

# Gas Industry Co Briefing to Incoming Minister of Energy and Resources - Hon Dr Megan Woods

November 2017

# 1 Key points summary

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1. Natural gas provides around 22 percent of the country's primary energy supply. Fifteen fields in Taranaki produce nearly 200 PJ of natural gas annually, which travels through 20,000 km of transmission and distribution pipelines to supply over a quarter of a million consumers in the North Island.
2. Additionally, liquefied petroleum gas (LPG) is extracted from the wellstream and is distributed nationally in bottles and through South Island distribution networks to around 150,000 households and industrial and commercial consumers.
3. Industry developments in the 2000s brought greater complexity to gas markets, more participants and a greater need for regulatory or other governance requirements. In that context, Gas Industry Co was established as:
  - the industry body and a co-regulator under Part 4A of the Gas Act 1992 (the Act) to develop governance arrangements for the downstream gas industry.
  - In essence, co-regulation requires Gas Industry Co to work closely with the industry; prefer developing non-regulatory options to address industry governance issues; and recommend any regulatory governance arrangements to the Minister for approval. A special-purpose company, owned by industry shareholders and governed by a Board of Directors appointed by shareholders. The Board has a maximum of seven Directors, the majority of whom, including the Chair, are required to be independent of the industry. Gas Industry Co has been chaired since inception by the Right Honourable Jim Bolger, ONZ.
  - Gas Industry Co continues to fulfil the original intention to provide a right-sized vehicle to reflect New Zealand's small-but-important downstream gas industry and its unique features. It relies on Gas Industry Co's owners remaining broadly inclusive of the industry. Gas Industry Co's share register has grown in recent years, and its shareholders represent the majority interests at each level of industry participant: gas production; gas pipeline ownership; and gas retailing.
4. Gas Industry Co's role is to:
  - develop downstream gas governance arrangements that improve:
    - the operation of gas markets;
    - access to gas infrastructure; and
    - consumer outcomes.
  - develop these arrangements with the principal objective to ensure that *'gas is delivered to existing and new customers in a safe, efficient, fair, reliable, and environmentally sustainable manner'*; and

- oversee compliance with, and review, such arrangements.

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

5. Gas contributes to New Zealand's energy supply as a direct fuel source, providing energy choice for around 280,900 consumers. Apart from a portion of imported LPG supply, New Zealand remains an 'islanded' market supplied entirely from Taranaki oil/gas fields, so gas supply and demand need to balance.
6. Around 265,000 households rely on gas for home heating, hot water and cooking, but use only 3.5% of gas production.
7. Gas fuels around 13 percent of electricity generation and underpins the operation of sectors that make a major contribution to the nation's economy. Around half of the gas supply is used for petrochemical production and other key users include dairy, pulp & paper, refining and food production sectors.
8. The industry is on track to meet current expectations for the downstream gas sector. In particular, gas markets are more efficient and competitive, resulting in growing connection and customer numbers. Significant work remains for Gas Industry Co in the coming period. The current Work Programme focusses on development of a single new multilateral code for gas transmission and associated issues of gas balancing, gas quality, transmission security and reliability, and gas reconciliation.
9. Gas's role is changing significantly. For example, its use in baseload electricity generation has declined, but it has an important role in providing electricity supply security and in meeting morning and evening peak demand.
10. Looking to the future, significant ongoing change in the gas industry is already being driven by the following inter-related factors:
  - The gas industry is being indirectly affected by new electricity technologies, such as electric vehicles, solar/photovoltaic panels and embedded generation. Resulting consumer preferences are transforming energy markets globally.
  - As a carbon fuel, gas's role is affected by climate change issues and responses. Gas is already playing a key role globally in reducing coal use, and can offer a lower carbon footprint in New Zealand than other alternatives (e.g. displacement of coal, advantages of home hot water heating). The Government's new climate change policies will further transform the sector as it transitions to a low carbon future.
  - The fall in global oil prices has seen a corresponding drop in the upstream investment required to replenish gas reserves, which has been reflected in lower responses to the annual Block Offers in recent years. Long term gas supply/demand scenarios

commissioned by Gas Industry Co identify that gas supply conditions will most likely tighten over the next several years due to the current low levels of exploration coupled with relatively high levels of demand. Industrial and commercial consumers would be affected first by any such tightening, including through increased gas prices. However, residential consumers use only a small proportion of supply.

11. Amongst industry risks is the potential for gas supply to be interrupted at national, regional and local levels, generally as a result of a production station outage or from a transmission pipeline failure. As part of Gas Industry Co's role, the Gas Governance (Critical Contingency Management) Regulations 2008 (CCM Regulations) are in place to ensure orderly management of any larger interruptions. Large events are rare, and robust arrangements for management of them are in place. But, as in the last large interruption in October 2011, the Minister may have a role in managing media responses or other flow-on effects for Government. Your Energy Private Secretary is included in notifications of critical contingencies, both Gas Industry Co and First Gas (the gas transmission system owner) would be first contacts for any advice you may require.
12. Gas Industry Co looks forward to meeting with you, particularly to report on:
  - specific matters which will be the subject of Gas Industry Co recommendations and advice to you; and
  - the performance and current state of the industry, and on its future.

