Transmission Pipeline Balancing Issues

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Submissions close: 12 September 2008

GAS INDUSTRY COMPANY LIMITED

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About Gas Industry Co.

Gas Industry Co was formed to be the co-regulator under the Gas Act.

As such, its role is to:

- recommend arrangements, including rules and regulations where appropriate, which improve:
  - the operation of gas markets;
  - access to infrastructure; and
  - consumer outcomes;
- administer, oversee compliance with, and review such arrangements; and
- report regularly to the Minister of Energy on the performance and present state of the New Zealand gas industry, and the achievement of Government's policy objectives for the gas sector.

Authorship

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Submissions close: 12 September 2008

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Executive summary

New balancing arrangements introduced to the Maui and Vector pipelines on the commencement of the Maui pipeline open access regime on 1 October 2005 have not been operating as intended. A number of developments could potentially improve the performance of these balancing arrangements, including:

- Maui Development Limited recently introducing new balancing gas procurement arrangements and issuing new balancing instruction to its operator;
- the possible settlement of a long running dispute between Maui Development Limited and Vector over imbalance quantities;
- the recent cessation of retrospective re-nomination of legacy Maui gas; and
- the possible removal of Maui Pipeline Operating Code provisions relating to legacy Maui gas.

However, Gas Industry Co remains concerned that core elements of the balancing regime are flawed, and will not provide efficient pipeline balancing. This issues paper discusses why regulatory intervention to address the problem may be necessary, analyses the causes of the problem, and suggests the design element that should be considered in a subsequent options paper.

Feedback from interested parties on Gas Industry Co's analysis and findings is sought by 12 September 2008.

Contents

1 Introduction

1.1 What is Balancing?

The term pipeline balancing refers to the management of the inventory of gas in a pipeline, generally known as *linepack*. Without effective balancing, reliable transportation of gas is impossible. Effective balancing of transmission pipelines is therefore a key element of successful open access.

Balancing arrangements must specify how pipeline balancing takes place. They must also specify how balancing costs are to be recovered from users. If costs are recovered from the users who cause balancing actions to be taken, then user self-balancing is encouraged and balancing costs may be reduced.

1.2 Gas Industry Co Concerns

Pipeline balancing first came to Gas Industry Co's attention in its June 2006 Transmission Access Issues Review, where balancing issues and concerns were raised by most parties and became one of the key themes of the review. At that time, the concerns were around the impact of the Maui legacy arrangements and the anticipated decline in the flexibility of the Maui field which has been relied on to support pipeline balancing.

Since then, Gas Industry Co has monitored balancing behaviour and outcomes and has consulted with stakeholders on balancing issues as they have arisen. Specifically, Gas Industry Co has:

- attended and supported the MDL industry workshops following the 2006/07 overpressure incidents;
- provided an independent expert report on the treatment of unaccounted for gas (UFG);
- developed draft regulations relating to balancing service provision as part of its October 2007 Transmission Access Statement of Proposal;
- published a balancing research paper in April 2008 which considered New Zealand's balancing arrangements in the context of balancing principles developed in the European Community; and
- formed and chaired a Transmission Pipeline Balancing Advisory Group (TPBAG) which considered a range of balancing issues during May 2008.

Despite these various initiatives, Gas Industry Co has continuing concerns over balancing issues and the ability of pipeline owners and users to identify, agree and adopt the changes needed to address them. In short, there is a risk that the Gas Act objectives will not be achieved – now or in the future – as a result of shortcomings in balancing arrangements. It is for this reason that Gas Industry Co has decided that it needs to take an active and leading role in addressing these balancing concerns.

1.3 Objective of this Paper

Broadly, Gas Industry Co's process for developing and recommending new rules and regulations for the gas industry involves:

- developing and consulting on an issues paper;
- developing and consulting on an options paper;
- developing and consulting on a statement of proposal; and
- recommending industry arrangements, rules or regulations.

The publication of this issues paper is the first stage of this process in relation to the *possible* development of regulations for balancing. This is not to say, however, that all of these steps will be undertaken in this instance. It may be concluded at this 'issues' stage that the issues are insubstantial (although this seems unlikely). Alternatively, it may be concluded at the 'options' stage that a non-regulatory option is preferred.

Should it be decided that regulations are recommended, this paper will form a part of the process for – and the justification of – those regulations. On the other hand, if a non-regulatory solution is preferred, this process will nevertheless be helpful in providing a forum for the industry to explore and debate issues and solutions and agree upon a way forward.

1.4 Structure of this Paper

This paper is structured as follows:

- chapter 2 discusses some generic concepts and issues around balancing;
- chapter 3 considers why some economic characteristics of balancing in the New Zealand context may make regulatory intervention necessary;
- chapter 4 considers how the current and possible alternative balancing arrangements might be evaluated;
- chapter 5 describes the existing balancing arrangements on the MDL and Vector pipelines;
- chapter 6 discusses the issues arising with the existing balancing arrangements; and
- chapter 7 proposes what design elements will need to be considered in developing options for addressing these issues.

This paper is mostly based on the balancing research paper, the work of the TPBAG, and subsequent consideration of the issues arising. The paper is intended to:

- provide an economic framework against which balancing arrangements can be evaluated;
- identify issues with current arrangements as measured against this evaluation framework; and
- identify the design elements which will need to be considered when alternative balancing options are developed.

The issues discussed are part of the consultation process under the Gas Act and may ultimately lead to a recommendation to the Minister for regulation.

To aid readers who may not be familiar with gas balancing, the paper begins with a high-level description of balancing, then sets out the elements in a framework that can be used to assess the various design issues and high level options.

