Cost benefit analysis of Gas Industry Co statement of proposal for critical contingency management

Report to Gas Industry Co

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1. Our understanding

Gas Industry Company requires a cost benefit analysis (CBA) to support a statement of proposal relating to amendments to the Gas Governance (Critical Contingency Management) Regulations 2008 (CCM Regulations) for setting the critical contingency price, curtailment bands and pressure thresholds.

A requirement of section 43N of the Gas Act is to assess the costs and benefits of each option intended to achieve the objective of regulation. CBA is the tool we use to evaluate whether the SOP delivers value to the economy over the intended operating period of the new regulations. This is the analytical tool that is best suited to delivering a view on value creation.

This analysis is a complex piece of work given the magnitude of the value in play. A consultation has already taken place in an initial SOP on most of the key features of this SOP with overall support for the measures, but with some reservations around curtailment order and what an effective curtailment price would look like. We note, indeed, that Gas Industry Co has decided in the interim not to proceed with one of the earlier recommendations for a price floor in the event of a critical contingency. However, this does not affect the overall analysis.

2. Description of the method

We use a whole of economy approach to this analysis. We are not concerned about wealth transfers or benefits to the gas industry itself. We are interested in whether the proposals are wealth creating for the country.

We assume that the regulatory process is the right approach in these circumstances. This question has already been more or less settled, and we do not intend to revisit it.

There are particular difficulties in quantifying over a future period of time as the probability of future events cannot be constructed into a repeatable statistical analysis.

The approach to a CBA should follow a series of steps that produce a result that indicates a preferred option or options that produce economic value. These steps would usually include:

- Definition of the problem and the objective sought
- Identification of the beneficiaries and those on whom a cost burden might lie
- Identification of any constraints (e.g. budgetary, physical possibilities, time)
- Identification of alternative options for achieving the objective, which would normally include the status quo
- Description, and, if possible, quantification of the costs and benefits of each option; analysis of non-tangible costs and benefits
- Description of the risks associated with each option and choice of a discount rate
- Valuation of the costs and benefits using net present value
- Sensitivity analysis, where appropriate
- Reporting and discussion of the results

We have undertaken several interviews with participants to try to establish a sufficient understanding of the issues to follow the above path and arrive at our conclusions.

3. Background

The CCM Regulations have the stated purpose of:

[achieving] the effective management of critical gas outages and other security of supply contingencies without compromising long-term security of supply.[1]

In practice the CCM Regulations achieve their purpose through and by directing and facilitating a number of actions and responses including:

1. Incentivising and facilitating early action to prevent a critical contingency arising
2. Maintaining linepack in the transmission system and distribution networks
3. Supplying small commercial and domestic consumers
4. Supplying consumers with an essential services designation
5. Allowing orderly shutdown to large consumers with a critical processing designation
6. Ensuring the continued connection of as many customers as possible while taking into account (to a limited extent) the costs of the parties through consideration of a party's access to a different fuel type

3.1 Costs of gas interruption

Interruption to gas supplies has divergent effects on participants. For some participants it is possible to halt some processes for a period and recover the production backlog once supplies resume.

Some participants have access to alternative supplies (e.g. their own gas storage) or can use an alternative fuel such as coal to resume producing within a certain crossover period.

Other participants have obtained critical processing designations within the Regulations which take into account the potential for damage to machinery if gas is curtailed too quickly.

For some processes (e.g. dairy factories) there can be times of year when the costs of shutdown can be significant because capacity to move inputs around to other sites is limited. There is the potential to have to dump inputs, which can come at an environmental and financial cost.

Essential services like healthcare need a continuous supply of energy to continue to provide their services. If they are interrupted, then there are significant costs to users of their services.

Most importantly costs escalate when line pack pressure is lost. The CCM Regulations have to deal with all circumstances including where the event is addressed within a few hours through to low probability events where line pack may be lost.

Work undertaken by NZIER[2] in 2012 showed that the value added of gas tends to increase with the curtailment bands. Noting this finding, Treasury's 2013 Regulatory Impact Statement[3] assessing

[1] Gas Governance (Critical Contingency Management) Regulations 2008

[3] https://www.treasury.govt.nz/sites/default/files/2014-12/ris-mbie-agc-aug13.pdf

proposed changes to the Regulations affirmed "that curtailing in order of size of consumer will result in the highest net benefit" and that such an approach was also "operationally" efficient.

Smaller gas users (commercial and domestic) that are interrupted will need to be visited by trained technicians to reconnect because of the safety risks. Site reconnection comes at a significant cost and the critical contingency operator (CCO), who is the party designated in the CCM Regulations to coordinate and direct the response, works hard to avoid these costs having to be incurred.