## 2 Gas industry background

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### Natural gas includes LPG

The gas industry, and most of the following Briefing, focuses on natural gas extracted from gas fields, along with oil and condensates, and transported in pipelines around the North Island. It also refers to liquified petroleum gas or LPG, which is a mix of propane and butane gases extracted from natural gas, and which is distributed nationally.

### Key gas industry statistics

- Natural gas has contributed to New Zealand's energy supply for over 40 years. By its nature, the gas industry is dependent on a range of players, from upstream explorers and producers through to customers, as well as on competitive markets and ongoing investment at all stages.
- Natural gas is produced from 16 fields, all onshore or offshore Taranaki, and is available only in the North Island.
- The forecast gas reserves-to-production (RTP) ratio for January 2017 is approximately 10 years. This is slightly down from the 11-12 years range experienced over the last four years. The fall reflects a drop in P50 gas reserves together with strong gas demand.
- Total gas market demand in the most recent calendar year (2016) was approximately 190 petajoules<sup>1</sup> (PJ).
- Natural gas accounts for 22 percent of total primary energy supply and 14 percent of consumer energy.
- Gas is used by approximately 280,900 consumers (264,300 residential; 16,200 commercial; 400 industrial).
- Gas underpins current electricity supply security. Around 26 percent of natural gas production is used for electricity generation, and gas fuels around 13 percent of total electricity generation.
- Over half of natural gas is used in petrochemicals manufacture (methanol and urea fertiliser), as feedstock and as process fuel.
- Industrial customers, who include many of New Zealand's major export industries (such as dairy, steel manufacture, oil refining and forestry) consume around 15 percent of annual natural gas production.
- The commercial and residential consumer groups respectively account for about 4 percent and 3 percent of annual natural gas consumption.
- LPG market demand is approximately 8.4 PJ a year. LPG is imported from and exported to Australia at different times, depending on whether domestic consumption meets or exceeds supply. There are indicatively 150,000 LPG household and larger consumers<sup>2</sup>

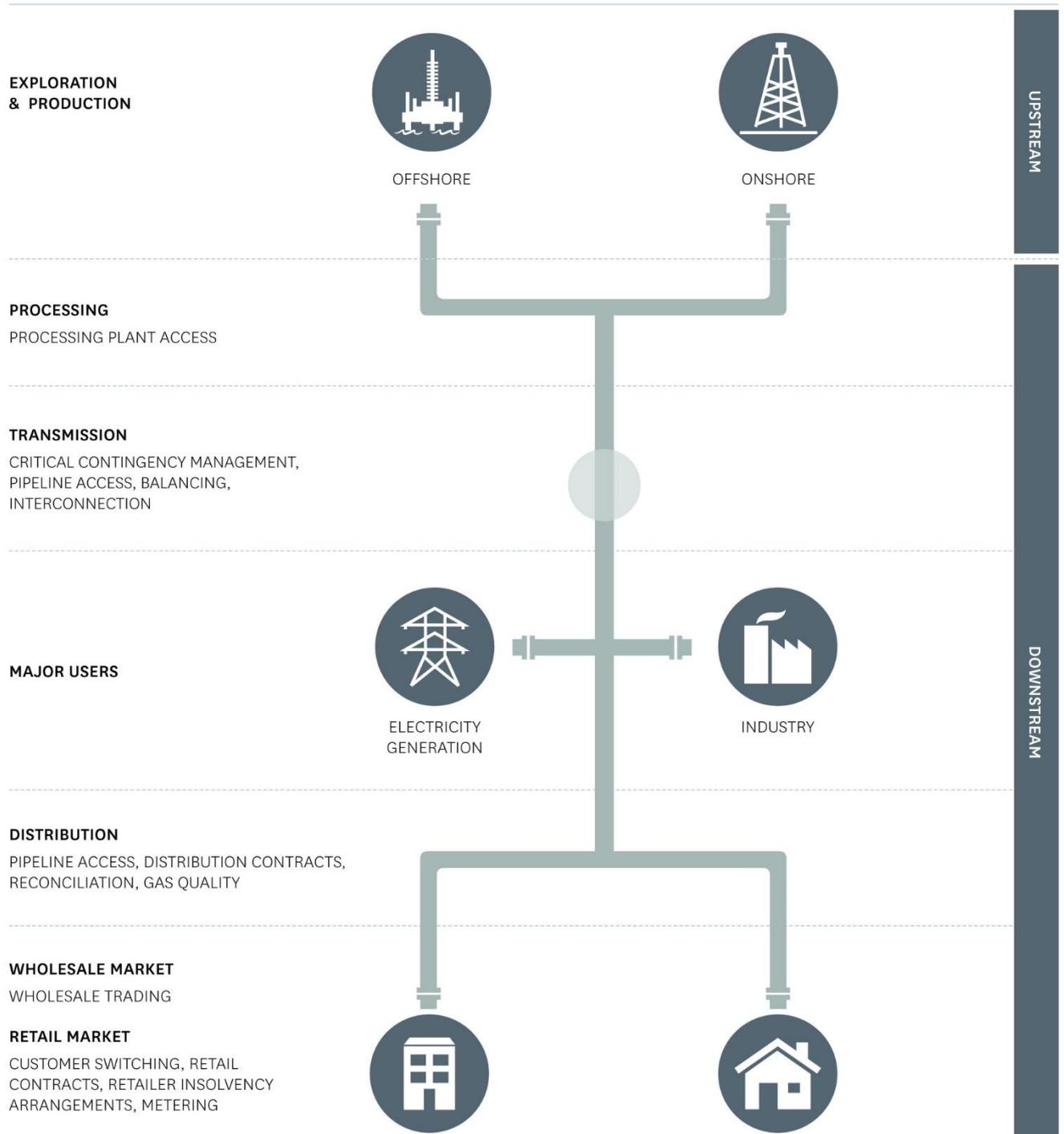
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<sup>1</sup> petajoule =1 million gigajoules (GJ). Based on average residential consumption of 23 GJ/year, 1 PJ equates to the annual gas consumption of approximately 43,500 households.

