Report prepared for First Gas Limited

Costs and benefits of adopting the Gas Transmission Access Code

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sapere research group

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Executive summary

First Gas, working with shippers and interconnected parties, has proposed a new code specifying the standard terms and conditions of using the New Zealand gas transmission system. The new code would be known as the Gas Transmission Access Code (GTAC). We have been asked to assess the costs and benefits of adopting the new code, relative to continuing with the existing codes – the Vector Transmission Code (VTC) and the Maui Pipeline Operating Code (MPOC).

We conclude that the GTAC represents a material improvement on the status quo in efficiency terms, and will provide a net national economic benefit. The new rules would establish an integrated network, with improved information transparency, and the ability to allocate capacity according to contemporaneous willingness-to-pay when scarce.

In our view, in terms of efficiency, the GTAC meets the 'overall materially better' standard that will be applied by the Gas Industry Company in assessing the request to adopt the GTAC. In other words, the new rules, taken as a whole, represent an overall material improvement from the status quo.

Benefits:

The GTAC provides benefits for operation of the transmission system. In relation to the short and medium term operation of the transmission system, the GTAC:

- allows for greater flexibility and efficiency in capacity allocation
- spurs necessary changes to the IT systems used to provide transparency to shippers and others about the operation of the network
- provides better (real time) information about capacity pinch points, and the value to shippers of certainty at congested points
- provides an improved process for balancing gas, and allows for balancing to take place across the entire system
- provides a new service for gas storage that promotes better signalling of imbalances than what existed before
- provides a contractual process for releasing priority rights onto a priority rights auction, which will promote improved transparency to shippers about capacity availability and its market value.

In relation to the long-term operation of the transmission system, the GTAC:

- will likely promote more short-term trading of gas and a more active wholesale market
- promotes a closer alignment of price to the service delivered (i.e. the provision of space in a pipe, at the times customers need that space)
- gives the system operator, FirstGas, better information upon which to make decisions about investment in expanding or changing the network.

These improvements to system operations will achieve an improvement in the allocative efficiency of the transmission system and will result in a reduction in risk of contractual capacity being reached in existing pipeline. There will also be an improvement in dynamic

efficiency from the enhanced information set. Over the longer term, the improvements to system operations are likely to result in further development of the wholesale market and a more robust reference price for gas. These improvements are expected to enable all market participants to make more informed decisions about their use of gas and their investments in exploration, production, pipelines and storage facilities.

These efficiency improvements would result in lower prices for shippers than would otherwise be the case.

Other benefits include:

- more reliable gas supply as a result of greater transparency of system use and events and better arrangements for balancing
- a new, optional service (park and loan)
- improved reliability: shippers will become more deliberate with decisions around imbalances and consequently there will be better visibility of system use and events
- lowered barriers to entry for new shippers.

We have not assessed the impact on gas quality or safety but have not identified any negative effects on either quality or safety.

Costs:

There are one-off implementation costs including the cost of IT system changes of around $6 million (ongoing IT licensing costs are expected to be of the same order as existing costs). However, the new system will provide an improved set of gas production/consumption/distribution information and therefore cannot be viewed as solely a cost (additional benefit will be provided by the new system).

The costs of developing the GTAC itself (i.e. the standard transmission system agreement) have been incurred and do not change whether or not the new rules are adopted. These costs are therefore sunk and are not considered in the CBA.

There will be transition costs for all parties to the GTAC. For example all parties to the GTAC will incur some costs in understanding the new rules and applying them to their own operations. There will be costs to some parties to renegotiate existing agreements and documents, including shipping agreements and interconnection agreements. And there will be system integration costs for entities using the new IT system – these costs need to be incurred to gain the benefits from the new IT system so the net cost of system integration could be low (or could be a net benefit) once these benefits are considered.

There are no additional costs expected from market operations or system operations.

The possibility of capacity hoarding (via the priority rights system) exists, but the risk of it happening is less pronounced than might appear at first glance. This is because there is no annual capacity reservation, no grandfathering and priority rights are only valuable if daily nominated capacity is nominated (and there is an underrun charge to discourage over-nominations).

Net benefits:

Implementing the GTAC would give rise to one-off transition costs which are comparatively small (when compared to the roughly $1.2 - $1.7 billion value of gas transmitted annually[1]). In return, the new rules would establish an integrated network, with improved information transparency, and the ability to allocate capacity according to contemporaneous willingness-to-pay when scarce. These gains would be ongoing and the gains would increase as and when the capacity of elements of the transmission system becomes constrained. For the reasons discussed in this report, these short, medium and long-term gains can be expected to dwarf the one-off transition costs, resulting in an overall material improvement in economic efficiency from the status quo.

[1] A rough approximation derived from the 229 PJ of gas transmitted each year (First Gas, 2016 Asset Management Plan) and taking a wholesale gas price of $5.00 - $7.50 per GJ (emsTradepoint).

1. Purpose and terms of reference

Transmission access codes specify the standard terms and conditions of using a transmission system. A new code for the New Zealand gas transmission system has been proposed, which would introduce a new set of access arrangements for all participants of the system. The new code would be known as the Gas Transmission Access Code (GTAC). We have been asked to assess the costs and benefits of adopting the new code.

Our evaluation will be followed by a review by the Gas Industry Company (GIC) against the objectives listed in section 43ZN of the Gas Act 1992 (provided in Appendix 1).

The terms of reference for this work were to:

- Identify the provisions in the code that will lead to material changes in behaviour relative to the existing codes (by First Gas, shippers, interconnected parties, or gas users).
- Identify the likely (economic) efficiency impacts of those changes (including allocative, productive and dynamic effects).
- Provide an assessment of the likely magnitude of the costs and benefits of adopting the GTAC to support the submission of the GTAC to the GIC 8 December 2017.

A copy of the terms of reference for this CBA is attached as Appendix 2.

We note that the GIC's evaluation of the GTAC will be broader than this cost benefit analysis because it includes objectives such as fairness, and impacts on quality and safety.

2. Approach

An economic cost-benefit analysis (CBA) is a well-known and often used technique for assessing whether a particular proposal or set of actions results in the economy being "better off" than if the proposal/set of actions had not taken place. Net benefit (i.e. benefits that are greater than costs) is the usual measure of the degree to which an economy is "better off." In some studies, it is helpful to decision-makers to know how the proposed actions contribute to non-economic objectives. In this study though, we focus only on economic efficiency outcomes.

2.1 Key aspects of approach

Key aspects of our approach:

- We have applied the essential organising steps of a standard CBA framework used for New Zealand regulatory impact statements (NZ Treasury, 2015).
- The factual is having the GTAC; the counterfactual is remaining with the current arrangements (Vector Transmission Code (VTC) and Maui Pipeline Operating Code (MPOC)). We have not considered the effects of an alternative set of rules or arrangements (for example, a different set of arrangements for trading Priority Rights or for balancing).
- In identifying who gains and who loses, we take a national perspective, that is, costs are costs to New Zealand's 'existing and new' gas customers in line with the national objectives in Section 43ZN in the Gas Act.
- Transfers between parties are excluded. For example, if consumers are made better off by x and producers are made worse off by x, then there has been no gain to the economy/society, only a transfer between parties.
- We look out to the long term – sufficient for the new rules to embed and establish incentives - to consider the likely impacts of the new rules. Adopting a long-term analysis takes into account the long life of assets and the potential longevity of the code provisions.
- We have included the benefits and costs of IT system changes, as we consider these to be inextricably linked to the introduction of the GTAC. This is because the current OATIS system is not built to reflect the products in the new code, so needs replacement with the introduction of any new code. As a corollary, the system would not likely have the same characteristics and costs if a different transmission system agreement was adopted.
- There are several rules that sit outside the proposed GTAC like pricing rules and auction rules which operationalise changes in the GTAC, but which are not part of the GTAC itself. In attributing costs and benefits to the GTAC, we have assumed that operational rules continue in the manner that they currently do. As such, no additional benefits from new or changed operational rules are counted. We note, however, that new auction rules are likely to be issued once the GTAC has been adopted, and that this may have efficiency impacts beyond what is captured in this report.

- We do not provide a full quantification of costs and benefits. Instead, we have attempted to give an assessment of the possible magnitude and conclude whether the benefits identified are likely to outweigh the costs, and the materiality of this difference.
- We structure the analysis by identifying the provisions in the code that will lead to material changes in behaviour relative to the existing code (by First Gas, shippers, interconnected parties, or gas users) and then identify the likely efficiency impacts of those changes (including allocative, productive and dynamic effects).

Box 1: concepts of efficiency

The Gas Act sets the principal objective for the new rules. Section 43ZN(b) states the objective "to ensure that gas is delivered to existing and new customers in a safe, efficient and reliable manner."

As economists, we are qualified to comment on the efficiency aspect of this objective and to a certain extent, reliability. Economists generally recognise the following types of efficiency:

Allocative efficiency – this term is used to refer to the situation in which society's resources are allocated between end uses in an optimal way to those that value them most.

Productive (or technical) efficiency – this term is used to refer to goods and services being produced at the lowest possible cost, using the least-cost combination of inputs.

Dynamic efficiency – this term is used to refer to a market outcome in which society's resources are deployed efficiently between present and future uses, so that the welfare of society is maximised over time (i.e. allocative and productive efficiency are achieved jointly over time). This term is also used to refer to the ability of firms and markets to adapt over time in response to changes in consumer preferences and/or technology by implementing measures that result in a reduction in costs, improvements in product quality and/or the development of new products.