And finally, if gas is curtailed to domestic consumers there are substantial costs to householders who have to find alternative ways to cook food, and heat water and space. Across the 250 thousand households that use gas, these costs are significant. Some domestic consumers would probably need to spend on capital items such as electrification options or bottle supply if interruption to their connection went on for a longer period.

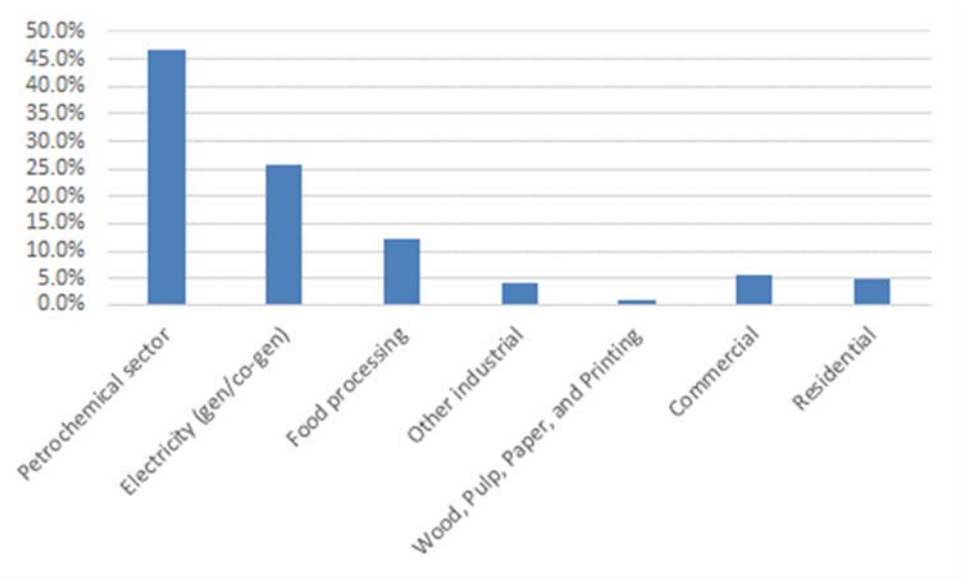
Accordingly a goal of maintaining linepack in the transmission system and distribution networks has an important effect on outcomes and assessment of costs and benefits. We take account of the point that the cost of an event rises exponentially if line pack is lost to a large number of consumers even if those consumers are small.

3.2 What is happening in the gas market

It is also important to look at what is happening in the gas market environment to help understand the background to the changes that are being proposed.

Figure 1 below shows gas consumption by major sectors. For those familiar with the electricity market there is an immediate observation that can be made: whereas in the electricity market total consumption by domestic and commercial consumers amounts to around 60 percent of total consumption, the corresponding figure for the gas market is around 11 percent for the most recent data available. This underscores that gas in New Zealand is used primarily by a small number of large scale operators. This distribution of consumer size influences the cost of an objective to maintain linepack if a critical contingency event occurs.

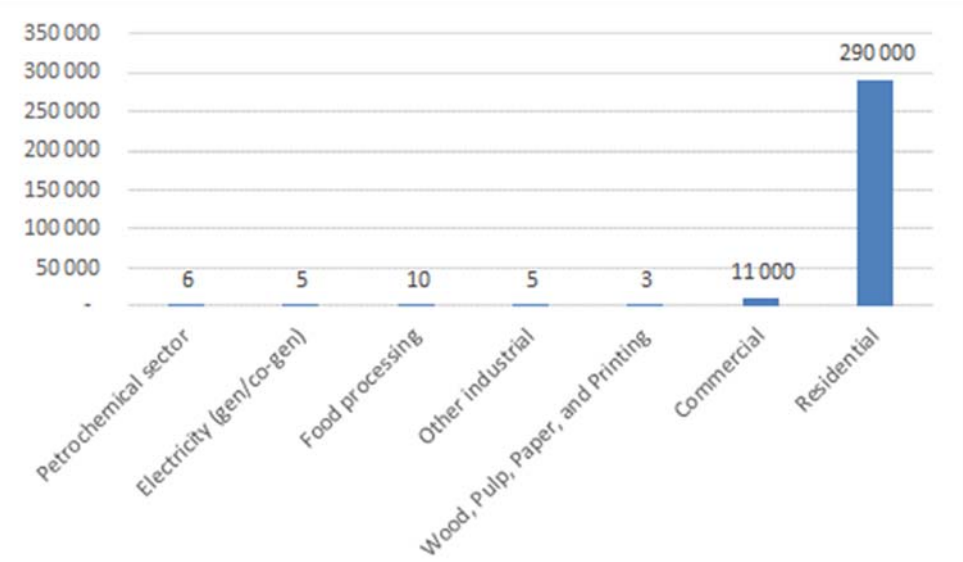
Figure 1 - Gas consumption by sector – year to June 2023



Source: MBIE data, Sapere analysis

Figure 2 shows the corresponding number of ICPs for each sector. Unsurprisingly, when looking at the number of ICPs for each sector, there are very few individual large users and many small users. The consistency of the two figures is explained through the low average consumption of small users and the high average consumption of large users.

