuations in consumption, while responding to customers' preferences for variable tariffs.

[6] Alfred E. Kahn, *The Economics of Regulation, Principles and Institutions,* 1971, p.155.

5. PRICING METHODOLOGY

5.1 DESCRIPTION OF PRICING METHODOLOGY FOR REGULATED SERVICES

This section provides an overview of the methodology used to set network prices. Detailed descriptions of a number of key steps are provided in later sections.

The methodology for setting Powerco's network prices applies the following steps:

1. determine Powerco's costs of gas distribution;
2. allocate customers to network load groups, based on historical consumption;
3. allocate costs to customer groups using an appropriate allocation factor. Powerco's network cost of supply model analyses costs within each of its five gas network areas for each of its six standard and two non-standard customer classes;
4. assess price structures to determine consistency with the pricing principles and objectives; and
5. establish medium term price paths to make prices more cost reflective and consistent across regions, while satisfying the Commission's pricing principles.

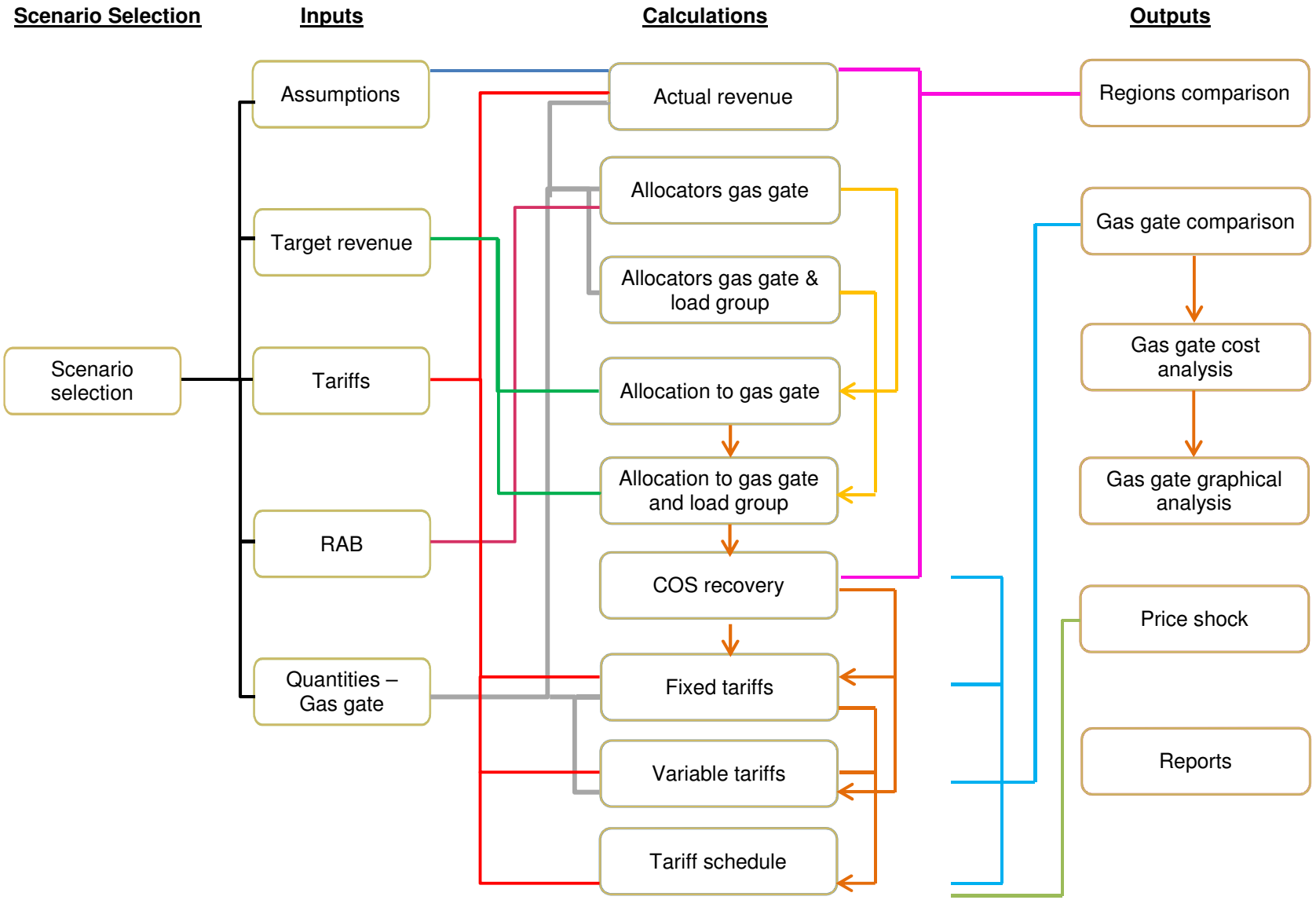
5.2 PRICING METHODOLOGY DEVELOPMENT

5.2.1 Cost of supply model

Powerco's cost of supply model for the gas network business allows the user to allocate costs and revenues across the respective tariff load groups using alternate allocation methods. The model develops a total cost per network load group as well as a cost per kWh.

A schematic of the cost of supply model is presented below. There are a number of assumption and input sheets that include parameters such as weighted average cost of capital (WACC), consumer price index (CPI) figures, demand forecasts, and cost and revenue forecasts. Calculation sheets (coded grey in the figure) allocate ICPs to defined load groups and allocate costs based on the parameters selected. Output sheets show distributed costs, analyse the subsidy-free tariff range and evaluate pricing scenarios for compliance with the aggregate price cap.

Cost of Supply Model Schematic



5.2.2 Service Class Definitions and Quality

Network Load Group Definitions

Network Load Groups are delineated by nominal capacity, in scmh, and by annual consumption, as shown in the chart below.

Network Load Group Definitions

	scmh		Annual Consumption	
Load Group	**Min**	**Max**	**Min GJ**	**Max GJ**
G06	0	10	0	15 Central North Island 14 Greater Wellington
G11	0	10	15 Central North Island 14 Greater Wellington	Unlimited
G12	10	25	15	Unlimited
G14	25	60	15	Unlimited
G16	60	140	15	Unlimited
G18	140	200	15	Unlimited
G30 Individually priced customers who do not have a TOU meter	n/a	n/a	0	10 TJ
G40 Individually priced customers with a TOU meter	n/a	n/a	10 TJ	Unlimited

Network Service Quality

The provision of a safe and reliable gas network distribution service is an integral part of Powerco's business. Consumer safety is paramount in the management and operation of a gas pipeline network. Gas pipeline faults are inherently more dangerous to consumers than electricity network outages, and consequently more stringent safety requirements apply to gas pipeline operators.

Powerco must comply with the very high safety standards under the Gas Act 1992, the Gas Regulations 2010 (SR 2010/76), and NZS4645 (Gas distribution networks). In particular, Powerco must ensure that appropriate network pressure is maintained at all times to ensure that domestic and commercial gas appliances connected to the network are able to operate safely and satisfactorily.

Powerco must operate all parts of its networks to a very high level of availability, as any form of supply interruption would result in a requirement to physically inspect all affected

gas appliances and installations, an expensive and time-consuming process. This is because some domestic appliances do not automatically shut down in the event of a gas supply interruption. Once gas supply is restored to these appliances, there is a risk that pilot lights may not reignite; causing an unsafe build-up of uncombusted gas that can result in an explosion. There is also the risk of air entering the gas pipeline and causing supply interruptions or explosions. As a result of these risks, Powerco targets and achieves a very high level of availability throughout its networks, and this standard is available to all customer classes.