Thus the efficiency element requires consideration of matters such as operating and transactions costs, efficient use of available capacity (particularly at times of capacity scarcity), competition among system users and in related markets, the facilitation of efficient investment, the equal and open availability of information and the ability to evolve arrangements in response to changing market conditions in a low cost, timely way.

3. Background and context

This section sets out the background and context for the GTAC.

3.1 Relevant characteristics of the New Zealand gas market[2]

The New Zealand gas market has unique features. This section describes some of these features, as this provides important contextual information for a cost benefit analysis.

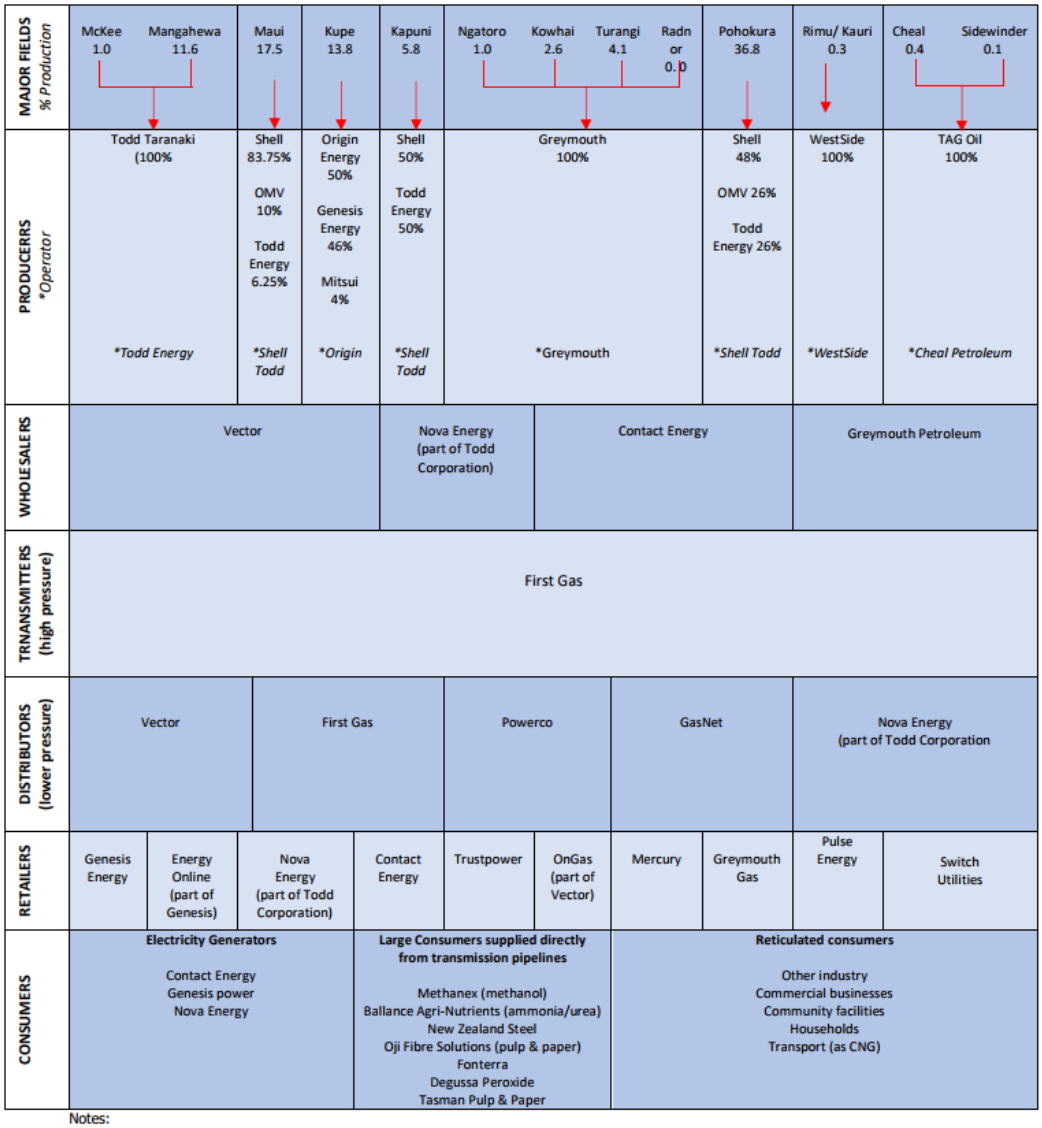
3.1.1 Gas industry participants

The most important contextual point is that the industry is small and relatively concentrated, but changing. Recent change has seen the industry transition from a substantial reliance on the large Maui field, to drawing supplies from multiple smaller fields. While this change has seen the emergence of new participants, industry activity remains concentrated in a relatively small number of players.

The figure below, from the New Zealand Gas Story, shows the gas industry participants and their operational interests.

2 This section draws heavily from Gas Industry Company *The New Zealand Gas Story Fifth Ed* 2016 <www.gasindustry.co.nz>

Figure 1 Gas industry participants and their operational interests



Notes:
[1] Genesis Energy acquired NZ Oil & Gas's 15 percent interest in the Kupe field for $168 million in January 2017.
[2] WestSide Corporation of Australia acquired Origin Energy's 100 percent interest in the Rimu/Kauri fields in October 2016.

Source: Gas Industry Company, The New Zealand Gas Story

3.1.2 The wholesale gas market

The arrangements for the wholesale trade of gas are evolving. Gas trading has traditionally been arranged bilaterally between parties – at present 98 percent of gas delivered is traded bilaterally.[3] Wholesale trade is becoming more established, however, following the

[3] The only non-bilaterally traded gas is via the emsTradepoint market. Its last annual report (available here: http://www.emstradepoint.co.nz/news-and-documents/2016-annual-review/ states that 2.7PJ was delivered

introduction of a commercial trading platform in 2013 (emsTradepoint). This is also the platform used for balancing the transmission pipeline.

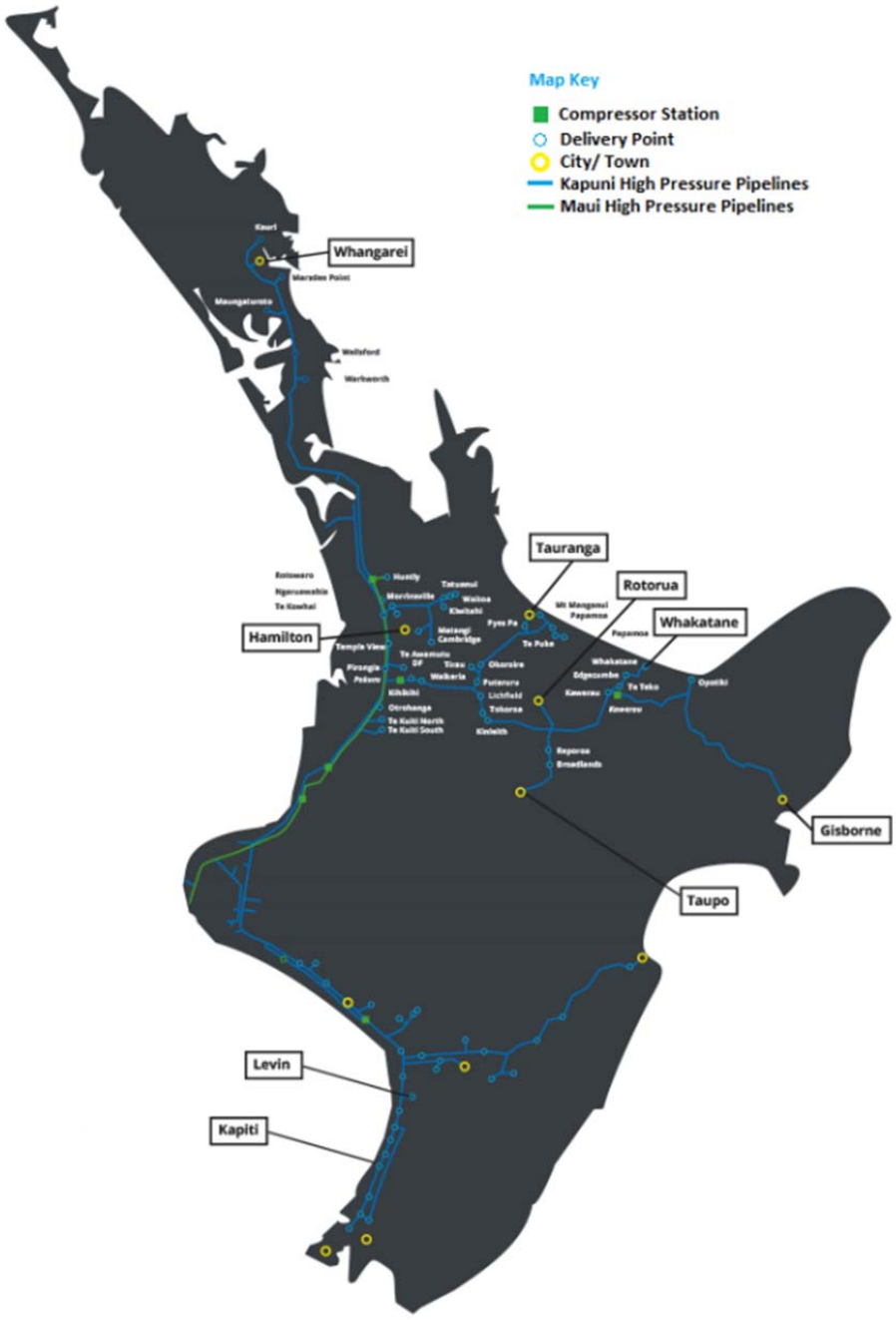
This platform is providing improved transparency of prices and volumes. There has historically been no transparency of terms that enable discovery of prices or other information, such as trading frequency.