Figure 2 - Number of gas ICPs by sector, 2023



Source: MBIE, Gas Industry Co, Sapere analysis

We are also interested in what is happening in over time in the New Zealand gas market.

First, in the electricity generation sector there have been several major changes. The following gas powered stations are now no longer operating or are likely to cease operations in the near future:

- Southdown (decommissioned in 2015)
- New Plymouth (decommissioned in 2019)
- Otahuhu B (decommissioned in 2015)
- Taranaki Combined Cycle (likely decommissioning in 2024)

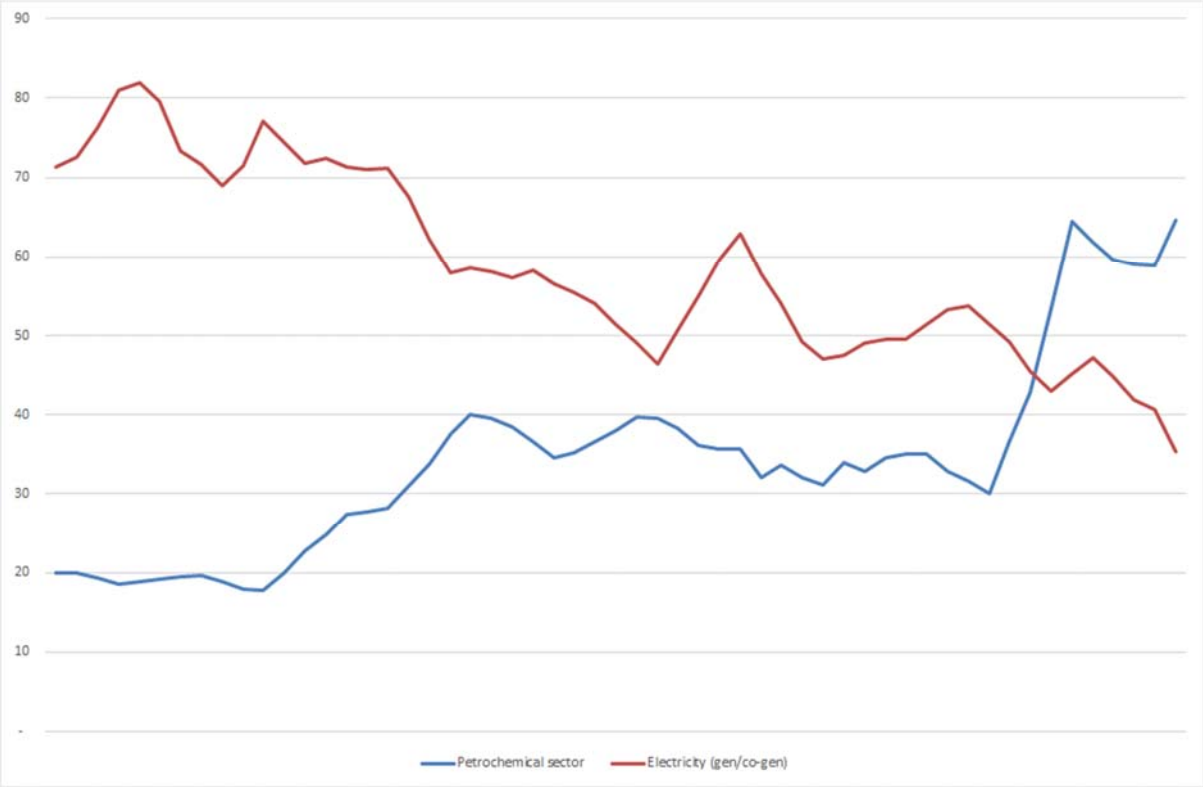
Over a similar period several new gas stations have been commissioned:

- Stratford peakers (commissioned in 2011)
- McKee peakers (commissioned in 2012)
- Junction Road peakers (commissioned in 2020)

The existing portfolio of gas generation also includes E3P, P40, and the Rankine units at Huntly. In addition there is the Te Rapa co-generation facility.

Since 2010 there has been a clear trend down in electricity produced using gas while at the same time there has been a marked increase by Methanex as a response to continued high global oil prices as shown in Figure 3.