<sup>2</sup> Includes South Island reticulated consumers, household 45kg bottle installations and larger commercial/industrial bottles; excludes 9kg bottles.

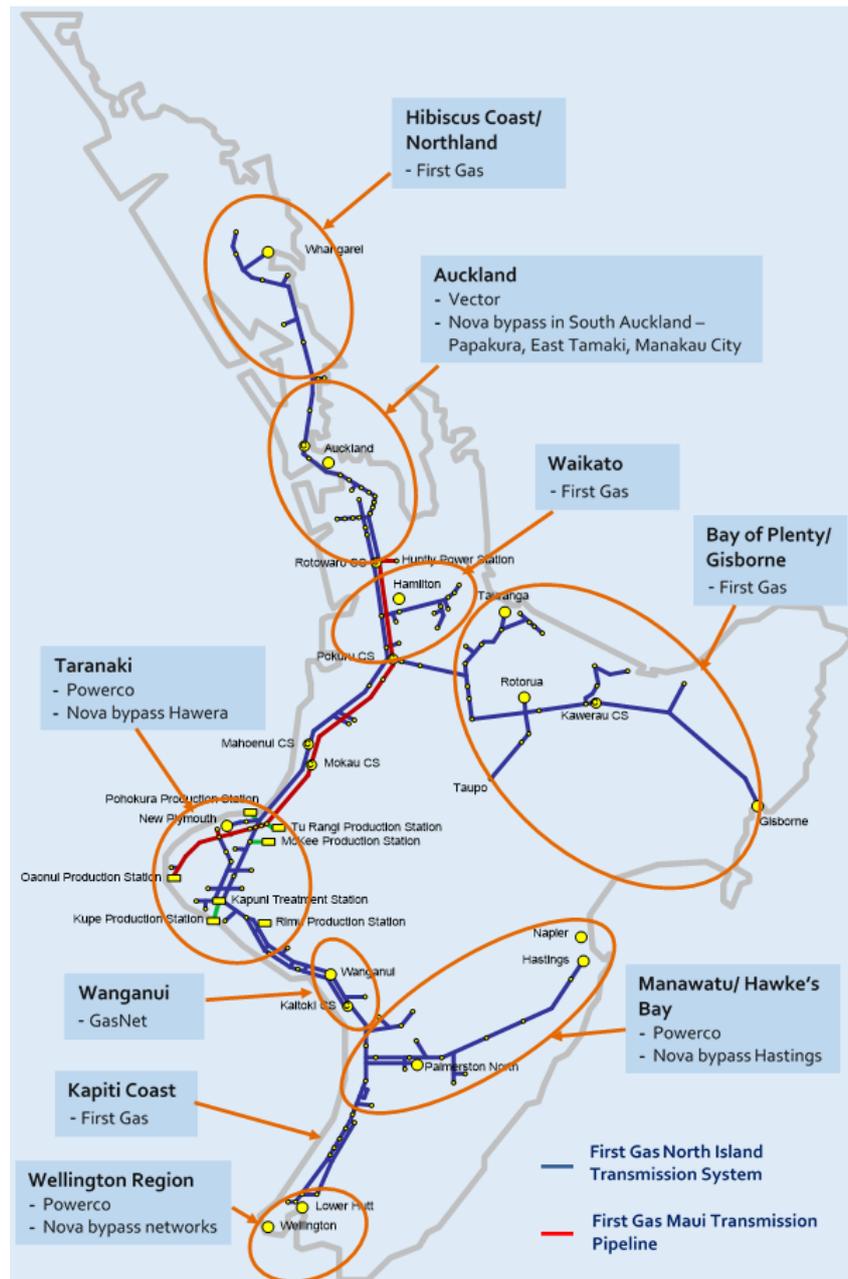
## Industry makeup

The following chart illustrates the main parts of the upstream and downstream gas sectors. The upstream sector is governed primarily through the Crown Minerals Act 1991, administered by the Ministry of Business, Innovation and Employment. Gas Industry Co's role under the Gas Act encompasses the downstream sector, comprising processing facilities, transmission, distribution, wholesale, and consumer markets. The chart refers to a number of the areas in which the Gas Act provides powers and objectives for possible governance arrangements.