3.1.3 The gas transmission network

The gas transmission system consists 2,523 km of pipeline, 12 receipt points, 132 delivery points. The pipeline network connects most major centres in the North Island. The map below illustrates the network.

via the emsTradepoint market last year (with 5 PJ traded). Total gas deliveries for 2016 were 197PJ (see MBIE Energy Data file), so that gives 1.4%.

Figure 2 Network map under GTAC



3.1.4 Economic regulation of gas transmission and distribution

A price-quality regime for gas transmission and distribution businesses, overseen by the economic regulator, the Commerce Commission, was introduced on 1 July 2013. The Commission recently reset the transmission price/quality paths from 1 October 2017, with an average price reduction of 10%.

The price-quality regime is needed because gas transmission pipelines have the characteristics of a natural monopoly, and exhibit strong economies of scale. A natural monopoly arises where the costs or physical characteristics of a service preclude efficient competition in the provision of the service. In addition, transmission pipelines exhibit strong economies of scale. These economic characteristics have implications for the commercial terms – including pricing – that underpin investment in new pipeline capacity. In addition, there are very significant fixed costs, but relatively low variable costs, of transporting gas through a transmission pipeline. It is important therefore that the physical capacity of the pipeline is used as efficiently as possible.

3.1.5 Transmission infrastructure reliable and fit for purpose, and capacity is adequate at present

According to the Gas Industry Company, the transmission infrastructure is generally reliable and fit for purpose.[4] Recent legislative changes, including the introduction of a price-quality regime and associated information disclosure requirements under the Commerce Act, have improved security and reliability on the system.[5] In particular, the publication of First Gas' Asset Management Plans (AMPs) has improved transparency for stakeholders. There has also been a review and revision of the Critical Contingency Management Regulations.[6]

Transmission system capacity is considered adequate for the foreseeable future.[7] Capacity modelling in First Gas' latest AMP update suggests that only 10 out of 132 delivery points presently have a close balance between demand and supply at some time during the year.[8] There was concern about capacity issues on the transmission system in 2009 when periods of congestion on the transmission North Pipeline affected the ability of then owner, Vector, to offer new capacity contracts on that section of the pipeline. These issues have since been resolved,[9] but the uncertainty and volatility in gas demand makes it difficult to determine the extent to which future capacity shortages may arise on transmission pipelines in the future.

While capacity is adequate at present, it is important to consider longer term market development objectives, such as promoting trading of transportation capacity rights between shippers. While the opportunity costs associated with capacity potentially being booked but not used might be low if there is sufficient capacity available, this may not be the case as future demand increases and transportation capacity becomes potentially scarce. In addition, demand for short-term transportation capacity may increase as shippers seek additional capacity to manage inherently volatile demand. Market development requires that barriers to

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4 Gas Industry Company, The New Zealand Gas Story, Fifth Ed 2016, xi <gasindustry.co.nz>

5 Gas Industry Company, Gas Security and Reliability Issues Paper and Analysis of Submissions. <gasindustry.co.nz>

6 The Gas Governance (Critical Contingency Management) Regulations 2008 (Critical Contingency Regulations) were reviewed and revised after the critical contingency in October 2011 on the Maui Pipeline.

7 Ibid, n 5

8 FirstGas, Gas Transmission Asset Management Plan 2017 Update, Appendix C (capacity information for the baseline year of FY17). <www.firstgas.co.nz>

9 Capacity availability increased particularly with the retirement of two gas-fired power stations in Auckland - together accounting for about 60 percent of the North Pipeline capacity - in the second half of 2015.

accessing booked but unused transportation capacity are removed, such that all market participants have access to this capacity on a not unduly discriminatory basis.

3.2 Transmission codes and why they are needed

The GTAC is a transmission code. It provides a standard set of terms and conditions for transporting gas via the transmission system. The GTAC provides the rules governing the relationship between:

- The pipeline owner and operator;
- Owners of facilities physically interconnected with the transmission system (interconnected parties), who operate under the terms and conditions of an Interconnection Agreement (ICA) with the pipeline owner. Interconnected parties are involved in the physical transfer of gas into, or out of, the pipeline, and
- Shippers, who buy transmission services to transport gas for consumption or onsale in the downstream wholesale and retail markets. Shippers fall into three categories: electricity generators, petrochemical manufacturers, and retailers supplying end-users connected to the transmission and reticulated gas distribution networks. There are currently eight shippers (VGTL, Genesis, Contact, GGNZ, Trustpower, Mercury, Nova and Methanex). Of these, only Methanex ships gas under a single code only (the MPOC) – the remainder are currently operating using two sets of vastly different rules.

Transmission codes are needed because of the presence of externalities and transactions costs across the whole system: running the network, providing services using it and being an end user of it. For example, take a situation in which two shippers vie with one another for a limited amount of network access. Say there was a changed circumstance, a sudden shortage in capacity. If there was no code governing the rights and obligations of every party using the transmission system (and shippers were left to negotiate with each other and with the transmission operator) the parties would have to scramble to adapt to the changed circumstance. They would have to renegotiate quantities and prices, leaving contractual disputes to be settled by the courts. This results in high transactions costs and considerable uncertainty. This is why transmission systems agreements set out rules for balancing, emergency response, handling constraints, capacity allocation, and so forth.

Transmission codes like the GTAC also recognise that network industries need coordination (as distinct from the regulation and operation of the network). The GTAC sets out the terms and conditions on which First Gas acts as system operator. Specifically, it provides a contractual response to three co-ordination problems in relation to the role of system operator:[10]

1. Short term traffic management – with gas being shipped from all directions, there is a traffic management problem if congestion is to be avoided. There are also important

[10] Martin Cave and John Stern, Economics and the development of system operators in infrastructure industries, City University London Centre for Competition and Regulatory Policy, CCRP Working Paper No 20 (January 2013), chapter 4.

issues of system recovery, transmission constraint management plus short-term interactions with upstream and downstream markets, including contract fulfilment/compensation.

2. Medium term network access allocation – there are three dimensions to coordinate:

   (a) How best to allocate available network capacity among shippers, including allowance for planned maintenance.

   (b) How to ensure that network revenues cover costs, particularly as the network is investor-owned.

   (c) How to do the above without distorting competition among or between shippers.

3. Long run investment and network expansion – coordinating decisions about how to expand the network capacity in a way which benefits end users and which does not distort competition (recognising that these decisions are subject to regulation).

   There are well known issues with how the present set of rules under the VTC and MPOC deal with these coordination problems. These issues are summarised below.

3.3 A summary of the issues

The development of the GTAC has its origins in 2009 when Vector announced that it had sold all its commercial capacity on the North Pipeline and could not offer any more. That situation was problematic for:

- any existing retailer that had growth aspirations and any new retailer proposing to enter the market
- large users wishing to run competitive tenders as a number of them received proposals that could not be accepted, as they were conditional on being able to obtain transmission capacity.

The key term here is 'commercial capacity'. The pipeline was not physically congested. Rather, the pipeline was contractually congested. Contractual congestion occurs when the demand for capacity exceeds the amount of technically available capacity. This can happen when parties who have booked capacity in advance neither use it for themselves, nor release it to the market.

This contractual congestion occurred because the pipeline had effectively been partitioned into a series of smaller, 'virtual' pipelines, each owned by a shipper. Vector's contract carriage arrangements, by virtue of creating these virtual pipelines, meant that the pipeline capacity was unlikely to be used efficiently.

The Gas Industry Company launched a review into transmission access and pricing (the TCAP project). The first step in that project was the creation of the Panel of Expert Advisers (PEA) that was made up of experts drawn from the gas industry as well as economists. The PEA's brief was to examine issues relating to efficient commercial and

physical arrangements for gas transmission in New Zealand. In its Second Advice Paper to Gas Industry Co in July 2013, the PEA stated that its key concerns were the following:[11]

- Access arrangements do not provide for efficient allocation of capacity, both physical and commercial, as it becomes scarce.
- There are inadequate transparent price signals to inform pipeline investment and operating decisions, and provide advance warning of expected pipeline congestion. There is also limited transparency about the physical state of the pipeline systems and contractual arrangements for use of the pipeline systems.
- The current arrangements provide preferential rights to incumbents, which can hinder new entrants and downstream competition, and foster a perception that arrangements are biased toward the interests of some parties.
- There is an increased risk of inefficient intervention to address future congestion, because it can emerge with little or no warning (due to muted or absent forward price signals) and there are no demonstrably neutral and transparent mechanisms to allocate capacity if it becomes scarce.

[11] Advice from Panel of Expert Advisers, Report to Gas Industry Company, July 2013. <www.gasindustry.co.nz>

4. Main code changes

This section compares the provisions in the GTAC to the existing rules (a combination of the Vector Transmission Code (VTC) and the Maui Pipeline Operating Code (MPOC). The comparison centres on changes to incentives, information sets and efficiency – and by extension, economic costs and benefits.

4.1 Geographic and product changes

The GTAC will apply the same product definition across the entire North Island open access gas transmission system. The new system will be divided into 1 receipt zone and 12 delivery zones + large dedicated delivery points for capacity booking nominations and pricing.