As the level of availability is high across the network, the network is interconnected and consumers of different classes are geographically diverse, different levels of quality are generally not offered to different customers, i.e. all customers receive the same level of service quality. One exception to the rule of uniform quality across the gas distribution network is in terms of service pressure. In some cases, large industrial customers can specify, and receive, delivered gas pressure that satisfies the particular requirements of their businesses.

Network service quality is monitored and audited by WorkSafe New Zealand, an independent Crown entity. There are also legal requirements under the Gas Regulations to report certain types of incidents. Powerco must publicly disclose other system condition and reliability information under other regulations.

Regulated Network Service Quality Measures

The network service quality measures set by the Gas Distribution Services Default Price-Quality Path Determination 2017 are:

To be compliant with the Quality Path, Powerco's RTE values for an assessment period must be such that:

a) of the total of all RTEs, the percentage greater than 60 minutes does not exceed 20%; and

b) the RTE to any Emergency does not exceed 180 minutes.

Put another way, Powerco must respond to 80% of emergencies in 60 minutes or less, and all emergencies (less excluded events[7]) within 180 minutes in the assessment period

5.2.3 Cost Allocation Methodology

Cost allocation for network services

Conceptually, there are three possible categories of costs:

- costs that are directly attributable to a specific load group within a specific region; currently no costs are allocated in this way;
- costs that are attributable to a specific region but not a specific load group, for example the costs of reactive maintenance, scheduled maintenance and customer initiated maintenance; and
- indirect costs, which cannot be attributed to a region or a load group, for example administration costs, information technology costs and some pass through costs.

Costs that are directly attributable to a specific load group within a specific region do not need to be allocated; they can merely be assigned to the relevant load group. The cost of supply model allows costs of this nature to be included in the evaluation, though none has been identified.

The other two categories of costs need a specific method to allocate them to load groups. It is important to note that networks create economies of scale through shared assets and there is no single "correct" way of efficiently allocating the resulting common costs. In practice, however, the possible allocators available are limited.

In all cases, Powerco has attempted to allocate costs based on the factor that is most closely related to the cause of the costs.

Regional costs have been allocated as follows:

1. [7] refer clause 9.2 of the Determination

Regional Network Cost Allocators

Directly Attributable Costs to Regions	Cost Allocator
Service interruptions and emergences	Customer numbers
Routine and corrective maintenance – inspections lines	Total line length (rural/urban weighted)
Routine and corrective maintenance – inspections other	Customer numbers
Routine and corrective maintenance – location checks	Customer numbers
Depreciation of network assets	Replacement cost
Other Direct Costs	
Direct rates to regional property	Weighted ICP/GJ
Other direct regional costs	GJ

The method used to allocate asset values to load groups is described in the Asset Value Allocation section below.

Indirect costs have been allocated on the basis of the following allocators:

Indirect Network Cost Allocators

Indirect Costs	Cost Allocator
Administration	Weighted ICP/GJ
System operations and network / business support	Weighted ICP/GJ
Pass Through Costs	
• Audit fees	Weighted ICP/GJ
• Indirect rates	Weighted ICP/GJ
• Statutory levies	Weighted ICP/GJ
• Other indirect costs	Weighted ICP/GJ
Return on Assets	
• Depreciation of network assets	GJ
• Amortisation of intangibles	Customer numbers
• WACC	GJ
Taxation	
• Taxation expense	GJ

Generally, costs that are asset-related (which include depreciation and return on assets and, by extension, taxation) are allocated on the basis of the share of Powerco's total gas volume that a particular load group uses. Costs that are not directly related to assets, such as administration and pass through costs, are allocated by an ICP/GJ weighting across all customers.

Network Asset Value Allocation Methodology

The costs attributable to a specific region tend to be related to the value of network assets needed to service the region. For this reason, there is a need for a methodology to allocate regional network asset values to load groups. Broadly, the methodology Powerco has adopted estimates the percentage of regional assets used by each load group based on the types of assets employed and the annual consumption of each load group.

The analysis involves three steps, which are outlined in greater detail in the sections below.

1. The first step is to group network assets into System Categories.
2. Load groups are assigned to one or more System Categories depending on the assets used to supply their loads.
3. A load group's share of the total annual consumption for System Category is used to assign a portion of that System Category's value. These System Category value

portions then are summed for each individual load group to give its total asset value allocation.

System Category assignment

Powerco's network assets can be broadly broken down into three distinct modern equivalent asset System Categories: Intermediate Pressure (IP), Medium Pressure (MP), and Services (which include Low Pressure (LP) and MP). The assignments made are shown in the table below.

Asset classes assigned to each System Category

Intermediate Pressure	Medium Pressure	Services
Cathodic protection	Land	LP services
IP mains	LP mains	MP services
IP services	MP mains	
IP valves	MP valves	
SCADA	Stations	
Crossings	*Crossings*	
Standby pipe	*Standby pipe*	
Traffic management	*Traffic management*	

Cathodic protection has been allocated to the IP system category, as it would primarily be used to protect the steel pipe that makes up all of the IP mains. SCADA has also been allocated to the IP system category, as it is primarily used to monitor the gas pressures and flows through the IP networks.

Station assets have been allocated to the MP system category, as they only exist to provide the lower pressures used in the MP networks. Land has also been allocated to this system category, as each station location requires land.

Italicised asset classes are common to both the IP and MP system categories. In these cases, the asset class's value is shared between the system categories based on the proportion of total mains length in each system category. For this exercise, the MP system category mains length is the sum of the MP mains and LP mains lengths.

Load group assignment

Each load group is served by a different collection of system categories. The large industrial customers that make up the G40 tariff group are almost exclusively served by the IP system category, the load groups usually assigned to commercial customers are served

by the IP and MP system categories, and finally the residential load groups are served by all three system categories. These assignments are shown in the table below.

Assignment of Load Groups to each System Category

Intermediate Pressure	Medium Pressure	Services
G06	G06	G06
G11	G11	G11
G12	G12	
G14	G14	
G16	G16	
G18	G18	
G30	G30	
G40		

Determining allocation shares

The annual consumption volumes for each load group are entered into the table where they appear, and total volumes within each system category are calculated to give the total annual demand for that category.

Within each system category, a load group's contribution to the total annual demand is calculated as a percentage of that category. For example, if a load group contributed 5,000 GJ to the total annual demand of 20,000 GJ in the IP system category, then it would be allocated 25% of the IP system category. If this load group were also represented in the MP system category, then it would account for a larger percentage of the MP system category as the overall total would be smaller.

Within each system category, load groups are weighted according to the percentage of consumption volume that each contributes to the overall consumption within that category. These percentages are then multiplied by regional asset values to derive the value of assets used by each load group within each category. To continue the example above, if this IP system category had an asset value of $200,000, then the load group in question would be allocated 25% of this amount, or $50,000. These asset value shares are then summed across load groups to obtain the total value of system assets used by each load group. Finally, these values are converted to a proportion of total regional network asset value. These proportions are used as allocators in the network model.