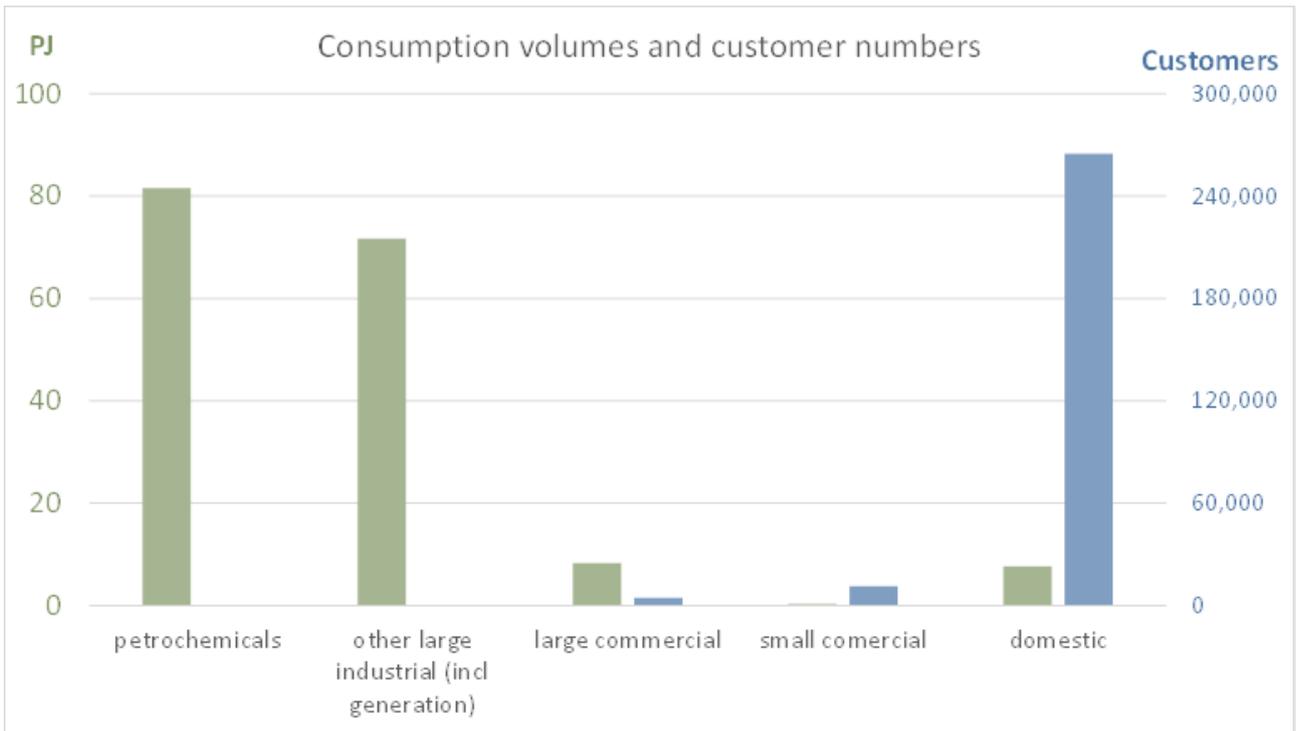
## Gas transportation

- Open access high pressure transmission pipelines (total length: 2,520km) owned by New Plymouth-based First Gas Limited
- Open access lower pressure gas distribution networks owned by First Gas Limited, Vector Limited, Powerco Limited, and GasNet; and a number of private pipelines owned by Nova Energy Limited (total length: 17,967km).



### Customer numbers and volumes

The New Zealand gas market is unusual in comparison with other countries, insofar as a large number of households consume only a small percentage of supply, while a small number of industrial users consume the large majority of supply.



### LPG

LPG is supplied nationally to around 150,000 customers. Residents are typically supplied via 9kg and 45kg cylinders, while commercial customers are supplied via larger cylinders or, in some cases, banks of 45kg cylinders. Transport includes maritime import/export, trucking and interisland ferry. There are also small LPG pipeline networks in Christchurch, Queenstown, Wanaka, and Dunedin.

## 3 Gas Industry Co's role and current gas governance arrangements

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The co-regulatory model for downstream gas stems from successive Governments' desire for industry involvement in developing the industry as it has become more complex, as well as a desire to avoid any undue regulatory burden on a comparatively small 'challenger' gas industry. The model provides a greater opportunity for the Government and industry, facilitated by Gas Industry Co as the 'industry body' and a 'co-regulator' under the Gas Act, to work together on developing governance arrangements.

Gas governance arrangements provide for the operation of gas markets, access to key infrastructure, and protection of consumers; and for compliance and enforcement. Gas governance arrangements may take the form of voluntary arrangements or rules and regulations.

Gas Industry Co has progressed a long way towards completing the objectives and tasks required by the Act and the Government Policy Statement on Gas Governance 2008 (GPS). For example, in relation to consumer market arrangements, industry participants can now trade with the confidence that there are robust systems for switching customers, accurately reconciling downstream quantities of gas, and managing critical contingencies.