The GTAC replaces and allows for more streamlined coordination of the two existing networks. Currently, whilst both networks are operated from a single control room (in Bell Block, New Plymouth), they are operated according to different protocols. One key practical difference between the GTAC and the existing codes, is that under the existing codes welded points between the ex-Vector system and the Maui pipeline assume a particular significance (i.e. Frankley Road, Pokuru, Pirongia, Rotowaro). However, those welded points have no particular relevance to the use of gas, since they simply transfer gas between pipelines.

4.2 Change to daily nominated capacity

The proposed rules allow for daily contracting for nominated capacity (nominations will be required week ahead; day ahead). This is a change from the annual capacity reservation system that is applied under the VTC, but is like the daily contracting system that is used to facilitate the use of gas transmission capacity under the MPOC.[12]

This is a significant change away from the status quo as it moves the system away from one where the vast majority of capacity is reserved annually to one where daily capacity booking become the norm.[13,14] This has operational value to both First Gas and to pipeline users.

The operational value to First Gas is that a daily nominated capacity booking system:

- provides advance indication of intended use of system (week ahead day ahead) – early indication of any deliverability concerns

[12] The rules in the MPOC provide a product definition in use on the emsTradepoint marketplace, which makes physical gas available for trade in two markets: Day-Ahead (forward 24 months) and On-The-Day). EmsTradepoint provides electronic trading, central counterparty settlement and market information.

[13] At least four intra-day cycles will also be offered, with ability to increase and add emergency cycles if the IT platform supports this.

[14] Interconnection agreements (ICAs) do not confer rights to transmission capacity and will still need to be negotiated independently of transportation arrangements under the GTAC.

- enables optimum use of compression, minimising operating costs and potentially improving system security
- provides a contractual tool to encourage shipper/interconnected party behaviour in the interests of all system users (overruns/underruns)
- provides a contractual tool for First Gas to respond on the day to operational issues when they arise (e.g. using operational flow orders)
- provides a mechanism for allocating capacity when scarce (nominations to Congested DPs).

For pipeline users, the daily nominated capacity booking system:

- provides system functionality for ordering gas (from producers)
- provides reasonable certainty of transmission booking ahead of time
- provides visibility of how system capacity is being used ahead of time (enable through the new GTAC IT system).

Specifically, the GTAC replaces the VTC rules under which there is currently no market-determined signal of the value of capacity, whether in the short- or long-run. The Panel of Expert Advisors review of the issues relating to efficient commercial and physical arrangements for gas transmission in New Zealand noted that "the absence of these mechanisms in the primary market is of particular concern where the secondary market is thin and unlikely to provide for an efficient redistribution of capacity."[15] For example, in the VTC there is no seasonal or peak pricing to ration scarce capacity. Overrun fees do provide a signal (to a shipper) of increasing costs as (individual) capacity is approached (including external effects on other shippers). However, the level of the overrun fee is administratively set and does not vary. In addition, overrun charges are only visible to the particular shipper and therefore do not provide market-wide information on pipeline capacity.

Furthermore, the GTAC removes the grandfathering component of the capacity product definition in the VTC. These rules provided capacity certainty to incumbents, which were arguably necessary at the time to foster pipeline development but can hinder new entrants[16] and downstream competition, and foster a perception that arrangements are biased toward the interests of some parties. Another downside of grandfathering is that it could inhibit the efficient primary allocation of transmission capacity in the absence of liquid secondary trading.[17]

The current system shows signs of being inflexible. An indicator of this inflexibility is capacity transfer requests, which are required in a situation where transmission capacity is no longer required in one location but is needed in another. This situation arises because of

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15 Review of Transmission Access and Capacity Pricing, Advice from the Panel of Expert Advisers July 2012. Available from <www.gasindustry.co.nz>

16 Specifically, grandfathering and long term contracting poses barriers to entry for customers who might need short term supply at quick notice.

17 At present, under the VTC, the transmission operator allocates capacity by giving priority to grandfathered rights and thereafter, if capacity is scarce, allocating it pro-rata to shipper requests. The panel of expert advisors noted that this arrangement "provides little flexibility in allocating scarce capacity to those shippers that place greatest value on that capacity."

uncertainty in demand or attempts to reduce transmission charges. Currently, First Gas receives over 1200 capacity transfer requests per year.[18] While most requests are resolved quickly, the presence of a short term market arrangement would resolve short term allocation issues and avoid the need for shippers to juggle data to optimise their capacity deployments. The current capacity transfer request system adds no economic value as capacity cannot, of course, be transferred and the arrangement is only necessary because of the existing inflexible regime.

Whilst daily nominations are common in jurisdictions overseas, using them as the contractual product - as proposed in the GTAC and employed currently under the MPOC[19] - is novel internationally. We are not aware of any close comparators in established gas markets overseas that can be used to provide evidence of an efficiency gain from switching from annual reservations to daily capacity nominations. However, the experience with emsTradepoint and the MPOC rules gives confidence that extending a daily nomination system across the rest of the transmission system will work well.

Shorter term product definitions are becoming more prevalent internationally as gas markets develop. For example over the past decade gas markets in the United Kingdom have evolved toward standard short-term contracts, with physical delivery to the grid or from the grid and financial settlement between the delivering/taking parties. This in turn enabled the tightening up of the UK balancing regime.[20]

The market carriage model in Victoria, Australia, provides another example of short term trading arrangements. To meet local or short-term requirements for gas within a day, AEMO may need to schedule additional injections of gas that have been offered at a price which is higher than the wholesale market price. The market carriage access regime seeks to allocate the costs of these ancillary payments to those participants whose actions led to the cost arising. A system of capacity rights, authorised maximum interval quantity (AMIQ), insulates participants from uplift costs that have arisen from congestion, providing that the participant remains within its AMIQ. The work of the Gas Market Reform Group would also see unnominated capacity being required to be auctioned day ahead.

Operationalising the rules to achieve improvements in allocative efficiency will depend on improvements in real time data (and reliable information systems). For example in the UK, the introduction of real daily balancing, including pricing at marginal trading prices and the slow withdrawal of tolerances over time, was dependent on improvements in real time data.

Under the GTAC there will be greater seasonality of both daily nominated capacity and the use of priority rights (which are discussed later in this report). This is because of the seasonality of gas usage – parties will pay for transmission when they need it. Prices for shipping in response to seasonal or lumpy demand will fall; but there may be an increase in prices for parties with flat load.

This seasonality in charges will:

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18 Data from First Gas (email from First Gas, 27 October 2017).

19 The MPOC allows daily nominations for the gas product traded via emsTradepoint.

20 James Whistler and Jo Sant, Transmission Pipeline Gas Balancing - Gas Balancing International Benchmarking and Good Practice, February 2014, p15. <www.emstradepoint.co.nz/assets/Documents>

- Provide an incentive for parties to make use of the gas network during non-peak periods.
- Reduce the intermediation role for shippers to provide customer diversification in booking reserved capacity.
- Result in First Gas' revenue becoming more seasonal instead of constituting more stable, fixed payments throughout the year (we note that First Gas currently has some seasonality of revenue already, due to higher overrun charges in the winter/dairy season).
- Lead to greater complementarity of gas and transmission, both as daily products.

4.2.1 Overall, more efficient primary allocation and more flexibility

Overall, the proposed change to daily nominated capacity would promote the efficient primary allocation of transmission capacity by First Gas. It would reduce or remove the potential for contractual congestion. The changes greatly improve the ability of First Gas to operate the system in response to short-term and medium-term changes in demand or capacity, bringing operational benefits to First Gas and transmission users.

4.3 Introduction of priority rights

The GTAC introduces a priority rights auction system. The system puts a holder of priority rights at the front of the queue when demand for daily capacity exceeds supply at delivery point or group of points. Priority rights are tradeable amongst shippers.

The priority rights system provides firm access when physical capacity becomes scarce. It also provides a price incentive to shippers to redirect demand away from capacity pinch-points (by diversifying load or managing peak usage).

The GTAC provides a more focussed set of actions for First Gas if capacity is constrained than the status quo under the VTAC and MPOC. The status quo procedure relies on demand management by the transmission system operator, with interruptible contracts (and AQ on the Maui Pipeline). The demand management rules are superseded by critical contingency rules which provide an administered process in emergency situations.

In contrast to the status quo rules, the GTAC priority rights system relies firstly on disclosure and secondly on price. It starts with First Gas assessing and publishing the prospect of congestion (using the capacity determination methodology[21]), taking into account whether interruptible capacity or timely investment can relieve the constraint. A priority

[21] First Gas uses specialist modelling software to determine the capacity of the pipeline systems. The physical capacity of a pipeline is determined by the operating and design limits of the pipeline's components (i.e. their physical capacity and prudent operating limits), the pressures that must be maintained within the pipeline and the volume of gas that can be made available at the receipt point(s). Capacity modelling requires an understanding of a number of factors, the most important being the: Physical configuration of a pipeline, the operating limits of key components, a profile of historical gas usage, in particular peak demand gas flows, and likely future gas usage. Detailed information on capacity modelling approach can be found in First Gas' Asset Management Plans. < www.firstgas.co.nz>

rights auction will be announced if no other means of easing the constraint is feasible in time. The auction will allocate firm capacity rights to those shippers who value it most.

Presently physical capacity is adequate across most of the system. In the near term, there are only 10 delivery points out of 132 where the Unused Operational Capacity[22] is less than 200GJ/day.[23] The transmission owner, First Gas, has identified that investment might be needed at those points soon. This investment may or may not be able to be implemented quickly or efficiently.