5.2.4 Analysis of the extent to which costs are marginal, and whether the associated price components in the tariff structure reflect those marginal costs

Marginal costs are very difficult to evaluate in a meaningful way for gas distribution companies. The term "marginal" implies the cost of the next additional unit of production and long run marginal cost (LRMC) refers to the cost of providing an additional unit including the capital cost of added capacity. The marginal cost for a distribution company is zero much of the time, meaning that the next unit of gas can be distributed within the existing capacity of the network system. Once in a while, marginal cost is a very large number, meaning that the next unit of gas would require additional installed capacity to distribute it. Because of this dichotomy, the application of a strict definition of marginal cost would lead to a step-wise pricing function, which would be neither practical to implement nor conducive to price stability.

In order to avoid the difficulties inherent in evaluating marginal cost, Powerco uses the long run average incremental cost of service (LRAIC) as a proxy for marginal cost. Incremental costs are those that are caused by the addition of incremental units of volume load on the distribution system. LRAIC is an adaptation of the LRMC approach and is widely used by network businesses; it involves evaluating all forward-looking load-dependent costs as a function of incremental volume. These costs are the average costs that Powerco would incur on a per kWh basis as a result of additional volumes of gas flowing through its distribution pipelines and, as such, they do not include the costs related to already-constructed assets. Prices based on these incremental costs would under-recover allowed revenues.

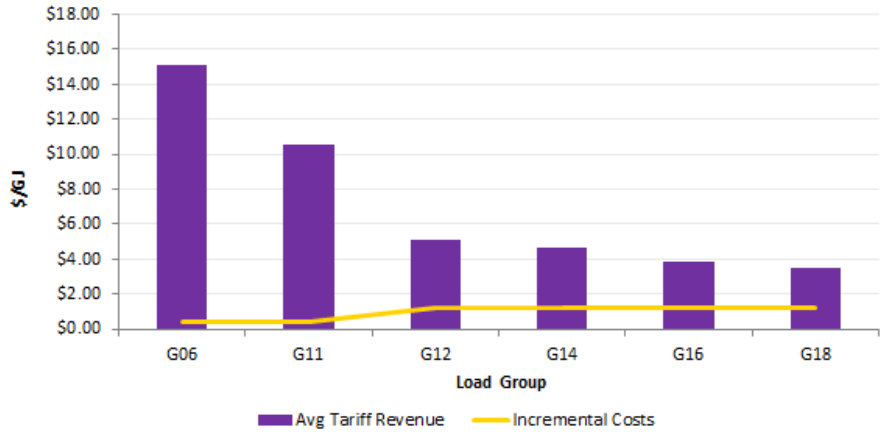
The methodology used to do this evaluation is detailed in section 5.2.5 below. In 2015, when the analysis was done, incremental costs fell between $137 per year and $8,049 per year for network services.

It is a characteristic of distribution companies that they have large fixed costs and substantial economies of scale in their operation. As a result, for such companies, the average cost of serving a customer is greater than the marginal cost of service. Attempting to address this situation, while still providing meaningful cost signals to consumers, is the justification for a two-part tariff: one that contains a fixed, daily charge as well as a consumption-based variable component. From an economic point of view, such a two-part tariff should ideally be structured such that all marginal costs are charged on a variable basis and all other costs on a fixed basis (so as not to distort consumption behaviour). However, this ideal is just one of several competing and sometimes contradictory objectives Powerco is trying to balance when developing its pricing methodology.

Powerco has limited tariff tools available to signal marginal costs and, as a network business, its marginal cost signal would generally (and correctly) be swamped by the marginal cost of the fuel. Further, it is not practicable to reflect Powerco's long run average incremental costs in the variable tariff component, due to the fact that the long run marginal cost of service is very small, compared to the average revenue that needs to be recovered from each customer group. Instituting such a low charge for the variable component of the tariff would mean a correspondingly higher fixed charge would need to be implemented. Such a high fixed charge would act as a significant deterrent to existing and potential customers.

Powerco has therefore determined that the variable tariff component must reflect at least the LRAIC. This will ensure that the incremental costs (which are essentially avoidable costs if no incremental load occurs) are signalled to customers.

Comparison of Network LRAIC with Variable Charges in $/GJ



5.2.5 Subsidy-free prices

For prices to be subsidy-free they must be set equal to or greater than incremental costs and less than or equal to standalone costs. A consumer's standalone cost is the cost of delivering the energy they require from an alternative network or fuel source (assuming equivalent quality of supply).

Practically, bypassing Powerco's network with supply from an alternative gas distribution network is unlikely as it would be uneconomic to duplicate network expenditure. However, there are examples in New Zealand of alternative bypass networks that operate within close proximity to a gas transmission gate.

The cost of substituting gas distribution supply with an alternative fuel source (such as electricity or bottled LPG) is a more real concern for the Powerco gas distribution business. Reticulated natural gas is to a certain extent a competitive service, as it competes for

customers with both electricity supply and LPG. The standalone cost for the gas distribution business is therefore the cost of supply from these alternative energy sources.

Standalone cost methodology

Standard gas distribution customers

For standard gas distribution services, standalone costs are established by estimating the costs by load group likely to be incurred by a notional efficient competitor to Powerco's distribution network. In other words, the standalone cost methodology estimates the bypass cost of supplying each of Powerco's load groups. This is an appropriate approach to determine standalone costs for the tariff group and is consistent with how standalone costs have been calculated in other regulatory jurisdictions. A tariff group is the smallest practical grouping of customers that could be used for this analysis.

Powerco closely follows the costs of competing alternative fuels, particularly for residential consumers where the gas distribution business competes directly with those fuels to meet demand for cooking and heating.

The Gas Hub website (www.gashub.co.nz) provides smaller consumers with a comparison tool which they can use to compare the cost of reticulated gas supply for a typical consumer (G06 and G11) against comparable costs for supply of bottled LPG and electricity. This tool is a key input to the calculation of standalone cost for small consumers.

The method used to calculate and compare annual costs of supply for a notional G06 and G11 consumer in each of Powerco's gas distribution regions is:

- **LPG:** kWh and annual LPG prices are sourced from the Gas Hub web calculator tool and are multiplied by annual kWh consumption
- **Electricity:** comparable electricity prices are sourced both from the Ministry of Business Innovation and Employment's (MBIE's) quarterly survey of electricity prices as well as the Gas Hub's own information (prices sourced from the big five retailers on the Powerco network and averaged) and multiplied by annual kWh consumption
- **Gas Final Retail Prices:** Retail gas prices are sourced from Powerco distribution prices and an average of the main four retailers operating on the Powerco network offering Gas only pricing; these are then multiplied by annual kWh consumption

- **Gas Distribution:** Gas distribution prices are sourced from the Powerco COSM and Powerco distribution prices and multiplied by annual kWh consumption

The standalone cost is compared at a retail and distribution network level for gas and electricity to identify the total cost and the network cost component which consumers face. Ultimately consumers base their fuel consumption decisions on final retail prices.

Non-standard gas distribution customers

Many commercial and industrial consumers also have energy supply options. For these consumers, standalone cost also means the cost of alternative supply, but, for this group, the cost of switching may be sizeable due to the need to convert large scale plant and equipment (e.g. from electricity to gas).

Powerco calculates the the annual cost of supply for a notional G14 and G18 consumer (commercial and industrial, respectively) as follows:

- **LPG:** The cost of supply from the Gas Hub website provides limited information for large commercial and industrial consumers, but we can use LPG prices from the price comparison tool to calculate the annual cost of supply for LPG.
- **Gas and electricity retail:** We source average retail gas and electricity charges from MBIE price surveys. We use these prices to calculate the average annual retail cost of gas and electricity
- **Gas Distribution:** We source gas distribution costs from the COSM and existing Powerco pricing schedules. We were not able to source commercial and industrial distribution prices for electricity.