### Company Shareholders

The Constitution of Gas Industry Co provides eligibility for all 'gas industry participants' to become shareholders in the Company. The share register currently represents the majority interests at each level of 'industry participants' – gas production, gas pipeline ownership, gas retailing, etc

Shareholders as at October 2017 are:

- Contact Energy Limited
- emsTradepoint Limited
- First Gas Limited
- Genesis Energy Limited
- Greymouth Gas New Zealand Limited
- Mercury NZ Limited
- Methanex New Zealand Limited
- New Zealand Oil & Gas Limited
- Nova Energy Limited
- OMV New Zealand Limited
- Powerco Limited
- Shell (Petroleum Mining) Limited
- Trustpower New Zealand Limited
- Vector Limited

## Board of Directors and Management

The Board of Gas Industry Co is a mix of independent and non-independent (industry) directors appointed by shareholders, a majority of whom (including the Chair) must be independent of the gas industry.

Board members are:

Name	Role
Rt Hon. James Bolger, ONZ	Independent Chair
Robin Hill	Independent Deputy Chair
Andrew Brown	Independent Director
Keith Davis	Independent Director
Nigel Barbour (Powerco Limited)	Non-independent Director
Dennis Barnes (Contact Energy)	Non-independent Director
Gabriel Selischi (OMV)	Non-independent Director

The Management team is:

Name	Role
Steve Bielby	Chief Executive
Ian Dempster	General Manager Operations
Susan Dunne	General Manager, Corporate Services

## Funding

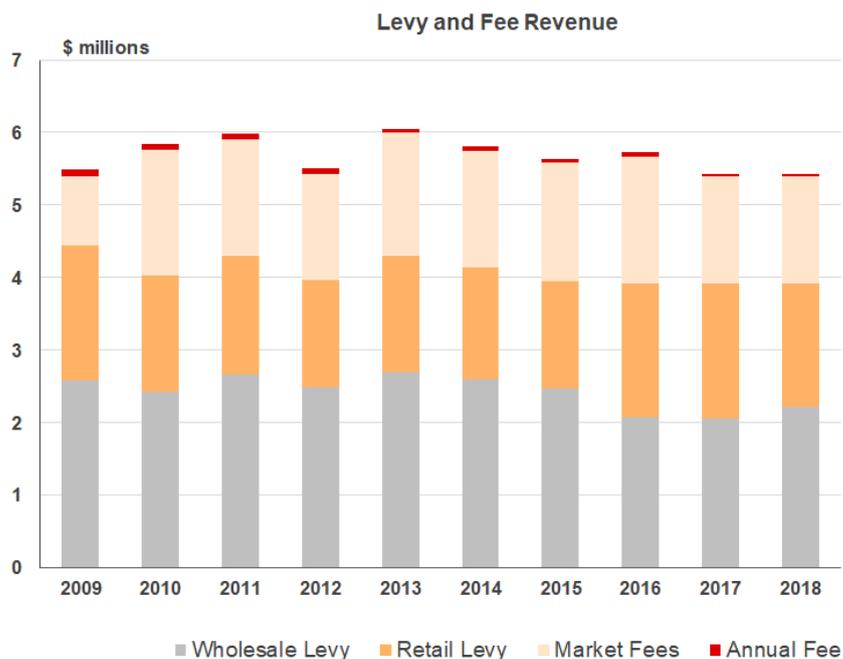
Gas Industry Co's funding of \$5.38 million for the current year comes principally from two sources: an annual levy and market fees.

Each year, Gas Industry Co consults with stakeholders on its proposed strategy, work programme and costs for the following year. There has been a high level of concurrence from stakeholders on these matters in recent years.

Gas Industry Co then makes a recommendation to the Minister for levy regulations for the next financial year.

The graph below illustrates the composition of Gas Industry Co's costs over the past ten financial years to FY2018. We will shortly be commencing consultation on the strategy, work programme and levy for FY2019.

### Levy and Fee Revenue



### Strategy

In fulfilling its statutory role, Gas Industry Co's Board, in annual consultation with the industry, has adopted the following corporate strategy:

- The Company's strategic goal is to *optimise the contribution of gas to New Zealand*;
- Its mission seeks to provide leadership for the gas industry; and
- The Company's strategic objectives are to:
  - Promote efficient, competitive and confident gas markets
  - Facilitate efficient use of, and investment in gas infrastructure
  - Deliver effectively on Gas Industry Co's accountabilities as the gas industry body
  - Develop and communicate the role of gas in meeting New Zealand's energy needs

## Developing governance arrangements

In recommending arrangements to the Minister, Gas Industry Co is directed by the objectives of the Gas Act and must also take account of the objectives and outcomes set out in the GPS. The principal objective of any gas governance regulation is ensuring *'that gas is delivered to existing and new customers in a safe, efficient and reliable manner'*. Other objectives include:

- Providing access to essential infrastructure;
- Providing competitive market arrangements;
- Minimising barriers to competition in the gas industry;
- Enhancing incentives for investment in gas processing facilities, transmission and distribution;
- Ensuring that delivered gas costs and prices are subject to downward pressure;
- Risks to security of supply are properly and efficiently managed; and
- Ensuring there is consistency with the Government's gas safety regime.