One possible conclusion is that the priority rights system is not of use at present. That conclusion would be short-sighted. Given the lead time and expense associated with rule change processes, it is sensible to include systems for managing congestion as this future-proofs the rules for a future where capacity is more constrained. It also allows for experimentation and improvement over time.

It is important to note that Priority Rights auction rules are to be developed in 2018. These rules will operationalise the provisions in the GTAC and will provide safeguard mechanisms.[24]

Box 2: How will the priority rights auctions work

- First Gas required to identify congestion
- At a Congested Delivery Point/group of Delivery Points, First Gas will offer PRs up to AOC (s.3.5, 3.7)
- Priority Rights will only be allocated by auction (s3.9).
- First Gas will notify (s3.10) ≥ 20 days before :
  - The Delivery Point(s)
  - Number of Priority Rights available
  - A flexible Priority Right Term
  - Reserve Price ($/PR)
- No auction if congestion eases (s3.17): Priority Rights may be cancelled
  - Shippers may bid ($/PR) for Priority Rights: up to 5 tranches, different prices
  - FG will allocate PRs in descending order of bid price (s3.11)
  - Those who bid the most, get the most
  - Shippers may trade Priority Rights (s3.12, 3.13)
  - All Priority Rights Charges will be credited to Shippers (s11.14), pro-rata on

22 "Unused" operational capacity for a delivery point is calculated by subtracting the normalised peak demand from the operational capacity.

23 First Gas, Gas Transmission Asset Management Plan 2017 Update, Appendix C (capacity information for the baseline year of FY17). <www.firstgas.co.nz>

24 See: www.gasindustry.co.nz/dmsdocument/4885

DNC Charges

– First Gas is financially indifferent

In our view, the introduction of the Priority Rights regime in the GTAC provides an efficiency improvement on the status quo because:

- Priority rights provide a mechanism for a future in which capacity becomes more constrained, and where investment cannot reasonably be provided in time (or interruptible contracts called-on).
- The process prior to a priority rights auction creates motivation for First Gas to regularly assess capacity versus demand. The GTAC provides a contractual process for communicating when particular locations face the prospect of congestion.
- The mechanism provides a means for pricing certainty, whereas no such mechanism exists at present (instead there is demand management and interruptible contracts). Trading priority rights allows for a shift to highest value user and improved transparency about the value of certainty. Further, it improves use of existing pipeline capacity because parties who have the greatest need for gas supply at any point have the ability to pay for certainty.
- The Priority Rights system gives an additional mechanism for resolving critical constraints before they happen. In this sense, the Priority Rights provide a 'top of the cliff' contractual prevention policy, while the Critical Contingency regulations provide a 'bottom of the cliff' physical response mechanism.
- The ability to purchase and sell priority rights supplements the primary market (and supports further development of that market).
- Adding priority rights trading information to primary capacity trading information will result in a more complete real time set of market information, including information about capacity pinch points. This information will be useful for traders, but also FirstGas and the Commerce Commission when setting and evaluating Asset Management Plans.

The rules can be expected to improve on the status quo, which is the relevant test. Policy-makers can never know whether settings are optimal, but must seek to make improvements at the margin based on sound principles and research, and the development of the priority rights mechanism is founded on sound principles, as outlined above.

In the short to medium term, priority rights are unlikely have a lot of value to shippers until there are actual or perceived capacity shortages. While priority rights should set a more efficient price where capacity is constrained, there is inevitably some uncertainty about the design and operation of any new market mechanism and some risks of unexpected outcomes. There are some aspects of the priority rights rules that may be tricky to navigate, both in the detailed design of the rules and in their operation.

However, when these potential difficulties are assessed against the information, capabilities, and incentives for decisions under the new arrangement, the outcomes can be expected to be welfare enhancing:

- The proposed system relies on First Gas to assess the prospect of congestion at Delivery Points,[25] and relies on First Gas to offer Priority Rights into the auction system (provided it is satisfied that pipeline investment was not reasonably possible in time and that interruptible capacity agreements cannot be used). First Gas is best placed/has the best information to assess the prospect congestion, and the priority rights do not alter First Gas's financial incentives (as the revenue from the sale of any right reduces the revenue requirement from other charges). However, the integration of priority rights with the regulated revenue allowed by the Commerce Commission is untested.
- Priority Rights establish the value of using a congested transmission network but may not create incentives to remove congestion. Shippers are best placed to value use of the transmission network at any point in time, and the Priority Rights allow this value to be discovered. However, beyond some level of congestion, there are efficiency arguments for First Gas to have incentives to invest to build new transmission capacity. As any revenue from the Priority Rights auction reduces the revenue First Gas receives from its other charges (so total revenue is unchanged) the incentive effects on First Gas to invest may be unchanged.
- There are mixed incentives and potentially unclear rules around emergency or critical constraint scenarios. When such a scenario happens, the Critical Contingency regulations kick in, which provide a separate administered process that would prevent profiteering. Hence, in some circumstances in which priority rights should be the most important and valuable, a separate set of rules takes precedent. This interaction may mean that priority rights would not be priced 'fully' to reflect the true value to the network's shippers in expanding capacity/ taking actions to reduce demand.
- Strategic purchasing of Priority Rights is a possibility, albeit a minor one. The concern about hoarding priority rights seems overstated. The rules would restrict speculation for priority rights (only shippers are able to bid), and the Priority Right would only have value if the holder needs to take gas at the time capacity is congested since it is only exercised on making a nomination – the Priority Right does not restrict the volume of gas transmitted. However, as experience with the mechanism is limited, it remains possible that the auction could be subject to some attempt at manipulation, which has not been anticipated and addressed in the rules.

[25] There is no explicit obligation in the GTAC on First Gas to assess capacity availability.

4.4 Zonal, postage stamp transmission price

The proposed rules introduce a standardised transmission price across the entire transmission system – each shipper must pay a Daily Nominated Capacity Charge for each day on which it has DNC at a delivery zone or delivery point. This DNC capacity charge is informally referred to as a 'postage stamp', as it represents users paying for a delivery service. The charge is established by dividing revenue by expected demand for daily nominated capacity (DNC). This has the effect of 'zoning' prices: as DNC changes within a zone then so does the delivery price. The zones closest to Taranaki will likely exhibit the lowest delivery prices and the zones further away will likely exhibit higher delivery prices. The change means that those who use less of the transmission system pay less; and those who use more, pay more.

4.5 System-wide balancing

The status quo set of rules under the MPOC contains a balancing to point regime, under which balancing is performed in segments. The GTAC removes this mechanism and allows for system-wide balancing. The impact of this is that linepack can be moved around the entire transmission system, an integrated whole. This is a significant benefit to shippers, as they will not face imbalance charges as long as their position across the whole system is balanced (within a tolerance level set by First Gas).

There will be no more automatic 'cash-outs' where First Gas risks being left as a buyer and seller of gas of last resort. Instead there is an obligation on shippers to maintain a balanced position within a tolerance limit, and an incentive charge if this limit is exceeded (know as the Excess Running Mismatch). Excess running mismatch provides a reasonably strong incentive to return to a balanced position since any imbalance between injections and offtakes beyond the tolerance attracts the charge.

Overall, the improved rules for balancing under the GTAC mean that First Gas can undertake its short-term system operator function – moving gas around the system, matching gas injections with deliveries and handling transmission constraint problems – more effectively.

4.6 Introduction of park and loan

The GTAC introduces the ability for First Gas to sell a park and loan service for short-term imbalances when capacity exists. In effect, the park and loan service is an authorised running mismatch for a pre-determined period. It provides an additional tool for shippers to manage their gas positions (intra-week).

The park and loan service is expected to be offered at a lower price than excess running mismatch (subject to linepack availability).

One advantage of the park and loan facility is that it will likely give greater visibility to First Gas of shippers intentions in relation to using linepack as storage, and encourage shippers to be deliberate with their storage intentions.

Another advantage is that the uptake of park and loan provides First Gas with better information about the value that shippers place on line pack in different locations. This information can be used to assess investments to increase linepack.

There are also potential competition impacts. Lower price short-term storage may encourage new shippers to enter the market and/or may encourage some customers to purchase their gas at the wellhead rather than on a delivered basis (e.g. industrial customers self-shipping).

Most importantly, the park and loan service is optional for shippers – they do not have to use it and can seek other alternatives such as paying imbalance fees or selling gas at a discount. Therefore, if it gets used, it creates an economic value for shippers. The economic value of the storage to shippers is the difference between the price of park and loan service and the cost of the alternative currently used by shippers (e.g. selling gas at a discount or paying imbalance fees).

4.7 Common interconnection terms

The GTAC incorporate provisions that maintain common interconnection terms for all transmission system users (via section 7). The new rules allow for ICAs to reference the GTAC as part of the agreement, which may encourage more consistency across ICAs and make negotiations easier.

However, incumbent parties may incur some costs renegotiating or re-setting existing ICAs and other agreements to accord with the GTAC. This is a one-off cost.

The proposed rules also prompt commonalities in non-standard agreements, re-focussing these agreements on uneconomic bypass and attracting new loads.[26]

[26] The proposed rules are more restrictive than the VTC and more enabling than the MPOC. They strike a middle ground between the two sets of rules.

5. Behaviours, costs and benefits

This section summarises the expected costs and benefits that might be expected to arise from the changes outlined in the previous section.

5.1 Benefits for the short, medium and long term operation of the transmission system

The GTAC provides benefits for the short, medium and long term operation of the transmission system (the objectives for a system operator are summarised in section 3.2).