Incremental cost methodology – gas distribution

Economic theory states that prices are efficient where they recover the additional cost of connecting a consumer or of providing another unit of capacity. Pricing according to this rule is termed marginal cost, or alternatively, incremental cost pricing.

In the short run, where the network has spare capacity (i.e. any point in the diagram below where installed capacity exceeds demand), the incremental cost of connecting one more consumer or providing one more unit of capacity is usually very low. This is because the distributor has already invested in the network and these costs are fixed. The network will only face additional costs related to the connection of individual consumer assets. The

short run incremental costs of connecting a consumer include the cost of the service line, dedicated equipment, and any administration fees and costs.

Short Run IC *= Service Lines + Dedicated Equipment + Admin costs*

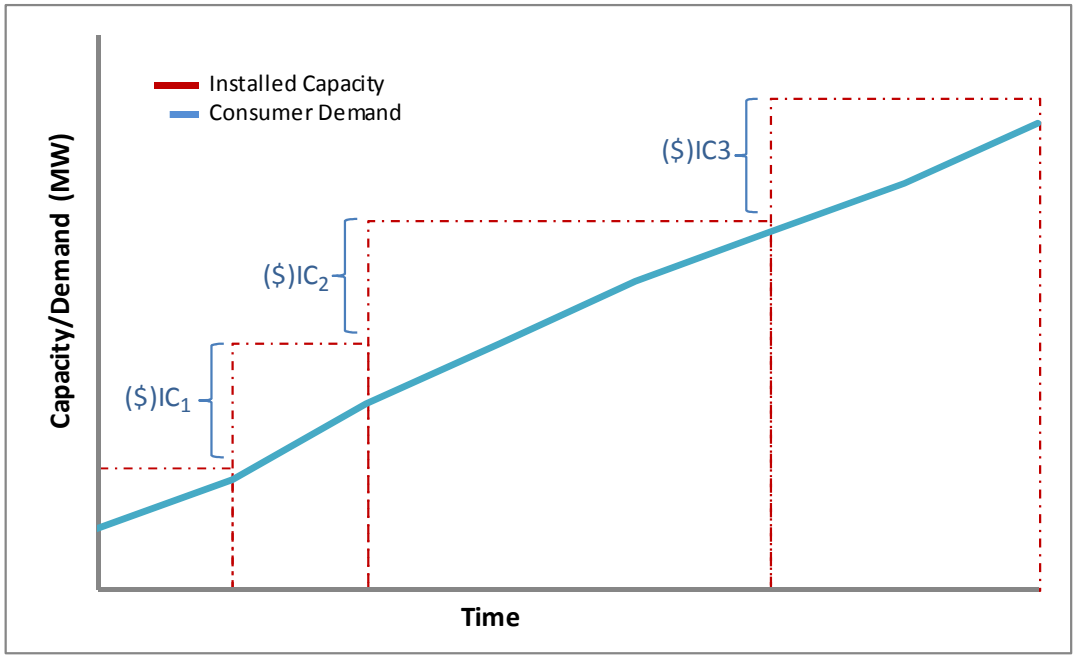
As the network becomes constrained, the cost of adding a new consumer will become much higher as significant investments in new capacity will be required to connect the consumer. However, one consumer typically is not solely responsible for any individual investment in new capacity. Every customer that has joined the network prior to the required new investment in capacity has contributed to the need for new capacity and so should reasonably share in the cost to build the new capacity.

In this context, it is useful to take a long term view of incremental costs for pricing purposes by considering the average cost of investing in the next increment of network capacity. This means that any new consumer (regardless of when they connect) should incur their share of the next incremental investment as well as their own specific connection costs. This is illustrated by the following equation.

Long Run IC *= Service Lines + Dedicated Equipment + Admin costs + share of long-run incremental investment* in additional capacity

The diagram below illustrates the incremental costs associated with each investment in capacity. The long run IC (or LRIC) can either be calculated as the incremental cost of the next investment (i.e. IC_1) or the long-run average of incremental costs (i.e. $(IC_1+IC_2+IC_3)/3$).

Long run incremental cost



Calculation of incremental cost

Powerco's gas COSM calculates average incremental costs for the gas distribution network with reference to both short run average incremental cost and long run average incremental cost.

Short run average incremental cost is calculated as the average annualised connection cost per connection for the following connection types:

- residential/small commercial
- commercial
- industrial

The amount for each consumer is calculated as follows:

- 10 year forecasts of future real connections capex are sourced from Powerco's Gas Distribution Asset Management Plan (AMP) by connection type;
- this value is divided by the expected annual increase in connections for each connection type (sourced from the Powerco Gas AMP) to determine average connections capex per connection;

- the ten year average is annualised (using the DPP WACC as a discount rate, and assuming a 60 year asset life) to derive an annual connection cost per connection type.

Long run average incremental costs are calculated as short run average incremental cost (above) plus the average incremental investment in upstream capacity. Powerco calculates upstream capacity costs per connection type as follows:

- the 10 year forecast of future real systems growth capex is taken from Powerco's Gas AMP;
- this value is divided by the annual change in maximum monthly load (also sourced from the AMP) to determine systems growth per GJ of demand;
- the ten year average of this figure is multiplied by average load per connection by connection type to derive a long run average incremental cost of additional upstream capacity.

Appendix 1 shows graphically that gas distribution prices fall between the incremental cost and the standalone cost both on average and across a range of annual consumption thresholds.

5.2.6 Compliance with the pricing principles

Summary of Compliance with Pricing Principles

Principle	Compliance
1) Prices are to signal the economic costs of service provision, by a) being subsidy free (equal or greater than incremental costs, and less than or equal to standalone costs);	The proposed prices fall within the subsidy-free range, as demonstrated by the charts shown in Appendix 5 of the pricing methodology.
b) having regard, to the extent practicable, to the level of available service capacity; and, c) signalling, to the extent practicable, the impact of additional usage on future investment costs.	Coincident peak demand charging was considered, but would be impractical to implement for mass market customers. The ability to store gas in the network ("line pack") also undermines the economic case for coincident peak charging as higher peak demand does not necessarily trigger the need for additional capex. Locational capacity signalling is used in the case of high volume users and subdivisions located away from the existing network.

2) Where prices based on "efficient" incremental costs would under-recover allowed revenues, the shortfall should be made up by prices being set in a manner that has regard to consumers' demand responsiveness, to the extent practicable.	This pricing principle envisages the possible use of Ramsey pricing[8] or some form of coincident peak charging. However, Ramsey pricing is impracticable as there is very limited information available on the price elasticity of demand for gas. In any event, distribution charges are invariably smaller than the charges for the energy that is consumed in conjunction with distribution services, so any price signals provided by the distribution charge are bound to be substantially diluted. With respect to coincident peak demand charging see the comment in the cell above. Powerco has tailored a new G06 residential tariff to reflect the preferences of small residential customers.
3) Provided that prices satisfy (1) above, prices should be responsive to the requirements and circumstances of users in order to: a) discourage uneconomic bypass, and, b) allow negotiation to better reflect the economic value of services and enable consumers to make price/quality trade-offs or non-standard arrangements for services.	Powerco offers non-standard tariffs to industrial and commercial customers to address the risk of bypass and to enable arrangements that are tailored to customers' needs. These tariffs are reviewed to ensure they do not exceed stand alone cost (as a proxy for bypass).
4) Development of prices is transparent, promotes price stability and certainty for consumers, and changes to prices should have regard to the effect on consumers.	Price stability and the effect of price changes on consumers have been important considerations when designing the pricing methodology and the future strategy.