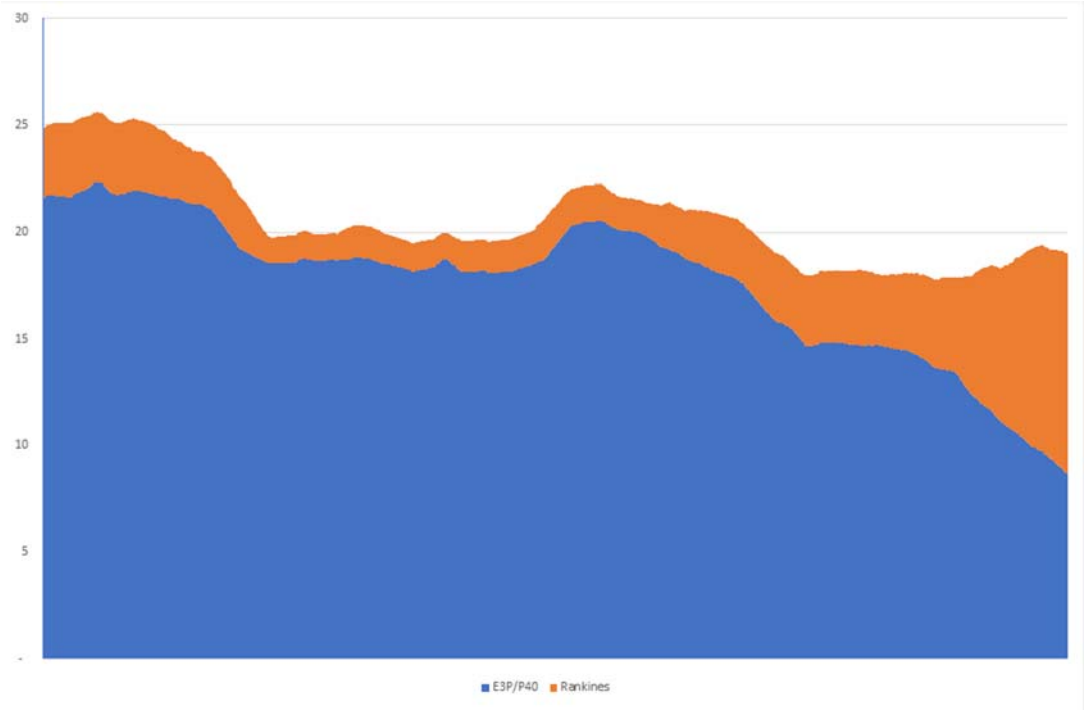
Figure 3 – Annual gas use (PJ, rolling 12 months) since 2010 for electricity and petrochemical production



Source: MBIE data, Sapere analysis

Looking at electricity generation since 2019 at Huntly we observe that total gas consumption has trended down over the period. Gas use in the Rankine units has been sporadic on the whole with the exception of past few months in 2023.

Figure 4 – Total gas use at Huntly 2020-2023 rolling 12 months (PJ)



3.3 What Critical contingency events have taken place and how they have been managed

Since the 2008 CCM Regulations went into effect there have been six occasions on which the CCO has considered the declaration of a critical contingency event (CC event). These occasions are summarised in Table 1 over the next page. We note also that since the 1970s there have been other interruptions to supply prior to the Regulations being in force. The WorleyParsons report[4] notes in addition to the events detailed below four major events, all pipeline related, between 1977 and 2010.

[4] WorleyParsons – Gas Disruption Study Report on the Potential Impacts on the New Zealand Gas Market – January 2014

Table 1 - Critical contingency events and near-events since 2008

Date(s)	**13/07/2010**	**25 to 30/10/2011**	**3/03/2012**	**15/04/2015**	**24/05/2016**	**23/05/2017**
Cause	Pohokura production station outage	Maui Pipeline outage	Pohokura production station outage	"Potential critical contingency" following observed pressure drop	Pohokura production station unplanned outage	System imbalance event
Actions by CCO	Discussions with Transpower; early warning to participants;	Discussions with Transpower; early warning to participants; some parties changed to band 5	Discussions with Transpower; early warning to participants;	Assessment of situation requires no declaration of CC event	Discussions with Transpower and Methanex; early warning to participants;	Own analysis indicates possibility of event; discussions with Transpower
Actions of parties prior to CC being declared	None noted	Genesis prepares to curtail prior to CC event being called	None noted	None noted	Self curtailment of Methanex and Ahuroa injections; local MPOC curtailment actions	Additional injection from PPS
Duration of CC event (hours)	2:58	130.58	10.85	CC event not ordered	4.50	7.42
Curtailment ordered	None	Up to band 6	Bands 1a and 1b	None	None	None
CC price $/GJ	15	Regional event, no price	11.1	No CC event	6.66	10.62

Source: Gas Industry Co, CCO

These events help us to summarise the actions of the CCO prior to, during and after a CC event.

We note the following observations that are pertinent to our analysis:

- In a number of events, the participants themselves will take actions to avoid a CC being declared. Based on our discussions with participants the main incentive for these actions relates to the desire to avoid a CC event and forced curtailment.
- Prior to an event being declared the CCO engages in early discussions with parties able to affect the overall situation.
- Once an event is declared the CCO must follow the curtailment order in accordance with the CCMP. The total amount curtailed will be supported by ongoing monitoring and analysis of the situation.