In relation to the short and medium term operation of the transmission system, the GTAC:

- allows for greater flexibility and efficiency in capacity allocation
- spurs necessary changes to the IT systems used to provide transparency to shippers and others about the operation of the network
- provides better (real time) information about capacity pinch points, and the value to shippers of certainty at congested points
- provides an improved process for balancing gas, and allows for balancing to take place across the entire system
- provides a new service for gas storage that promotes better signalling of imbalances than what existed before
- provides a contractual process for releasing priority rights onto a priority rights auction, which will promote improved transparency to shippers about capacity availability and its market value.

In relation to the long term operation of the transmission system, the GTAC:

- will likely promote more short term trading of gas and a more active wholesale market
- promotes a closer alignment of price to the service delivered (i.e. the provision of space in a pipe, at the times customers need that space)
- gives the system operator, FirstGas, better information upon which to make decisions about investment in expanding or changing the network.

5.2 Benefit of lessened barriers to entry

Lower price short-term storage (in the form of park and loan) and better transparency of prices and terms may encourage new shippers to enter the market and/or may encourage some customers to purchase their gas at the well-head rather than on a delivered basis (e.g. industrial customers self-shipping).

The transmission system becomes easier to understand for potential new entrants as a result of the GTAC. The rules are easily navigated. They are significantly easier to interpret, for

example, than two sets of rules. The proposed rules will make it easier for newcomers to connect to the system. For example, the proposed rules introduce a standardised pricing regime across the entire transmission system and incorporate provisions that maintain common service terms for all transmission system users.

5.3 Benefit of more reliable gas supply

One benefit resulting from improved incentives for balancing is that shippers will likely be more deliberate with decisions around imbalances and consequently there will be greater transparency and visibility of system use and events.

The result is improved reliability. The security and reliability of transmission pipelines is a matter of importance to gas users, given that transmission outages have the potential to cause significant supply interruptions. Some gas consumers may face very high costs in the event that they cannot obtain gas supply, and may not be able to mitigate their losses.

Valuing these improvements in reliability is challenging – particularly as many other factors contribute to a reliable system[27] - but it is useful to reflect on the size of the consequences for some parties of an outage. In October 2011, a land slip near Pukearuhe in northern Taranaki caused a critical contingency on the Maui Pipeline. The associated outage of approximately five and a half days was the longest experienced since gas first flowed through the pipeline 36 years ago. The event was estimated to have cost the New Zealand economy around $200 million[28]. While that was a rare event, the cost provides an indication of the value of reliability (and the economic value of a reduction in the risk of such an event occurring). Even a small reduction of the likelihood of a system collapse (or indeed a small reduction in the duration of an outage event) creates a significant public benefit.[29]

5.4 Benefits expressed in efficiency terms

These changes represent an improvement in allocative and dynamic efficiency.

Allocative efficiency improves because participants in the market can make better decisions about when and how to ship gas. The consequence of this improvement in allocative efficiency is a lower likelihood of 'contractual congestion', where physical capacity exists but the transmission operator cannot utilise it. Effectively, what is achieved is an increase in the capacity of existing transmission assets. This increase in capacity has a clear economic value: there can be an increase in the volumes shipped without the need for further investment in fixed network assets.

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27 For example, the disclosure requirements under the price-quality regime and associated information disclosure requirements under the Commerce Act, have greatly improved transparency around investment plans.

28 Major Gas Users Group submission to the Gas Industry Company on Gas Security and Reliability, 2016. <gasindustry.co.nz>

29 The economic value of a reduction in the risk or duration of an outage event has been observed by the Commerce Commission when considering an application by Transpower for authorisation of a process intended to improve decisions on managing electricity supply uncertainty.

Dynamic efficiency improves because information becomes more transparent and barriers to entry are lowered. The network owner can make better decisions about where and when to make investments in expanding the network. Other market participants have a clear reference price for gas and for transmission services from which they can make decisions about when, where and how to invest.

5.5 Operational costs

First Gas advised that it is not budgeting for significant opex savings resulting from the move to a single transmission access code. The GTAC will enable more effective processes to allocate and manage transmission system contracts. However, the level of involvement from First Gas teams (for activities such as scheduling and commercial negotiation) will not materially change.[30] For example, First Gas is expecting a small decrease in the cost of administration in relation to reserving annual capacity and in relation to transfer requests. It is expecting a corresponding increase in administration costs in managing daily capacity bookings (noting that gas nominations are already made so this is an incremental change).

The cost of running the Bell Block SO will remain the same.

5.6 Technology costs

The new market mechanisms set in place by the GTAC will be supported by a change to transaction management systems at the same time as go live. The new system will support metering validations and commercial operations of the First Gas pipelines. The cost of establishing these systems is part of the cost of operationalising the rules, and therefore needs to be included in this analysis. Tenders have been issued for the system. First Gas has budged for capex of around $6 million, plus ongoing licensing costs of $600,000 per annum. The existing licensing costs are of the same order so there is no net change in ongoing costs.

The new system will provide an improved set of gas production/consumption/distribution information. While there is already a national dataset on the OATIS system, it is not real time (there is a limited set of information on the bgix website which are close to real time). The new system will provide information so that locations where there are capacity 'pinch points' can be readily identified in real time, providing a better set of investment signals to the transmission operator, shippers and interconnected parties.

5.7 Transition costs

All parties to the GTAC will incur some costs in understanding the new rules and applying them to their own operations. There will be costs associated with integration of IT systems with the new First Gas system. There will also be a cost to some parties to renegotiate existing agreements and documents, including shipping agreements and interconnection agreements. These costs need to be incurred to gain the benefits from the new IT system so

[30] FirstGas, Gas Transmission Asset Management Plan 2017 Update, Appendix C (capacity information for the baseline year of FY17). <www.firstgas.co.nz>

the net cost of system integration could be low (or could be a net benefit) once these benefits are considered.

5.8 Summary

Implementing the GTAC would give rise to one-off transition costs which are comparatively small (when compared to the roughly $1.2 - $1.7 billion value of gas transmitted annually[31]). In return, the new rules would provide short-term, medium-term, and long-term benefits for the transmission system.

In relation to the short and medium term operation of the transmission system, the GTAC:

- allows for greater flexibility and efficiency in capacity allocation
- spurs necessary changes to the IT systems used to provide transparency to shippers and others about the operation of the network
- provides better (real time) information about capacity pinch points, and the value to shippers of certainty at congested points
- provides an improved process for balancing gas, and allows for balancing to take place across the entire system
- provides a new service for gas storage that promotes better signalling of imbalances than what existed before
- provides a contractual process for releasing priority rights onto a priority rights auction, which will promote improved transparency to shippers about capacity availability and its market value.

In relation to the long-term operation of the transmission system, the GTAC:

- will likely promote more short-term trading of gas and a more active wholesale market
- promotes a closer alignment of price to the service delivered (i.e. the provision of space in a pipe, at the times customers need that space)
- gives the system operator, FirstGas, better information upon which to make decisions about investment in expanding or changing the network.

These improvements to system operations will achieve an improvement in the allocative efficiency of the transmission system. The result is a reduction in risk of contractual capacity being reached in existing pipeline and an improved information set for making transmission investment decisions. These efficiency improvements would result in lower prices for shippers than would otherwise be the case.

Over the longer term, the improvements to system operations are likely to result in further development of the wholesale market and a more robust reference price for gas. These improvements are expected to enable all market participants to make more informed

[31] A rough approximation derived from the 229 PJ of gas transmitted each year (First Gas, 2016 Asset Management Plan) and taking a wholesale gas price of $5.00 - $7.50 per GJ (emsTradepoint).

decisions about their use of gas and their investments in exploration, production, pipelines and storage facilities.

Other benefits include:

- more reliable gas supply as a result of greater transparency of system use and events and better arrangements for balancing
- a new, optional service (park and loan)
- improved reliability: shippers will become more deliberate with decisions around imbalances and consequently there will be better visibility of system use and events
- lowered barriers to entry for new shippers.

6. A material improvement

Implementing the GTAC would give rise to one-off transition costs which are comparatively small (when compared to the roughly $1.2 - $1.7 billion value of gas transmitted annually[32]). In return, the new rules would establish an integrated network, with improved information transparency, and the ability to allocate capacity according to contemporaneous willingness-to-pay when scarce. These gains would be ongoing and the gains would increase as and when the capacity of elements of the transmission system becomes constrained.

We conclude that the GTAC represents a material improvement on the status quo in efficiency terms, and represent a net national economic benefit. In our view, in terms of efficiency, the GTAC meets the 'overall materially better' standard that will be applied by the Gas Industry Company in assessing the request to change the rules. In other words, the new rules, taken as a whole, represent an overall material improvement from the status quo.

[32] A rough approximation derived from the 229 PJ of gas transmitted each year (First Gas, 2016 Asset Management Plan) and taking a wholesale gas price of $5.00 - $7.50 per GJ (emsTradepoint).

Appendix 1Section 43ZN of the Gas Act 1992

43ZNObjectives of industry body in recommending regulations for wholesale market, processing facilities, transmission, and distribution of gas

The objectives of the industry body, in recommending gas governance regulations under section 43F, are as follows:

(a)

the principal objective is to ensure that gas is delivered to existing and new customers in a safe, efficient, and reliable manner; and

(b)

the other objectives are—

(i)

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

(ii)

barriers to competition in the gas industry are minimised:

(iii)

incentives for investment in gas processing facilities, transmission, and distribution are maintained or enhanced:

(iv)

delivered gas costs and prices are subject to sustained downward pressure:

(v)

risks relating to security of supply, including transport arrangements, are properly and efficiently managed by all parties:

(vi)

consistency with the Government's gas safety regime is maintained.