Principle 1: Prices are to signal the economic costs of service provision, by

a) being subsidy free (equal or greater than incremental costs, and less than or equal to standalone costs)

The methodologies for determining standalone and incremental costs are discussed in Section 5.2.5 above. Charts demonstrating that prices fell within the subsidy-free range are included in Appendix 1.

b) having regard, to the extent practicable, to the level of available service capacity

Please see section (c) below.

c) signalling, to the extent practicable, the impact of additional usage on future investment costs.

Economic theory suggests that efficient prices should ignore historical costs and only look forward to future investments; that is, prices should be based on long run marginal costs. According to this approach, prices should be low where the need for further investment is far in the future (and spare capacity exists). Prices should be high in cases when capacity is constrained and investment is needed in the near future. This approach contrasts with the average historical cost approach, which applies an accounting perspective to allocate operating costs, depreciation, and cost of capital to customer groups.

[8] Ramsey pricing requires prices to be set in inverse proportion to the price elasticity of demand for the product concerned.

Powerco has considered these principles from a number of perspectives. The first consideration is, if prices are meant to signal capacity and the need for future investment, then to whom should these pricing signals directed and what action are they meant to prompt?

Capacity-based pricing issues

If the pricing signals are aimed at existing customers, then they should signal times of system peak, when additional consumption could trigger the need for new investment. Coincident peak demand pricing has been used with success in some situations to flatten electricity demand peaks and defer then need for network upgrades. However, there are a number of reasons why coincident peak pricing would be infeasible for Powerco's gas networks.

The first issue is that gas travelling through a pipeline has different delivery characteristics to electricity travelling through wires. Electricity cannot be stored, so demand has to be balanced instantaneously with generation at all times. This inflexibility necessarily leads to peaky consumption patterns – major peaks are observed in daily, weekly and annual consumption.

By contrast, reticulated gas systems do not tend to have such sharp peaks in consumption. Unlike electricity, natural gas can be stored, and it is often stored in transmission and distribution pipelines. At times of high usage, this stored gas (or "line pack") is used to serve the demand for gas consumption. Because of the smoothing effect line pack can have on system peaks, there is less of a need for peak consumption to lead to greater network investment.

Further, the cost of reinforcing a gas distribution network is relatively low compared to the analogous investment in electricity. Gas distribution networks are designed for organic growth at the margins, and the cost of progressive upgrade is relatively uniform. Step increases in cost that restrict the ability to add new customers at the margins are rare. Even where upstream reinforcement of the network is needed, it can typically be completed in small incremental stages that balance the cost of upgrade against the value of additional customers added. This means that if a capacity charge were introduced, it would be small, as the costs of network reinforcement are small.

The third issue with coincident peak pricing is obtaining the data to implement such a pricing structure effectively. On the supply side, although Powerco monitors overall load on its networks, it is limited to periodic review of key network constraints. Monitoring actual

network utilisation would require significant investment in new equipment, and Powerco considers that the cost of investment and monitoring would likely outweigh any potential benefits.

There is also a lack of appropriate data on the demand side of the market to implement a capacity charge. For this, one would need time of use consumption data, so that gas consumed during a specified time period, say 5p.m. to 7p.m., would be priced at a different rate to gas consumed the rest of the day. However, time of use data is not available for the vast majority of Powerco's customers. Only very large industrial customers have a time of use meter. Converting Powerco's mass market meters to time of use meters would be prohibitively expensive, even if one could find time of use meters sized for the residential market. The only information that Powerco has on its customers' consumption is total units of gas consumed. Consumption data are not a good proxy for estimating customer peak demand.

Powerco therefore concludes that instituting a coincident peak demand charge in order to influence peak customer usage is neither warranted in the case of gas distribution nor practical from a data availability point of view.

Locational capacity signalling

Prices signalling capacity and the need to invest could also be targeted at potential gas customers, rather than existing gas customers. In this case, the signal might act as a means to influence potential customers' location decisions.

On a system level, Powerco has experienced periods of depressed growth due to disconnection of existing customers and low uptake of new connections with a decline in gas usage on its distribution network. These factors, coupled with the fact that the gas networks are designed and constructed to accommodate significant future growth in gas consumption, mean that there is a significant amount of unused service capacity within the distribution network as a whole.

Across network regions, the amount of spare capacity is similar, so there would be little to be gained by a regional capacity signal.

However, there are pockets within regions where service capacity can differ. For example, Powerco has needed to reinforce the gas network pipe that feeds the Churton Park suburb of Wellington. This pipe was originally installed over thirty years ago, when the suburb was much smaller. The population growth of this region and its uptake of reticulated natural gas have since meant that the original pipe needed replacing with a larger one. This is an

example of an instance where gas distribution prices to Churton Park residents could have had regard to the decreasing levels of service capacity in that suburb and prices could have signalled the effect of additional usage on future investment costs.

However, this outcome, while based on sound economic principles, would be impractical to implement. Developing and maintaining prices on a suburb-by-suburb basis would be an administrative burden, both for Powerco and for the retailers who sell gas on Powerco's network. More importantly, such a proliferation of tariffs would be confusing from a customer point of view.

More fundamental is the question of how potential residential customers are supposed to react to these potential pricing signals. To be effective, a pricing signal has to be proportionate to the decision it is designed to affect. It is difficult to believe, for example, that a prospective homeowner would use the differential prices of gas between two different suburbs as a deciding factor in choosing a house to purchase. Equally, a prospective restaurant owner would probably not be influenced by different gas prices when deciding on a restaurant location. Even if the relevant decision were whether or not to connect to reticulated gas, it is difficult to imagine that the distribution pricing differential would be able to be distinguished in the retail tariff. Indeed, Powerco considers it unlikely that retailers would elect to pass through such suburb by suburb pricing, even if Powerco did structure its tariffs on this basis.

Further, implementing such a structure may lead to price instability and uncertainty for customers. Again taking the example of Churton Park, once the pipeline is upgraded, then there would again be spare capacity in that region, meaning prices should fall. Powerco believes that tariffs should be constructed in a way that smooths such localised cost differences and provides a consistent, equitable price across the region.

There are a few groups of prospective gas customers for whom price signalling of capacity is a meaningful and feasible exercise: high volume users and subdivisions located away from the existing network may be two.

In the case of high volume users, it is Powerco's practice to consider capacity constraints and necessary upgrades when developing a non-standard tariff proposal for a prospective new large industrial or commercial customer. These proposals are necessarily location-specific and signal the level of available service capacity and any new investment required to supply the prospective customer with the required service. In some cases, prospective customers are considering more than one location, and different pricing proposals are

developed for each, reflecting the different costs that Powerco would face to construct the connection and any necessary reinforcements.

Potential subdivisions located away from the existing network are similarly evaluated to ensure that Powerco can adequately recover its cost of capital. In this case, Powerco may require a capital contribution to connect the subdivision to its network. This capital contribution signals the investment costs without the complexity of a proliferation of new tariffs.

Principle 2: Where prices based on 'efficient' incremental costs would under-recover allowed revenues, the shortfall should be made up by setting prices in a manner that has regard to consumers' demand responsiveness, to the extent practicable.

Setting prices based on a precise definition of price responsiveness, or price elasticity, is difficult for gas distribution business, for a number of reasons. First, robust and relevant information on price elasticity is extremely difficult to obtain, as the Commission itself stated in the Gas Control Inquiry, few studies have been done in New Zealand; and the results of studies conducted in other countries may not be applicable in the New Zealand context.