The GPS applies these objectives also to non-regulated arrangements, and adds two further objectives: fairness and environmental sustainability.

## Regulatory and non-regulatory options

A preference for developing non-regulatory arrangements is a key feature of the co-regulatory model. The Gas Act provides that before making a recommendation for regulations or rules, Gas Industry Co will 'ensure that the objective of the regulation is unlikely to be satisfactorily achieved by any reasonably practicable means other than the making of the regulation (for example by education, information, or voluntary compliance)' (43N(1)(c)).

## Current governance arrangements

Current regulatory and non-regulatory gas governance arrangements developed and administered by Gas Industry Co are as follows below. All resulted from industry consultation and either formal approval (in the case of rules and regulations) or endorsement (in the case of non-regulatory arrangements) by the Minister:

- The **Gas (Switching Arrangements) Rules 2008** enable consumers to choose and efficiently switch between competing gas retailers.

Substantial strengthening of market competition and higher levels of contestability has seen 99 percent of customers with a choice of at least seven retailers (there are a total of 10 gas retailers);

Since 2009, the switching rate has more than tripled to around 3600 per month. The churn rate for the 12 months to September 2017 is 15.7%.

Switching times have reduced from weeks or months. It now takes less than three business days, on average, for a switch to be completed.

- The **Gas (Downstream Reconciliation) Rules 2008** (Reconciliation Rules) reconcile volumes of gas leaving the high pressure transmission system against the volumes sold by retailers. The difference between the gas leaving the high pressure transmission system and the sum of all volumes sold by retailers is calculated as unaccounted-for gas (UFG). High levels of UFG is inefficient as the costs associated with UFG are paid by all gas retailers which is ultimately charged to consumers.

The Reconciliation Rules have been instrumental in reducing UFG to 1 percent of total allocated volumes. The industry is currently developing an alternative methodology to improve the timeliness of allocation information. This includes a day-after delivery (D+1) trial, which is intended to provide shippers with information on their daily allocated quantities on the day after gas has flowed.

- The **Gas Governance (Critical Contingency Management) Regulations 2008** (CCM Regulations) provide for the effective management critical gas outages and other security of supply contingencies without compromising long-term security of supply. These regulations have been invoked to manage both outages of major gas fields and transmission pipeline failures. The CCM Regulations were successful in managing the major outage on the Maui Pipeline in October 2011, and have subsequently been fine-tuned.

Significant critical contingencies are rare events and robust arrangements for managing them are in place. But, as in October 2011, the Minister may have a role in managing media responses or other flow-on effects of a major event. Your Energy & Resources Private Secretary is included in notifications of critical contingencies, and both Gas Industry Co and First Gas (the gas transmission system owner) would be first contacts for any advice you may require.

- The **Gas Governance (Compliance) Regulations 2008** provide a formal compliance regime that deals with alleged breaches of gas governance regulations and gas governance rules.

The level of compliance has increased markedly as participants have adjusted to the various requirements and instituted internal compliance processes.

- The **Retail Gas Contracts Oversight Scheme** provides a non-regulated process for reviewing retailers' supply contracts with small consumers.

In the first three years of this Scheme's operation, the alignment of retailers' supply contracts with small consumers improved to overall 'Substantial' compliance with Scheme benchmarks.

- The **Gas Distribution Contracts Oversight Scheme** provide a process for reviewing gas distribution contracts between distributors and retailers.

In the first two years of this Scheme's operation, the alignment of distributors' contract offerings to retailers also improved to overall 'Substantial' compliance with the principles.

- **Transmission Pipeline Interconnection Guidelines** provide for efficient interconnections to the transmission pipelines, both for injecting new gas and for consumers wishing to take gas; and
- Backstop arrangements exist for possible regulation of the orderly transition of affected gas consumers in the case of a gas retailer insolvency event.

## Reporting

Gas Industry Co is required by the Gas Act to publish annually a Statement of Intent, and Annual Reports. It also publishes Quarterly Reports, regular Bulletins and the regularly-updated *New Zealand Gas Story*. Collectively these also meet the requirement in the GPS to report to the Minister on the performance and current state of the industry.

## 4 Performance and current state of the gas industry

Gas Industry Co's responsibilities include reporting to the Minister of Energy and Resources on the 'performance and current state of' the gas industry. We do this on an ongoing basis, including through the detailed publication *The New Zealand Gas Story* and quarterly reports. The following highlights key industry developments and issues.

The Government played a key role in the development of an indigenous gas industry, as a key part of national energy security and competition. Since the mid-2000s the gas industry has undergone significant transformation as it has moved from a reliance on a single dominant field – Maui – to supply from multiple smaller fields. This has brought greater complexity to the gas markets, more participants and a greater range of governance requirements.