4. Outlining of the proposals

The SOP is shaped around what can be considered discrete initiatives. We have grouped these initiatives as follows:

- Setting a contingency price (section 4.1)
- Curtailment band definitions (section 4.2)
- Curtailment instructions (section 4.3)
- Critical contingency threshold limits (section 4.4)
- Other matters (e.g. form of instructions and how information is provided) (section 4.5)

To be clear we are considering only the proposal as it stands rather than previous iterations of proposals. Thus we are not looking specifically at the previous proposal for a price floor since, following further evaluation from Gas Industry Co, this proposal has been shelved.

We will consider each of the options on its own merits, acknowledging that the final outcome could be to proceed with none of the options, with one option but not the others. In practice given that the options can be treated independently we consider each of the options against the status quo.

4.1 Setting a critical contingency price

The existing Regulations specify that where only customers in curtailment bands 0-2 (that is large consumers) are curtailed then the contingency price is to be set based on the wholesale electricity price at the time. Gas Industry Co proposes to relax this condition on the basis that the interaction between the gas market and the electricity market has evolved recently given the reduction of gas generators who provide CCGT (combined cycle gas turbine) baseload to the grid.

The composition of the bands (current and proposed) is shown in Table 2.

Table 2 - Bands 1 and 2 - current and proposed

	Current	**Proposed**
Band 1	Genesis, NZ Refining (no longer in operation)	Methanex, Huntly
Band 2	TCC, Stratford peakers, Junction Road, Contact (Te Rapa), Methanex, Ballance Kapuni	Junction Road (Todd), TCC, Stratford Ballance Kapuni, Kinleith, Te Rapa,

A previous proposal for a price floor has been put to one side and is not the subject of this CBA.

4.2 Curtailment bands

In the existing Regulations there are eight curtailment bands (numbered 0 through 7), the first being 0 which is for participants who supply gas storage facilities. The curtailment order effectively describes the priority for curtailment, with band 1 curtailed first followed by the next bands all the way down to 7. The higher bands are curtailed only as a last resort as they encompass certain designated

consumers and consumers whose share of consumption is minuscule, but whose reconnection would be very costly if the distribution network were depressurised.

Table 3 – List of curtailment bands and proposed bands

	Original (2008)	**Existing**	**Proposed**
Band 0	Storage		
Band 1	More than 15TJ per day and with an alternative fuel supply	More than 15TJ per day and with an alternative fuel supply	More than 100TJ per day (threshold met from "time to time")
Band 1b	More than 15TJ per day and with **no** alternative fuel supply	*Not applicable*	
Band 2	More than 10TJ per annum and up to 15TJ per day and with an alternative fuel supply	More than 15TJ per day and with **no** alternative fuel supply	More than 15TJ per day and less than 100TJ per day (threshold met from "time to time")
Band 3A	*Not applicable*		More than 300TJ per annum and up to 15TJ per day
Band 3	More than 10TJ per annum and up to 15TJ per day and with **no** alternative fuel supply	More than 10TJ per annum and up to 15TJ per day	Up to 300TJ per annum and up to 15TJ per day
Band 4	More than 250 GJ per annum and up to 10 TJ per annum		
Band 5	More than 2 TJ per annum (but with an essential services designation)		
Band 6	2TJ or less per annum	250 GJ or less per annum	
Band 7	Not applicable	Any other if a critical care designation applies	

Gas Industry Co proposes two significant changes to the curtailment bands.

The first of these affects bands 1 and 2, removing the distinction between those participants with an alternative source of fuel and instituting instead a volume distinction. Gas Industry Co's rationale is that removing the distinction brings consistency to the band definitions and provides more load to band 1 thereby reducing the possibility of band 2 being called on.

The second change adds a new band, 3A, which would be curtailed before band 3. This initiative essentially means that there would now be nine bands instead of eight (if we include band 0). It was thought that it was simpler to divide band 3 into two bands rather than rename all the bands above band 3 in the curtailment order. Like for the first initiative, there would be less likelihood of the current band 3 participants being called on in their entirety and more granularity in the curtailment order.

There are also some initiatives that involve how to calculate the threshold volumes for categorisation of participants into curtailment bands. These initiatives are, in our view, of less significance.

As for the contingency price, the alternative to these options is to stick with the status quo.

4.3 Curtailment order

There is one significant change to the curtailment order. Under the proposed arrangements bands 1 to 3 (including any critical processing designations) must fully curtail before band 4. The rationale for this change is that there is relatively little load in this curtailment band and that the disruption to customers in band 4, while doing little to help stabilise the system, would impose a significant cost on those participants for little gain.