Second, price elasticity, strictly speaking, is the change in volume consumed in response to a small change in price. In Powerco's experience, the risk with increasing gas prices is less about volumes consumed as it is about customer disconnections. As explained previously, Powerco has experienced episodes when large numbers of customers disconnected in response to a sudden increase in the fixed daily gas tariff. Consequently, Powerco needs to be cautious when changing the price signals it sends to its connected customers.

The third difficulty with considering price elasticity in a formal way is that customers respond to final prices, of which distribution represent only a portion. Retailers re-bundle distribution prices, as well as wholesale gas and retail costs, into a final retail tariff for their customers. In many cases, the structure of distributors' prices – the extent to which tariffs are charged on a daily or per unit of energy basis – is changed by the retailers. It is therefore very difficult to discern customers' responses to changes in distribution prices.

However, Powerco is very concerned about the potential impact of its prices on its customers. In Powerco's experience, customers can be very sensitive to reticulated gas prices: as outlined above, there have been instances when an increase in the fixed portion of residential retail gas tariffs has led to a significant number of disconnections. Powerco's price setting therefore addresses the issue of demand responsiveness from the perspective of experience, rather than a quantitative assessment of price elasticities of demand.

It is Powerco's perception that the small residential customers are the most vulnerable of its customer groups. Customers consuming less than 15 GJ of gas per year are likely to be using gas for only one or two small applications: cooking, perhaps, or a small gas heater. These applications could be easily converted: gas cooktops can run on LPG gas with only minor modifications; small gas heaters can be replaced with electric ones.

Consequently, a tariff aimed specifically at small residential customers has been created (G06). This tariff, which is fully variable with no fixed daily charges, is the most economical choice for customer using less than about 15 GJ of gas per year.

For the remaining customer classes, it is not known how customers will respond to any price increases. Powerco therefore aims to take a prudent approach and implement price changes cautiously, so that retailer responses and customer reactions can be gauged before any subsequent pricing changes are determined.

Principle 3: Provided that prices satisfy (1) above, prices should be responsive to the requirements and circumstances of users in order to:

a) discourage uneconomic bypass, and

b) allow negotiation to better reflect the economic value of specific services.

Powerco offers non-standard tariffs to industrial and commercial customers to address the risk of bypass and to enable arrangements that are tailored to customers' needs. There are generally two groups of such non-standard customers: large industrial customers that require capacities greater than 200 scmh (G40 customer group), and smaller commercial and industrial customers located near a bypass pipeline (G30 customer group).

A number of criteria are considered when developing prices for non-standard customers. For new customers, the process involves an assessment of the costs of constructing a new connection to Powerco's network and of the revenue required to support such an investment. Other factors include an assessment of the estimated demand of the new customer, the likely stability of the business (and therefore the risk that Powerco is taking on in building dedicated assets for it), the length of the contract period, and other market information.

For customers that fall within the defined consumption and capacity ranges of standard customers, Powerco compares the developed non-standard price with the standard price in the relevant customer category; the new customer is offered the lower of the two. For large industrial customers, the developed non-standard tariff is presented as a proposal; the possibility of bypass means that industrial customers generally are able to choose between two or more price offers. In this way, any non-standard tariff is tested by comparison to alternative pricing arrangements, and only those prices that represent the best value to customers are put into place.

For existing non-standard customers, there is no investment decision on Powerco's part, as the connection assets have already been constructed. The expiration of a non-standard pricing contract provides a point at which non-standard customers can revisit the terms of their supply agreement with Powerco and ensure that their network services are consistent with the requirements of their businesses.

While Powerco enters into direct discussions with large (G30 and G40) customers in a number of instances, Powerco's price discussions are generally with the retailers that represent the large customers. In these cases, Powerco considers the retailers to be acting as the agents for the large customers and seeking to ensure the best deals for their customers.

By this process, Powerco discourages the uneconomic bypass of its network and allows negotiation to tailor its services to the specific needs of businesses. Powerco expects to continue this practice.

5.3 APPROACH TO SETTING PRICES FOR NON-STANDARD CONTRACTS

Powerco may offer non-standard tariffs to large commercial and industrial customers in response to customer preferences or to address by pass risk. Non-standard tariffs may be offered to customers that satisfy the following criteria:

- commercial and industrial consumers that require capacity of more than 200 scmh with more than 10 TJ of annual consumption (G40 load group);
- commercial and industrial consumers that are located near to a potential bypass pipeline (G30 load group) with consumption of less than 10 TJ per annum.

Considerations that may be taken into account when developing non-standard tariffs are:

- specific customer needs and preferences, such as load requirements, estimated usage and specific location of investment;
- the most effective and efficient network solution and design to meet consumer requirements, including the capacity of the existing Powerco network to supply the customer's needs;
- the cost of constructing a competitive network solution, and
- the investment risk for Powerco associated with constructing a dedicated network solution for the customer. This assessment would include the risk associated with the customer's business and the period that the consumer would be willing to commit to remain connected to the Powerco network. For a higher risk business the contract price may be set with higher fixed component and the contract period may be shorter.

5.4 POWERCO'S OBLIGATIONS AND RESPONSIBILITIES TO CUSTOMERS ON NON-STANDARD CONTRACTS IN THE EVENT THAT THE SUPPLY OF GAS PIPELINE SERVICES TO THE CUSTOMER IS INTERRUPTED

Powerco does not differentiate non-standard (G30-G40) customers from standard customers with respect to interruption to supply. Basic load shedding categories are industry set / driven and the status of customers at the ICP level are held in the Gas Industry Company's gas registry.

5.5 THE EXTENT OF NON-STANDARD CONTRACT USE

All customers in the G30 and G40 load groups are subject to non-standard tariffs. The total number of ICPs represented by non-standard contracts at the end of March 2017 was 226 and the value of target revenue anticipated for these contracts in 2017/18 is $5,399,675.

5.6 THE VIEWS OF CONSUMERS

To date, Powerco has not undertaken any direct consultation with end customers about variations in distribution prices and quality. The main reason for not doing so is that, for mass market customers, changes to distribution prices do not flow through to end use customers in a transparent way – how final charges are set is determined by the retailers. However, Powerco does conduct market research (via both focus groups and customer interviews), which helps to identify forms of pricing which may create barriers to the uptake of gas. Customers have identified increases in fixed charges as the largest barrier to the use of gas.

6. EXCLUDED SERVICES

6.1.1 Definition

Excluded services on Powerco's gas network include connection of new customers, reconnection, disconnection, and decommissioning services.

These services fall into two general categories: those services that will lead to increased future revenues and those that will not. For services that lead to future revenues, Powerco's approach is to weigh the cost of providing the service against future expected revenue from the site. In many cases, Powerco will charge a price that is less than its cost of providing the service, in recognition of the expected future revenue stream.

For services that do not produce future revenue, such as disconnection and decommissioning, Powerco charges a price that reflects the costs that Powerco incurs to provide the service.

Powerco's excluded services and pricing approach are summarised in the tables below.