The following simplified figure captures the more significant changes to the industry over recent years:

...in 2004	..today
Dominant Maui field in steep decline; only 6.5 years' P50 reserves	15 producing fields (incl Maui); 10 years' P50 reserves
Total gas use 156PJ p.a.	Total gas use 191PJ p.a.
238,000 gas consumers	280,900 gas consumers
Methanex cuts production to one methanol production train	3-train methanol production reinstated using around 50% of NZ supply
Gas meets baseload electricity generation (21% of generation)	Reduced 'peaking' role for gas in electricity generation (13% of generation)
Maui pipeline not open access; dual ownership of gas transmission systems	All gas transmission open access transmission and under single ownership of First Gas Limited
Regulation of transmission/distribution pricing emerging	Commerce Commission's price/quality regime in place
Retail competition emerging from historical local monopoly retailers	10 gas retailers
Consumer protection focus emerging	Consumer protection legislation reforms
Downstream gas industry governance through voluntary codes	Formal regulation/rules around critical contingency management, downstream reconciliation and consumer switching

Important recent developments and future issues include the following:

1. Gas makes a key contribution to New Zealand's energy supply, including 22% of primary energy supply. It is a direct fuel source; supports electricity supply security; and provides a competitive energy choice for around 280,900 consumers.
2. Gas fuels around 13 percent of electricity generation and underpins the operations of sectors that make a major contribution to the nation's economy. Over half of the gas supply is used for petrochemical production and other key users including the dairy, pulp & paper, refining and food production sectors.
3. The two gas transmission pipeline systems are owned by a single owner First Gas.
4. Development of a new gas spot (or wholesale) market by emsTradepoint, a subsidiary of Transpower.
5. Gas retail markets are more efficient and competitive, resulting in growing connection and customer numbers.
6. Gas's current role is changing significantly. A key example is reducing use of gas for electricity generation, although gas has also developed an important 'peaking' role (especially to meet growing morning and evening peak demand in Auckland) facilitated by new gas turbine technologies, which remains important for security of electricity supply. Growth in petrochemical production has compensated for reduced gas use in electricity generation.
7. Looking to the future, significant ongoing change is expected due to a combination of factors:
  - the gas industry is being indirectly affected by new electricity technologies, such as electric vehicles, solar/photovoltaic panels and embedded generation. Resulting consumer preferences are transforming energy markets globally.
  - as a carbon fuel, gas's role is affected by climate change issues and responses. Gas is already playing a key role globally in reducing coal use, and can offer a lower carbon footprint in New Zealand than other alternatives (e.g. displacement of coal, advantages of home hot water heating). The Government's new climate change policies will further transform the sector as it transitions to a low carbon future.
  - the fall in global oil prices has seen a corresponding drop in the upstream investment required to replenish gas reserves, which has been reflected in lower responses to the annual Block Offers in recent years. Long term gas supply/demand scenarios commissioned by Gas Industry Co identify that gas supply conditions will most likely tighten over the next several years due to the current low levels of exploration coupled with relatively high levels of demand. While industrial and commercial consumers

would be affected first by any such tightening, including through increased gas prices. However, residential consumers use only a small proportion of supply.

# 5 Gas Industry Co Work Programme for FY2018 and beyond

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## Strategic priorities FY2018-FY2020

The strategic priorities set for the current financial year and beyond are detailed in Gas Industry Co's *Statement of Intent 2018-20* and in essence fall into three categories:

- Progress priority issues developed in consultation with industry and MBIE.
- Complete currently committed workstreams.
- Maintain core industry systems to ensure the ongoing smooth operation of market arrangements and recommend improvements where required.

Specific workstreams include:

- Co-lead with First Gas the development of a single transmission access code. In FY2018 and beyond we will continue to work with First Gas and industry stakeholders on the detailed design of this single new transmission code;
- Operate the daily allocation pilot scheme that has been put into place to provide retailers with the information they need to manage successfully under current balancing arrangements. Based on the outcomes of this pilot, and once the design of the single transmission access code is known, identify changes needed to the Reconciliation Rules and any associated changes to the allocation agent's role and system.
- Oversee industry-led work on gas quality, and determine actions to address any remaining gas quality issues. Update the *Gas Quality Requirements and Procedures* document as required;
- Monitor and report on metrics arising from the market and regulatory processes to enhance transparency and foster a well-informed market;
- Review governance arrangement to ensure they remain fit for purpose and recommend changes where improvements can be made efficiently;
- Monitor the compliance of industry participants and take enforcement action where necessary;
- Monitor arrangements governing the Retail Gas Contracts Oversight Scheme. Review retailers' contracts on an exceptions basis and provide additional information to assist new entrant retailers to understand their obligations and governance processes;
- Continue to assess progress with executing new distribution contracts consistent with the Gas Distribution Contracts Oversight Scheme principles;

- Assess and report upon any new interconnections to the high pressure gas transmission pipelines;
- Update *The New Zealand Gas Story* so it is maintained as a current information resource for the Minister, the industry, and the public generally; and
- Further develop and implement the Company's broader strategy to optimise gas's contribution to New Zealand, and to increase general awareness of gas's role in the economy.

## **FY2019 Work Programme development**

In November 2017, Gas Industry Co will commence the process of developing a detailed work programme and levy proposal for FY2019. The process begins with an annual Co-Regulatory Forum, in which our proposals are presented to stakeholders for initial discussion. This leads to the proposals being formally published in December 2017 for written industry submissions. A Statement of Intent including the final proposals for FY2019 and an indication of activities for the subsequent two years will be prepared in the first quarter of calendar year 2018 and presented to the Minister for comment, as required by the Gas Act. The process culminates in a recommendation to you in respect of the FY2019 levy, for Cabinet approval, which would come into force on 1 July 2018.