Table 4 - Curtailment order

Current	**Proposed**
Band 0	Band 0
Band 1, Band 1 critical begins process	Band 1, Band 1 critical begins process
Band 2, Band 2 critical begins process	Band 2, Band 2 critical begins process
Band 3, Band 3 critical begins process	Band 3A, Band 3A critical begins process
	Band 3, Band 3 critical begins process
	Bands 1-3 critical fully curtail
Band 4, Band 4 critical begins process, Bands 1-3 critical fully curtail	Band 4, Band 4 critical begins process
Band 5	Band 5
Band 6, Band 4 critical fully curtail	Band 6
	Band 4 critical
Band 7	Band 7

4.4 Pressure thresholds

Firstgas has proposed some specific changes to pressure thresholds which are under active consideration. We do not propose to provide additional analysis of these proposals which are the subject of separate analysis. However, we do want to consider one specific aspect which has the potential to affect in the future the way that the CCO is able to manage the gas system.

Firstgas has requested these changes in anticipation of reducing operational costs by lowering the operational gas pressure across the transmission network. If these operational changes are made, the CCM pressure thresholds need to be adjusted to the operation of the system. Apart from the

Taupo/Broadlands gas gates Gas Industry Co has little information about how Firstgas intends to operate the system. Gas Industry Co has no jurisdiction over operational matters but has an obligation to ensure that the system is safe and efficient. The CBA required under the Gas Act for regulation changes only relates to the specific regulatory tool, not to any economic CBAs Firstgas has done to calculate its cost savings.

The adjustment of the pressure thresholds is to provide greater flexibility for the point at which a critical contingency is declared under the critical contingency management plan to align with the operation of the transmission system. The threshold changes provide for a tool to respond to operational changes rather than being a regulatory intervention resulting in additional costs.

The specific proposal is to expand the threshold limits for existing gas gates and exclude from Schedule 1 of the Regulations any gas gate where the operating distribution pressure is less than 20bar g. These changes will allow greater flexibility in the pressure thresholds to align with operation of the network. There are trade-offs to consider in relation to the Taupo/Broadlands proposed modifications:

- Injection of green gases is consistent with decarbonisation initiatives that have wider economic considerations for the country
- Depending on the quantity of gas injected there is an alternative supply of gas to domestic consumers that could present a benefit
- Operating at lower pressures means that there is less gas in the pipeline system for when an interruption happens which could lead to a more rapid disconnection for consumers than might otherwise be the case
- The CCO would no longer have jurisdiction over the gas gates concerned which may require different and specific measures to deal with incidents at those gas gates

4.5 Other measures

The other measures, which we have grouped for our purposes as a package include:

- How curtailment instructions are conveyed
- How information is provided to the CCO
- The nature of critical contingency plans
- Critical care and essential services designations

Our view of these measure is that these constitute a tidy up exercise. These measures have been well signalled in the initial SOP and we do not intend to consider these in detail. We do note specifically the proposal in 5.2.3 of the SOP to account for "consumption rates at the time a critical contingency is declared" in relation to partial curtailment which addresses a definite issue and takes account of the actual circumstances at the time of a CC event.

5. Benefits framework

Benefit category	Description of claim	How benefit can be measured
Contingency pricing	Removing the restriction on linking price to wholesale electricity market when curtailment hits only bands 0-2 for determination or price results in better price signal - Superior price signal - Price closer to marginal price	Better allocation of gas sees greater consumer surplus from gas use
Curtailment bands	Less over curtailment from more granular curtailment bands	Greater consumer surplus; less risk of flow-on costs to participants from shutting down
Curtailment bands	Less inefficient investment from participants over-investing in alternative fuels	Lower costs to economy
Curtailment bands	Easier to communicate to fewer and larger gas users	Lower management costs of critical contingency; higher likelihood of compliance; reduction in risk of catastrophic depressurisation and costly reconnection
Threshold limits	Greater flexibility for operating transmission system lowers costs	See Firstgas submission

6. How to measure the impacts

6.1 The implementation costs are not significant

In our view the implementation costs of the initiatives are minor. Costs incurred will relate to the need to update procedures and to ensure that operational staff are brought up to speed with the changes. In our view these costs will be absorbed into normal operational requirements, requiring no additional staff or external costs to be incurred. Larger organisations, which are the ones most affected by the changes and which have regulatory teams, will have negligible additional work to undertake given that CCM Regulations are already in place.

Other costs need to be considered in the context of net benefits. As stipulated at the beginning of this paper we have ignored wealth transfers. We acknowledge that some participants may find that their personal circumstances are less fortunate than the current arrangements. In some cases wealth transfers can undermine the functioning of a market if instability is the consequence.

6.2 Benefits are harder to quantify

Before we start looking at specific benefits we need to look at the likely operating environment. We consider the relevant period of analysis, the possible events that might lead to a contingency or the possibility of a contingency, and a possible discount rate.