Excluded Services

	Definition	Approach
Category: Service will provide increased future revenues		
New connection services	To establish a new point of connection	Powerco will make a contribution to the cost
Reconnection services	To reinstate a connection where an accessible point of connection exists	Powerco will make a contribution to the cost
Meter upgrades	To install a larger capacity meter	Powerco will make a contribution to the cost
Category: Service will not provide increased future revenues		
Disconnection services	To disconnect the Gas Metering System and to plug the riser (service pipe)	Price based on cost recovery
Decommissioning services	To disconnect and to cap the service main at a decommissioned point of connection	Price based on cost recovery
Meter downgrades	To install a smaller capacity meter	Price based on cost recovery

For new residential connections, the charges payable by the customer depend on the:

- nature of the connection (standard or non-standard, defined below);
- length of the service pipe required; and
- nature of the load being connected.

For new commercial and industrial connections, Powerco will consider connection charges on a case by case basis.

Standard residential connections are those that satisfy the following conditions:

- gas main is in the street;
- gas main runs past the property needing a connection; and
- gas main is on the same side of the road as the property needing a connection.

Standard connections have established prices. Non-standard connections may entail such factors as gas mains extension, road crossing, long service pipes, installation on a steep section, or a creek or river crossing. These connections are considered on a case by case basis and the charge is based on the actual time and material required to connect the customer and the expected customer load.

6.1.2 Medium-Term Price Strategy for Excluded Services

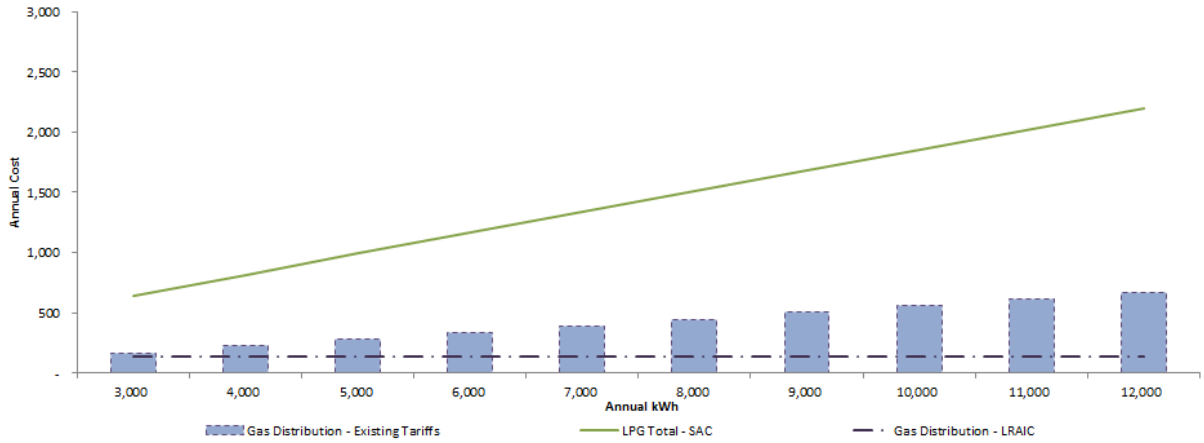
In the medium-term, Powerco intends to maintain its policy of making a contribution to the costs of those services that have a future revenue stream associated with them, such as connections, reconnections, and meter upgrades. For other services, Powerco intends to charge a price that reflects its own costs of performing the service.

Powerco intends to review its prices for these services periodically to ensure that they still reflect the costs that Powerco incurs.

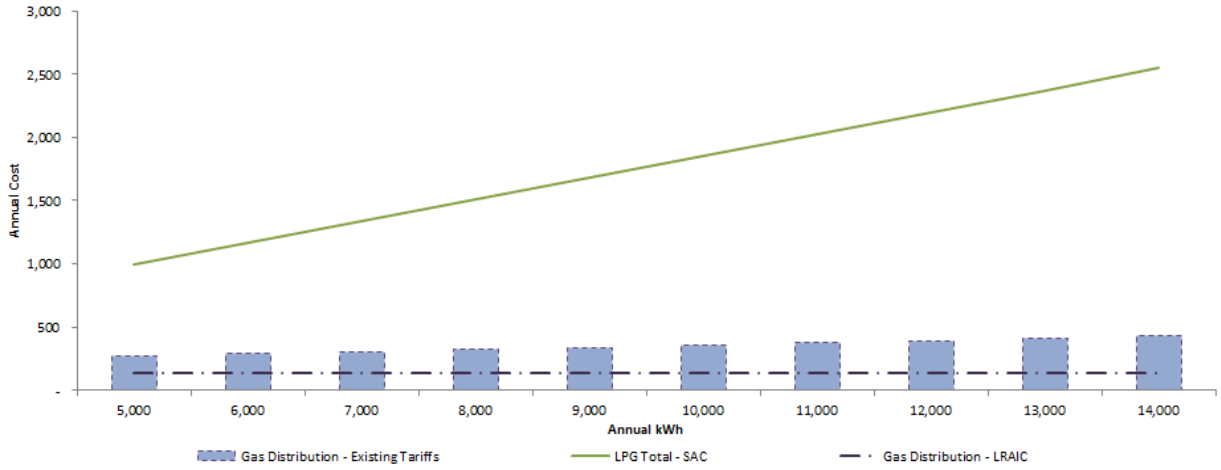
APPENDIX 1: ESTIMATES OF SUBSIDY FREE PRICES FOR STANDARD NETWORK CLASSES

This section sets out the results of analysis of the 2013/14 stand alone and the incremental cost of supply, against the average tariff revenue per kWh. The network charges fell within the subsidy-free range at that time and this finding is unlikely to have changed in the intervening period.