Appendix 2 Terms of reference

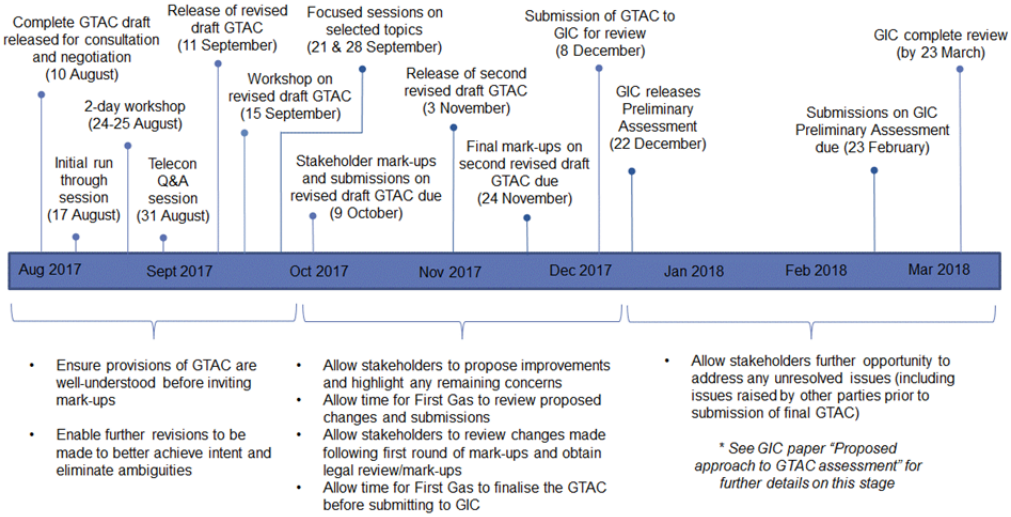
Scope of Work: Assessing the Costs and Benefits of Adopting the Gas Transmission Access Code

Background

Contracts for the transmission of gas in New Zealand are agreed pursuant to transmission access codes that specify the standard terms and conditions of using the gas transmission system. First Gas has spent the past 12 months working with shippers and gas users on a new set of access arrangements for the gas transmission system. This has required an extensive consultation process, involving several papers, 8 industry workshops, and 2 rounds of one-on-one meetings with each party.

A full draft of the new code (known as the Gas Transmission Access Code or GTAC) was released for consultation in August 2017, and we have begun negotiating the specific provisions of the new code with stakeholders. A revised draft of the GTAC was released for industry mark-ups on 11 September 2017, with mark-ups from stakeholders due on 9 October 2017. This stage in the process will be followed by a review by the Gas Industry Company (GIC) against the objectives listed in section 43ZN of the Gas Act 1992 (provided in Appendix 3). This review will occur against a version of the GTAC sent to the GIC on 3 November 2017.

These process steps (along with other engagement steps) are shown in the figure below. These dates target the new code to take effect from 1 October 2018, with IT system customisation and implementation being the focus during 2018.



A summary of how the GTAC addresses relevant issues compared with the existing codes (VTC and MPOC) is provided in Appendix 1. We have also summarised what we see as the major changes in Appendix 2 (extracted from a recent First Gas Board paper). The latest material released in this process is available here: http://www.gasindustry.co.nz/work-programmes/transmission-pipeline-access/developing/consultation-revised-draft-gtac/

Purpose of this work

We are seeking to engage an economist to assess the costs and benefits of adopting the GTAC. The main purpose of the review is to support the submission of the new code to the GIC and inform its assessment against the Gas Act s43ZN objectives. However, we expect that the review may also provide benefits in fine-tuning the proposed code ahead of finalisation. We understand that the GIC intends to engage Ben Farrington (as associate of Concept Consulting) to inform its review.

The specific objectives that we have for this work are to:

- Identify the provisions in the code that will lead to material changes in behaviour relative to the existing codes (by First Gas, shippers, interconnected parties, or gas users).
- Identify the likely efficiency impacts of those changes (including allocative, productive and dynamic effects).
- Provide an assessment of the likely magnitude of the costs and benefits of adopting the GTAC to support the submission of the GTAC to the GIC in early November 2017.

Possible report structure

We expect that the report provided by the economist selected for this work will:

- Set out purpose of report and terms of reference for the review.
- Summarise the economist's understanding of the key provisions in the GTAC compared with the status quo.
- Identify how the behaviour of various parties is expected to change as a result of the different provisions in the GTAC.
- Evaluate how behavioural changes would introduce costs (such as through new administrative effort by First Gas, shippers, interconnected parties, gas users, regulators or decreases in the efficiency of capacity use or investment decisions).
- Evaluate how behavioural changes would introduce benefits (such as through reduced administrative effort by First Gas, shippers, interconnected parties, gas users, regulators or increases in the efficiency of capacity use or investment decisions).
- Provide an overall assessment of impacts, concluding with a weighting of the costs and benefits evaluated.

We do not expect a full quantitative assessment of costs and benefits for this report. However, we do expect that conclusions will be drawn on whether the benefits identified are likely to outweigh the costs.

Desired attributes of economist

- Strong conceptual understanding of economic cost benefit analysis and the drivers of allocative, productive and dynamic efficiency.
- Experience working with different gas transmission access arrangements.
- Pragmatic approach to evaluating costs and benefits of change in rules/contract terms.

Timeline and cost

This work needs to be completed before First Gas submits the final GTAC to the GIC for review on 8 December 2017. We expect to be able to comment on a draft report (due end October 2017), with a final report responding to comments by mid-November 2017.

Budget redacted

Appendix 1: Summary of Transmission Access Codes: Proposed (GTAC) and Current (VTC and MPOC)

Code Element	Proposed Code (GTAC)	Vector Transmission Code (VTC)	Maui Pipeline Operating Code (MPOC)
Status of Code	In preparation. Will replace VTC and MPOC (from 1 October 2018)	In force for transmission pipelines purchased from Vector. Expires 30 September 2017 (unless extended by agreement)	In force for transmission pipeline purchased from Maui Development Limited. Does not expire, can be terminated by agreement
Scope of Code	Applies to Shippers (TSA Agreements). ICA agreements are separate bilateral contracts that are constrained by requirements in section 7 of GTAC	Applies to Shippers (TSA Agreements). ICA agreements are separate bilateral contracts	Applies to Shippers (TSA agreements) and Welded Point Owners (ICA Agreements)
Access Products	• Daily Nominated Capacity • Priority Rights (PRs) to Daily Nominated Capacity where prospect of congestion exists. PRs will be auctioned periodically • Interruptible Capacity where valuable	• Reserved Capacity, which is booked annually from 1 October and able to be transferred around the system • Interruptible Capacity where valuable (under non-standard agreements)	• Daily Nominated Capacity • Ability to introduce higher priority (firmer) product, but has not been required and design has not been finalised

Code Element	Proposed Code (GTAC)	Vector Transmission Code (VTC)	Maui Pipeline Operating Code (MPOC)
Geographic Definition	• Applies across entire North Island open access gas transmission system • System divided into 1 receipt zone and 12 delivery zones + large dedicated delivery points for capacity booking nominations and pricing • 2,523 km of pipeline, 12 receipt points, 132 delivery points	• Capacity reserved on a point-to-point basis between 7 receipt points and over 110 delivery points • Over 2,200 km of pipeline connecting most major centres in the North Island	• Nominations between 22 receipt and delivery points to major users (Methanex and Huntly) and the ex-Vector system • 309 km of pipeline running from Oaonui to Huntly Power Station
Use of Nominations	Nominations required; week ahead, day ahead. At least 4 intra-day cycles also offered, with ability to increase and add emergency cycle if IT platform supports this. Receipt nominations for gas are not physically linked to delivery nominations for use of transmission capacity	Not required	Nominations required; week ahead, day ahead plus 4 intra-day cycles to adjust nominations. No emergency nominations cycle. Receipt and delivery nominations are "daisy-chained", meaning that nominations are expressed as receipt-delivery pairs
Pricing	Postage stamp between zones, plus auction-based prices for priority rights. Overrun charges (x2 DNC) for exceeding daily nominated capacity into delivery zones or at large delivery points	Charges for reserved capacity and overruns (x10 CRF) make up more than 90% of revenue. Throughput charges ($/GJ) account for less than 10% of revenue	Throughput (GJ) x Distance (km) charges (70% of revenue) Throughput (GJ) charges (30% of revenue)

Code Element	Proposed Code (GTAC)	Vector Transmission Code (VTC)	Maui Pipeline Operating Code (MPOC)
Balancing	Daily incentive charges for excess running mismatch (i.e. imbalances at midnight above a tolerance). No automatic cash-outs of imbalances Park and loan service offered at a lower price than excess running mismatch (subject to linepack availability)	Balancing charges levied by Maui Pipeline passed on to shippers according to their share of imbalance at interconnection points (e.g. Rotowaro, Pokuru, Frankley Rd)	Imbalance at individual receipt and delivery points automatically cashed out when the imbalance exceeds the tolerance at that welded point (currently 1.5TJ per day)
Allocation	OBA, gas transfer agreements, other specified allocation methods allowed Multi-user gas delivery points allocated under the Downstream Reconciliation Rules	Various gas transfer agreements Multi-user gas delivery points allocated under the Downstream Reconciliation Rules	OBA only
Code Change Process	Consultation followed by independent approval by GIC. A fast-track process allowing for more rapid approval of non-controversial changes. Limited grounds for First Gas veto	Consultation followed by Shipper vote required greater than 75% support. Wide grounds for First Gas veto	Consultation, followed by GIC approval. Wide grounds for First Gas veto
Non Standard Agreements	Allowed within defined limits (more restrictive than the VTC), focusing on uneconomic bypass and attracting new loads	Allowed, within broadly defined limits	Minor variations to standard agreements allowed (not including price)

Code Element	Proposed Code (GTAC)	Vector Transmission Code (VTC)	Maui Pipeline Operating Code (MPOC)
Gas Quality	• No party to inject non-specification gas into the pipeline • Any party injecting gas must have adequate facilities systems and procedures to ensure that it injects only gas that meets specification • The party injecting gas must undertake regular or continuous monitoring and testing to ensure that the gas supplied meets specification	• No party to inject non-specification gas into the pipeline • Any party injecting gas must have adequate facilities systems and procedures to ensure that it injects only gas that meets specification • No monitoring requirement	• No party to inject non-specification gas into the pipeline • Any party injecting gas must have adequate facilities systems and procedures to ensure that it injects only gas that meets specification • Compliance with specification is required to be monitored

Appendix 2: Main areas of change

This appendix summarises what we see as the main areas of change in moving from the VTC and MPOC to the GTAC (extracted and edited from a paper sent to the First Gas Board).