## 6. Roles for New Zealand gas in the context of climate change response

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The Government has signalled that it intends to prioritise climate change policy, which will affect the gas industry and other fossil fuel industries. Given this, we thought it timely to outline what we perceive as the roles for gas in New Zealand in the transition to a low carbon future.

Current trends in New Zealand gas use are broadly consistent with the initial steps in the transition to a decarbonised energy system. There are four main groups of gas demand in New Zealand: petrochemical manufacturing, electricity generation, process heat requirements in the industrial sector, and space and water heating loads in the commercial and residential sectors.

The petrochemical sector currently consumes around 51 percent of New Zealand's gas supply, with Methanex using over 90 percent of gas in the sector (when operating at full capacity) to produce methanol. The production of methanol using natural gas creates significant amounts of CO<sub>2</sub>, albeit at much lower levels than in situations where coal is used as a feedstock<sup>3</sup>. Furthermore, a significant portion of CO<sub>2</sub> is 'locked in' to products made with petrochemicals such as plastics, rather than emitted to the atmosphere. Methanex is currently recognised as an emissions-intensive trade exposed (EITE) business in the NZ Emissions Trading Scheme (ETS), allocating Methanex free NZUs (an 'industrial allocation'). This policy recognises that if Methanex faced a higher carbon price in New Zealand, it may close local operations and increase production in jurisdictions that do not have an ETS (this is known as 'carbon leakage'). As world carbon markets develop, this form of local support may no longer be required.

In 2016, electricity generation demand accounted for approximately 51PJ (26.5 percent) of total gas use (2015: 56.4PJ; 30.4 percent). Concept Consulting<sup>4</sup> notes in its *Long Term Gas Supply and Demand scenarios – 2016 Update* report (Scenarios 2016) that gas demand in the sector has been trending down in recent times (particularly with the recent closure of the Southdown and Otahuhu B Combined Cycle Gas Turbines (CCGT) stations). The central scenario projection in Scenarios 2016 forecasts gas generation to fall gradually over the long term, due to the improved economics of baseload renewable generation and the potential for higher CO<sub>2</sub> prices. However, gas-fired generation has played a key complementary role to renewable generation over both the short and longer terms, augmenting renewable generation production during seasonal and peak periods, including dry winters.

The major use of gas in the industrial sector (excluding petrochemicals) is for intermediate (100°C – 300 °C) process heat, mainly in the form of boilers. Electricity is not a practicable option for many larger users of process heat, given the high temperatures that are required and the underlying economics. Renewable fuels (including wood, geothermal and biofuels) can be used for

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<sup>3</sup> China produces around a half of the world's methanol, with over 60 percent of this production using coal as the feedstock in methanol production.

<sup>4</sup> Concept Consulting (2016) "*Long term gas supply and demand scenarios – 2016 update*", Concept Consulting Group Limited, Wellington.'

process heat but they are very location dependent; plants using geothermal or wood for process heat must be located adjacent to the energy resource. Given this location dependency, process heat in New Zealand is fuelled mostly by coal and gas. Concept Consulting notes in its *Consumer Energy Options in New Zealand – 2016 Update*,<sup>5</sup> (Consumer Energy Options 2016) that gas is in a very competitive position, such that it would make sense for consumers with an existing non-gas fired boiler (with a sunk capital cost) to switch to gas and incur the cost of a new boiler. The economics of gas-fired boilers, relative to other fossil-fuelled boilers, improve as CO<sub>2</sub> prices increase.

The New Zealand Energy Efficiency and Conservation Strategy 2017-2022 (NZECS) identifies process heat as an area where there is significant potential to reduce carbon emissions and improve energy efficiency. The NZECS states that the government will implement a plan to improve the efficiency of existing process heat plant and encourage investment in efficient and renewable plant. Gas-fired process heat (where gas supply is available), has the potential to meet many of the objectives of this plan. As previously noted, replacing coal or diesel with gas-fired process heat provides the opportunity for improved efficiency while also delivering a lower carbon footprint.

Residential consumers use natural gas for three main purposes: space heating, water heating and cooking, with the first two categories using most of the gas. Consumer Energy Options 2016 finds that the carbon footprint of gas-fired space and water heating options is half that of standard resistance electric heating options, but a gas-fired heater's footprint is greater than high-efficiency electric heat pumps. These results stem from the fact that, during periods of peak energy demand, the marginal form of electricity generation is likely to be fossil-fuelled. Given these findings, a house with gas-fired water and space heating is likely to have a similar carbon footprint to a house with standard resistance water heating and a heat pump.

In summary, natural gas currently plays a key role in New Zealand's economy. This role is nevertheless already changing, and will need to change further to meet Government climate change policy and the country's international commitments.

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<sup>5</sup> Concept Consulting (2016) "*Consumer Energy Options in New Zealand – 2016 Update*", Concept Consulting Group Limited, Wellington.