We consider that a suitable period of analysis would be a 20-year horizon. These regulations are open-ended are expected to provide certainty for gas market participants over a long-term timeframe.

The hardest aspects to consider when quantifying the benefits of a CBA are the likelihood, length and impact of CCM events. Since 2008 we have observed six events or near-events in addition to five major events in the twenty years prior to the implementation of the Regulations. It is not easy to derive from this dataset a statistical profile of future events given several unknowns. It would be possible to look at some specific risks in a statistical analysis such as earthquakes, floods and landslides, and volcanic activity but this only gets us so far and would present an incomplete picture. The difficulties include:

- Interpreting each natural cause for our purposes would require also that we estimate the scale of disruption and the length of disruption which presents significant hurdles
- Human error, for example operator error, is difficult to predict. Furthermore, ongoing improvements to procedures and lessons learned from other events should diminish the probability of future events occurring

Human error can be manifested in unmaintained equipment (e.g. the Varanus Island incident) or equipment that will fail at some point. Again there is insufficient data to enable us to derive a useful pattern, and the probability of such events will continue to change given continuous improvement strategies.

Moreover there is always the possibility of something happening that cannot be conceived of at this moment.

For these reasons we are reluctant to try to outline a particular distribution of future events where we estimate the frequency, duration, and scale.

It should be observed that were we even to try to set out a range of possibilities then it is entirely possible that we would be forecasting a range of between no impacts and millions of dollars of impacts which would be of little use to decisions markers.

The question, therefore, of discount rates falls away as we do not propose to address the question of benefits in the manner of future events occurring with a certain probability at a particular time and a particular scale.

6.2.1 The "four event" model

To assist us in our analysis we have constructed a framework that tries to capture the scale of various types of incidents. This framework helps us to think about how the proposed changes to the Regulations affect different parties. By looking at the trade-offs we can come to a view about the net overall impact of the changes. The range goes from an event that is signalled but curtailment is not required all the way through to an incident where the CCO must consider curtailing all the way up to band 6. We note that as we move from left to right on the table while the scale of the event increases the probability decreases.

Figure 5 - Four event model

	Scenario one: minor event	**Scenario two: short event**	**Scenario three: major event**	**Scenario four: severe/ catastrophic event**
Description	CCO communicates risk of CC event but does not elevate to full event	CC event announced	CC event announced	CC event announced
Duration	6 hours	24 hours	1 week	4 weeks
Curtailment bands affected	None	Band 1	Up to band 3	Up to band 6

Thinking about these scenarios helps us to consider and illustrate the proposals in the SOP.

6.2.2 Scenario one considerations

In scenario one there is no actual curtailment but the participants are aware that a CC event may arise and will therefore consider voluntary actions to avert the announcement of an event. The likely price that would be set and applied to imbalances may incentivise helpful actions that are taken prior to an event which may decrease the likelihood of an event being called.

We might also consider the actions of the participants in the first curtailment band to be called, which may have a particular incentive not to see the situation escalated.

6.2.3 Scenario two considerations

Now that a critical contingency has been announced the critical contingency price is properly in play and will incentivise actions by some participants.

Compared to the status quo we are also interested in the costs to the arise to the parties from a different curtailment order.

6.2.4 Scenario three considerations

This scenario puts into perspective the curtailment order in respect of critical processing designations in bands 1 to 3 versus the band 4 customers.

6.2.5 Scenario four considerations

Finally, the main issue in scenario four is whether the CCO is successful in maintaining linepack and in so doing ensuring that domestic consumers and small businesses are protected from curtailment with the potentially very high costs that such a curtailment would result in.

6.3 Analysis

Table 5 Summary of effects.

	Minor outage; CC event announced as possibility	Short outage, CC event announced, curtailment band 1	Major outage, curtailment to band 3	Severe/catastrophic outage, curtailment to band 6	Overall assessment
Economic impact	Low economic impact →			Very high economic impact	
Frequency	More frequent →			Very infrequent	
Duration	6 hours	24 hours	1 week	4 weeks	
Total TJ effect	<50TJ	200TJ	2500TJ	>10,000TJ	
Cost	No effect	Possible curtailment out of merit order	Potential costs of critical plant shut down but with low probability	No effect	
Benefit	No effect	Some avoided costs through early action taken	Impact on fewer participants	Reduce probabilty of depressurisation with a cost running into hundreds of millions of dollars	
Effect one: setting critical contingency price	Unlikely to make difference	Positive, incentivises early action	Positive, incentivises early action	Positive, incentivises early action	Positive
Effect two: curtailment band redefinitions	Event dependent	Event dependent	Unlikely to make difference	Positive, lowers probability of accessing higher bands	Positive, on balance
Effect three: curtailment order	Unlikely to make difference	Unlikely to make difference	Event dependent	Positive, lower cost of disruption	Positive, on balance
Effect four: threshold limits	Event dependent	Event dependent	Event dependent	Event dependent	Event dependent

6.3.1 Explanation of table

We have looked at each of the four relevant proposals in the context of outage types and consider whether there is a net benefit from that proposal in those circumstances.We have not assessed any of the proposals as unambiguously negative.