Design of products to access the transmission system

The primary access product in the GTAC is daily nominated capacity (DNC). This is similar to the capacity product currently available on the Maui Pipeline. Maui delivery nominations are currently made to 4 interconnection points (Rotowaro, Pokuru, Pirongia, Frankley Rd) and dedicated delivery points serving Methanex and the Huntly Power Station. Under the GTAC, Shippers will be required to make nominations within zones for shared delivery points (12 are currently proposed), as well as to a handful of large dedicated delivery points (e.g. supplying Methanex and Huntly Power Station) they wish to use.

The main alternative to daily nominated capacity would be to use annual capacity reservations. This product is used in the VTC, Australia and the US. Basing the GTAC on reserved capacity would have been difficult, given that work undertaken by the GIC and stakeholders since the "North Pipeline Constraint" of 2009-12 identified significant limitations with the regime provided by the VTC. The criticisms primarily relate to the risk that reserved capacity creates contractual bottlenecks that may not reflect actual capacity scarcity (since shippers have no obligation to use the capacity they book). While that issue could be resolved in a capacity reservation system making any non-nominated capacity available via a day-ahead auction to other pipeline users (the approach being progressed in Australia)33, and by measures to discourage capacity hoarding, for reasons of simplicity we prefer a more flexible access product.

Moving from an annual capacity reservation to a daily nomination will likely mean that parties with seasonal or lumpy demand will pay slightly less for transmission – since they will only have the opportunity to pay for transmission service when they require it. In contrast, parties with flat load profiles are likely to pay more under the GTAC. The size of these price changes is unknown, since reserved capacity under the VTC is held by shippers with different customer load profiles and can be transferred between delivery points. (NB: First Gas can decline to transfer capacity where that would be physically impossible.) The GTAC will change the dynamic in shipper/end user relationships by removing the value that shippers currently provide through customer diversification and capacity transfers. Over time this may lead to more end-users shipping their own gas.

We also expect the combination of DNC and PR prices will lead to parties on congested parts of the network paying more for transmission capacity. This is a desirable feature of the proposed approach in signalling the value of scarce capacity, and more consistent with the Commerce Commission's pricing principles than the VTC/MPOC. However, this approach will encourage parties with customers in areas with a high prospect of congestion to support investment to relieve constraints or encourage their customers to switch away from gas.

33 See http://gmrg.coagenergycouncil.gov.au/

Ability to "firm up" access to capacity on parts of the system where the prospect of congestion exists

An important outcome under the GTAC (that is not provided for under the MPOC or VTC) is for transmission capacity to be allocated to its highest value use when scarce. This will be achieved by providing "priority rights" (PRs) to DNC that put the holder at the front of the queue when demand for daily capacity exceeds supply at a delivery point. In practical terms, this means when First Gas needs to curtail demand nominations due to congestion, shippers who hold PRs would not be affected. The draft GTAC proposes that PRs will only be made available where First Gas assesses a realistic prospect of congestion, which we currently assess to be a possibility in the near-medium term at around 10 delivery points (out of a total of 132 delivery points).

This approach aims to allocate risk appropriately – with First Gas best placed to assess the prospect of congestion, and shippers/end users best placed to value the right to firm capacity if the prospect of congestion exists.

The proposed design is for PRs to:

- Initially have a term of 6 months, with the term and time horizon over which PRs are available lengthened over time as experienced is gained.
- Be auctioned off one month ahead of the start of the six-month term, with the auction having a low (non-zero) reserve price and a price set by the lowest cleared bid.
- Be subject to secondary trading by shippers (i.e. parties with a Transmission Services Agreement).

The main alternative to PRs is to call for demand response to manage congestion. This would allocate scarce capacity by paying customers to reduce their demand, rather than requiring parties that value scarce capacity to pay more. The ability to respond to congestion through demand management where feasible has been incorporated into the GTAC, although PRs are seen as the primary tool for valuing scarce capacity. We will continue to offer interruptible contracts as non-standard agreements where there are significant network benefits (for example, at NZ Refining).

Zonal, postage stamp prices that explicitly minimise tariff shock

We propose a simple price-setting approach under the GTAC that divides the annual transmission revenue requirement (after allowing for revenue from non-standard transmission agreements) by the expected demand for DNC. Relative prices across DNC zones will then be set by adjusting this average DNC charge, with zones closest to Taranaki having the lowest prices and zones further away having higher prices.

The objective will be to set prices for the new zones to minimise "price shock". Because pricing zones under the GTAC will group delivery points in a different way than under the VTC (no zones exist under the MPOC), and also because shippers manage their reserved capacity more or less efficiently, they will inevitably experience some changes in their transmission charges at different delivery points.

The revenue earned from PRs will be refunded monthly, equally for each GJ of DNC, regardless of where on the system the costs are incurred. By spreading the revenue from PRs across the system, we aim to ensure that parties' willingness to pay for the firmer right is not influenced by the prospect of receiving a subsequent refund.

Charges for running pipeline imbalances

The GTAC proposes to introduce a new set of incentive charges for daily pipeline imbalances (differences between gas injections and gas deliveries across a day). This issue is currently managed under the MPOC "market based balancing" regime (MBB). The main changes in this area introduced under the GTAC are to:

- Balance the system as a whole rather than in segments (since we now own the entire transmission system we can use compression to move linepack around).
- Replace automatic cash-outs with daily incentive charges (known as excess running mismatch fees), so that shippers have strong incentives to maintain a balanced position and First Gas is not left as the buyer or seller of gas of last resort.
- Enable First Gas to undertake balancing actions when it deems that necessary, and ensure we have strong incentives to undertake cost-effectiveness balancing actions.
- Incorporate a park and loan service for short-term imbalances when capacity exists to provide this service. This puts the use of pipeline storage on a more commercial footing and potentially provides a price signal for expanding capacity (increasing Maui linepack) to provide the park and loan service. For gas producers, this change could mean paying to use pipeline storage for scheduled outages, rather than simply requesting cash out exemptions (or curtailing their customers).

The proposed balancing arrangements have been met with general industry support (which is pleasing given the contentious nature of changes to balancing arrangements in the past). The only issue raised by some parties has been whether a park and loan service might discourage short term trading on the wholesale market by giving shippers the ability to leave gas in the transmission system (or take it out) instead.

Other elements of the code

The remaining elements of the GTAC are largely carried over from either the MPOC or the VTC. For example, the definition of force majeure events and the liability caps that apply will be consistent with current practice. We will also continue to need the ability to negotiate non-standard shipping agreements under the GTAC (which we have under the VTC, but not explicitly under the MPOC). This will provide the ability to cater to the unique nature of particular loads, such as Methanex and peaking power stations, as well as to underwrite new investments (such as converting dairy loads from coal to gas).

A key part of finalising the new code arrangements will be to evaluate IT systems that can enable and facilitate the trading of GTAC products and administer GTAC processes (nominations, capacity release, imbalance tracking, and billing). To date, we have met with four potential providers of an off-the-shelf replacement to OATIS: Quorum, Trellis, ESI, and Tieto. The first three of these providers are based in the US, while Tieto is a Norweigen company that has an office in Australia and provides the transaction management system for the APA Group. Our discussions with IT system providers indicate that there should not be any major roadblocks in implementing the products and processes proposed in the draft GTAC, but the full extent of customisation and IT cost will only be revealed through a formal tender process. We intend to carry out this tender process over the coming months, applying the relevant internal governance processes for large IT procurements and obtaining shipper input via a reference panel.

Appendix 3: Objectives that the GTAC aims to achieve

To replace the existing codes, First Gas needs to demonstrate that the GTAC is materially better than the existing codes (VTC and MPOC) in achieving the Gas Act and Government Policy Statement objectives. Section 43ZN of the Gas Act sets out the objectives that the GIC needs to pursue under the Gas Act:

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

First Gas also established its own objectives as part of developing the new code. These are to:

- Enable the use of gas.
- Minimise the cost of transporting gas.
- Keep it simple.
- Promote flexibility.
- Promote transparency.

We see these two sets of objectives as essentially targeting the same thing, using different words. The cost benefit analysis should keep these objectives in mind when assessing whether the GTAC represents an overall improvement from the existing codes.