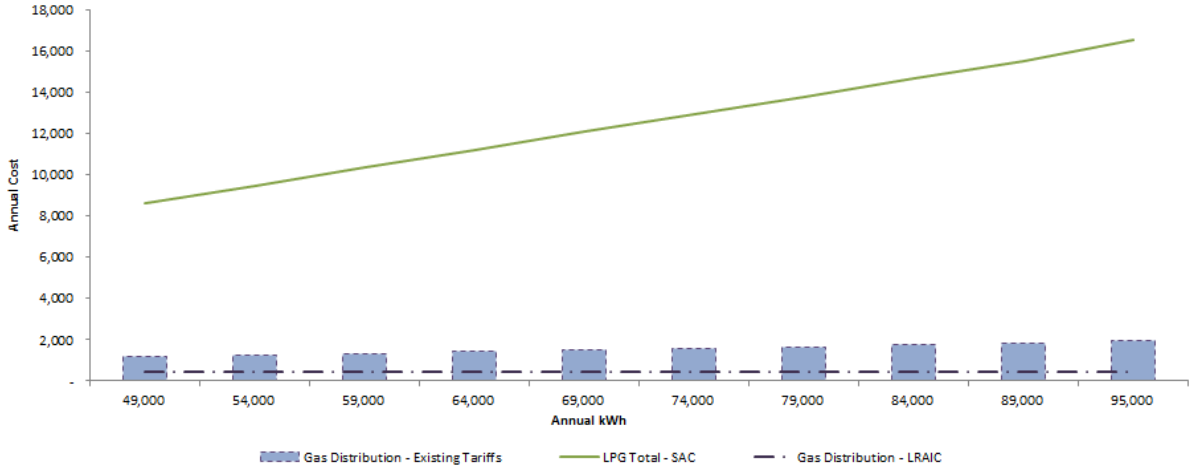
Powerco G06 Network Average – 2013/14



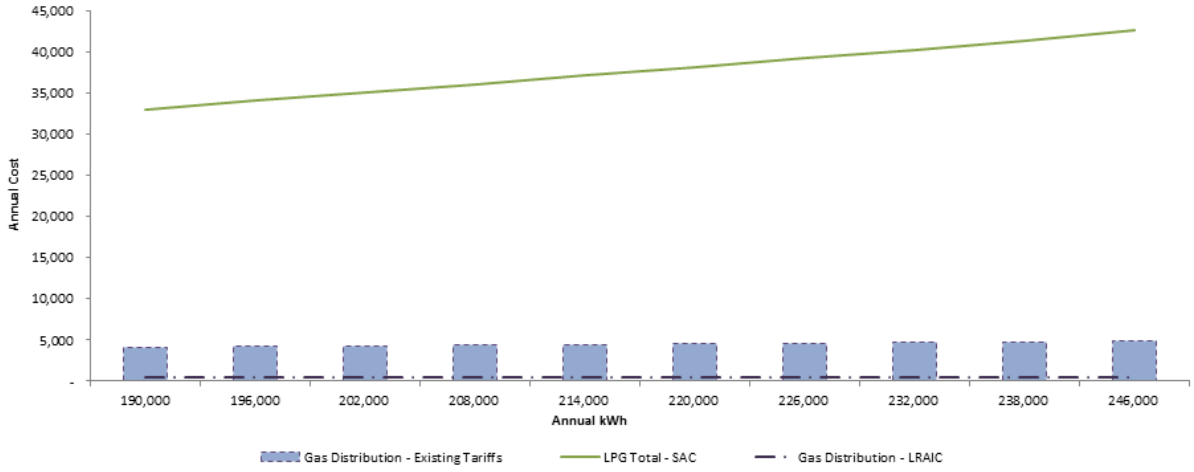
Powerco G11 Network Average – 2013/14



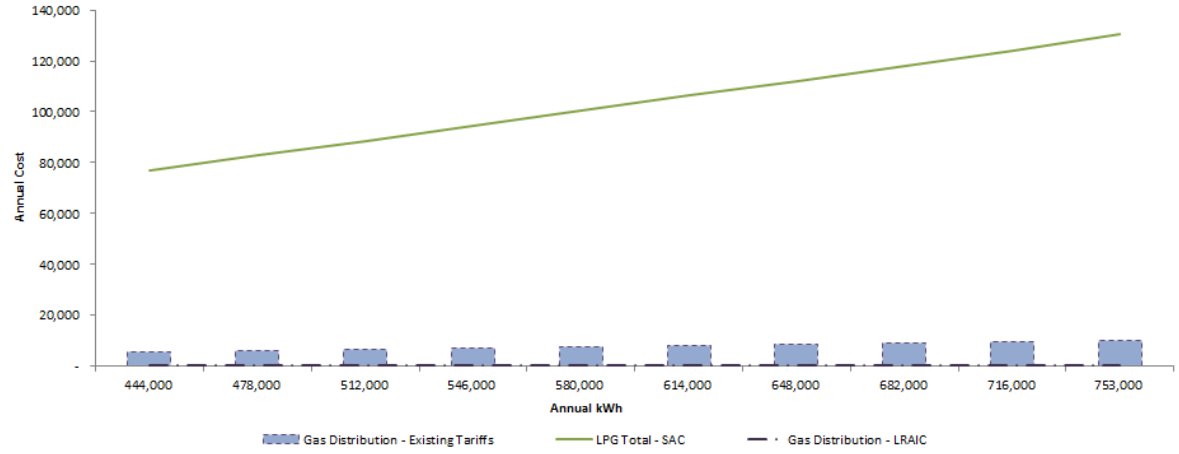
Powerco G12 Network Average – 2013/2014



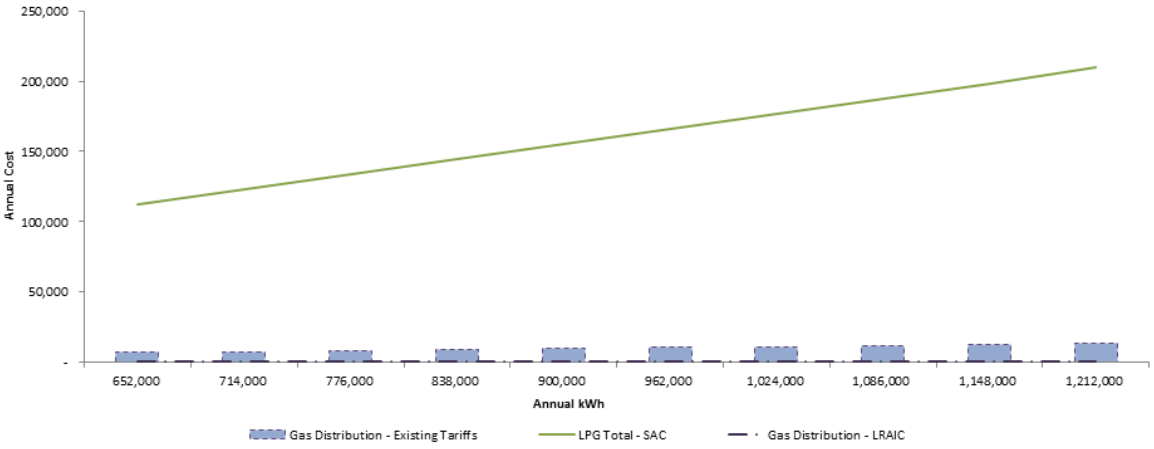
Powerco G14 Average – 2013/14



Powerco G16 Average – 2013/14



Powerco G18 Average – 2013/14



APPENDIX 2: TARGET REVENUE FOR 2017/2018 AND THE PROPORTION OF THE TARGET REVENUE THAT IS COLLECTED BY EACH TARIFF TYPE

Target revenue for Year 2017/18 (1 October 2017 to 30 September 2018): $50,049,580

Recovery of Target Revenue			
Load Group	**Fixed Revenue**	**Variable Revenue**	**Total Revenue**
G06	$ -	$ 6,518,339	$ 6,518,339
G11	$ 16,336,764	$ 12,899,342	$ 29,236,106
G12	$ 741,581	$ 2,024,049	$ 2,765,630
G14	$ 941,830	$ 1,678,966	$ 2,620,796
G16	$ 713,820	$ 1,953,465	$ 2,667,285
G18	$ 213,839	$ 604,397	$ 818,236
G30	$ 385,908	$ 798,242	$ 1,184,149
G40	$ 1,477,325	$ 2,761,714	$ 4,239,039
Total	**$ 20,811,066**	**$ 29,238,514**	**$ 50,049,580**

Note: figures may not sum exactly due to rounding.

Attachment 2: Directors' Certificate confirming regulatory compliance of the 2017 Powerco Gas Distribution Pricing Methodology

CERTIFICATE FOR DISCLOSURES AT THE BEGINNING OF A PRICING YEAR

Pursuant to clause 2.9.2 of section 2.9

We, Gordon Hay and John Loughlin,

being directors of Powerco Limited certify that, having made all reasonable enquiry, to the best of our knowledge—

a) The following attached information of Powerco Limited prepared for the purposes of 2.4.1 of the Gas Distribution Information Disclosure Determination 2012 in all material respects complies with that determination; and

b) The prospective financial or non-financial information included in the attached information has been forecast on a basis consistent with regulatory requirements or recognised industry standards.

Director

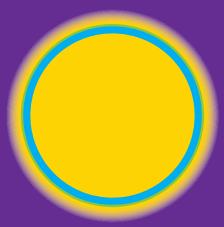
Director

29/9/17

Date

29/9/17

Date


POWERCO