The model helps clarify where the focus of the analysis should be. The outcome of more frequent, but (relatively) low impact events can be contested vigorously as to whether the curtailment order was economically efficient. It is possible that a large gas consumer in one of the first curtailment bands may place a higher value on their use of gas than a consumer in a non-curtailed band. However, when considering a less frequent but high impact event, the costs of depressurisation of the network overwhelm the analysis. In the absence of a market mechanism which clearly identifies the highest value use of gas, it is necessary to focus solely on what particular curtailment order achieves the objective of reducing the probability of depressurisation, and as a secondary objective, reducing the number of participants affected. Working through the proposals we find the following:

Proposal one (setting of the critical contingency price) is likely to incentivise early action for voluntary curtailment or to make alternative gas supplies available. We accept the rationale that the electricity market may be less likely to be the key factor in setting the price and that the independent industry expert should be free to take into account other factors when setting the price. Having reviewed previous price reports we have formed the view that large participants will have the technical skills to predict accurately the likely price and to take action accordingly.

Proposal two (changing the definition of bands one and two) has mostly a positive impact. There is some ambiguity in a short outage in that participants in band 1 may place a higher value on gas than participants in band 2 or that the cost of disruption is greater to the band 1 participants. We have no evidence to determine whether that is the case but acknowledge the possibility. In our view, however, the advantage to be gained from having the largest participant involved first in the curtailment discussions is sensible and could marginally reduce the probability of curtailment to domestic consumers and small businesses, where the costs would be very high. The addition of band 3A ultimately has a similar advantage in that there is the possibility of fewer participants being called on to curtail.

Proposal three (changing the curtailment order) is somewhat nuanced given the unknowns about costs of curtailment of critical processing bands. We find that the likelihood of accessing band 4 gas averting any critical processing curtailment in bands 1, 2 and 3 is minute and therefore that the advantages of curtailing fewer participants is supported.

Proposal four (expanding discretion regarding the pressure thresholds) is a balanced consideration and will be highly dependent on the actual pressure threshold, the characteristics of the gas gates concerned if it is to be removed from Schedule 1 and how it is managed. The consideration is to balance the inclusion and visibility of the gas gate within the CCO purview with the advantages of flexibility in pipeline management. It will be important too what sort of interruptible load exists at the gas gate. An additional matter is to allow greater operating range for gas gates that remain in Schedule 1. Again, our view is that this needs to be considered on a case-by-case basis. Expanding the allowable range of pressure thresholds

needs to be weighed against the reduction in linepack available to supply downstream of interruptions, but also in light of any additional investment that might be needed to maintain pressures at the current thresholds.

7. Conclusion

In our view proposal one, proposal two and proposal three show, on balance, a net economic benefit in that they:

- Facilitate the management of CC events thus achieving the objectives of the CCM Regulations
- Lower the risk of domestic consumers and small businesses being curtailed the reconnection of whom would give rise to high costs
- Lower the number of customers having to curtail, especially when those customers who are in higher bands are thought to place a higher value on the use of gas than those in lower bands

Although we acknowledge that there may be curtailment which is inconsistent with other theoretical merit orders we do not find that changes in lower bands would outweigh the advantages of the overall structure. Individual cases for organisations are dealt though the critical processing designation mechanism.

Proposal four, relating to pressure thresholds and the potential for removing a gas gate from Schedule 1 should be assessed against cost and benefits on a case-by-case basis.

The other proposals achieve greater clarity and certainty for participants which will improve the effectiveness of the CCM Regulations.

About Sapere

Sapere is one of the largest expert consulting firms in Australasia, and a leader in the provision of independent economic, forensic accounting and public policy services. We provide independent expert testimony, strategic advisory services, data analytics and other advice to Australasia's private sector corporate clients, major law firms, government agencies, and regulatory bodies.

'Sapere' comes from Latin (to be wise) and the phrase 'sapere aude' (dare to be wise). The phrase is associated with German philosopher Immanuel Kant, who promoted the use of reason as a tool of thought; an approach that underpins all Sapere's practice groups.

We build and maintain effective relationships as demonstrated by the volume of repeat work. Many of our experts have held leadership and senior management positions and are experienced in navigating complex relationships in government, industry, and academic settings.

We adopt a collaborative approach to our work and routinely partner with specialist firms in other fields, such as social research, IT design and architecture, and survey design. This enables us to deliver a comprehensive product and to ensure value for money.

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