1.5 Submission requirements

Gas Industry Co invites submissions on this issues paper and, in particular, answers to the specific questions contained within by 5pm on Friday, 12 September 2008. Please note that submissions received after this date may not be able to be considered.

Gas Industry Co's preference is to receive submissions in electronic form (Microsoft Word format and PDF) and to receive one hard copy of the electronic version. The electronic version should be emailed with the phrase 'Submission on the Transmission Pipeline Balancing Issues Paper' in the subject header to submissions@gasindustry.co.nz and one hard copy of the submission should be posted to the address below:

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Team Secretary
Gas Industry Co
Level 9, State Insurance Tower
1 Willis Street
PO Box 10-646
Wellington
New Zealand

Gas Industry Co will acknowledge receipt of all submissions electronically. Please contact Jay Jefferies on 04 472 1800 if you do not receive electronic acknowledgement of your submission within two business days.

Submissions on the specific questions should be provided in the format shown in Appendix D.

Gas Industry Co values openness and transparency and therefore submissions will generally be made available to the public on Gas Industry Co's website. Submitters should discuss any intended provision of confidential information with Gas Industry Co prior to submitting the information.

Following analysis of submissions, Gas Industry Co will release a submissions analysis paper containing a summary of submissions together with Gas Industry Co's analysis and conclusions.

2 Linepack Management

2.1 Linepack and Pressure

At any point in time, a gas pipeline will hold a quantity of gas within it, referred to as 'linepack'. Balancing means the management of linepack. Linepack is managed by controlling the level of injections into and offtakes from the pipeline. If aggregate injections exceed aggregate offtakes then linepack rises; if aggregate offtakes exceed aggregate injections then linepack falls.

Since linepack is fixed in volume, an increase in linepack will lead to an increase in gas pressure in the pipeline. Pipeline pressures must be maintained within upper and lower limits. If the pressure is too low, the supply of gas to consumers will be compromised leading to a critical contingency situation being declared, curtailment of gas delivery and possible loss of supply. Conversely, if the pressure is too high, gas receipts may be, in effect, curtailed, as some producers may be unable to inject gas into the pipeline potentially resulting in venting and loss of gas.

Failures to manage pressure within limits can therefore lead to widespread economic consequences as commercial arrangements are disrupted and production is interrupted. In extreme situations, such failures can also raise environmental and safety issues if gas is vented to prevent pressures breaching safe operating limits.

2.2 Uses of Linepack

A minimum linepack is required to create a pressure gradient to move gas along the pipeline from injection to offtake points, and to provide a minimum delivery pressure. This minimum linepack is known as the 'flowing' linepack. For example on the Maui pipeline it is of the order of 190 to 220TJ.

Some 'extra' linepack is required to provide a buffer against contingency events. The Maui regime distinguishes two categories of such contingency linepack:

1. 'Emergency' linepack to provide a response time for an emergency shutdown of last resort. This is currently set at 1.5 hours of typical total flows or 25TJ.

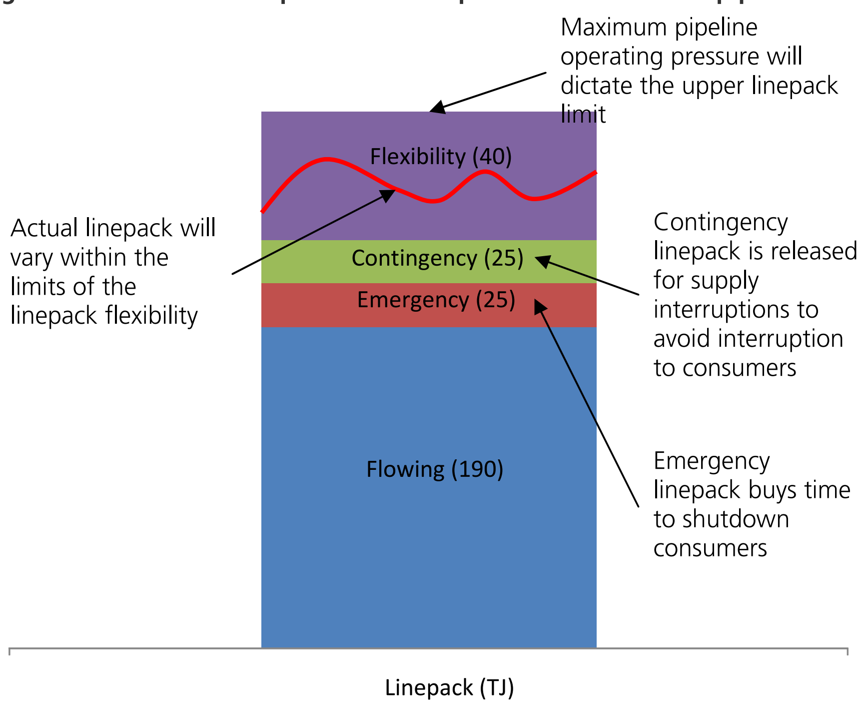
2. 'Contingency' linepack to provide cover for a plant outage and enable the market to avoid consumer interruptions during short production outages[1]. This is currently set at 2 hours of the largest producer or 25TJ.

The sum of the flowing linepack and the emergency reserve is the lower safe operating threshold after which intervention is required.

The maximum achievable linepack is the upper safe operating threshold, and the difference between these limits is the useable linepack, referred to as linepack flexibility. On the Maui pipeline this is in the order of 40TJ, some of which will provide for a gain in linepack (positive flexibility) and some for loss of linepack (negative flexibility)[2] .

The following schematic illustrates the composition of linepack within the Maui pipeline. The numbers are indicative and the actual numbers will vary with flow and conditions.

Figure 1 - Illustrative composition of linepack within the Maui pipeline

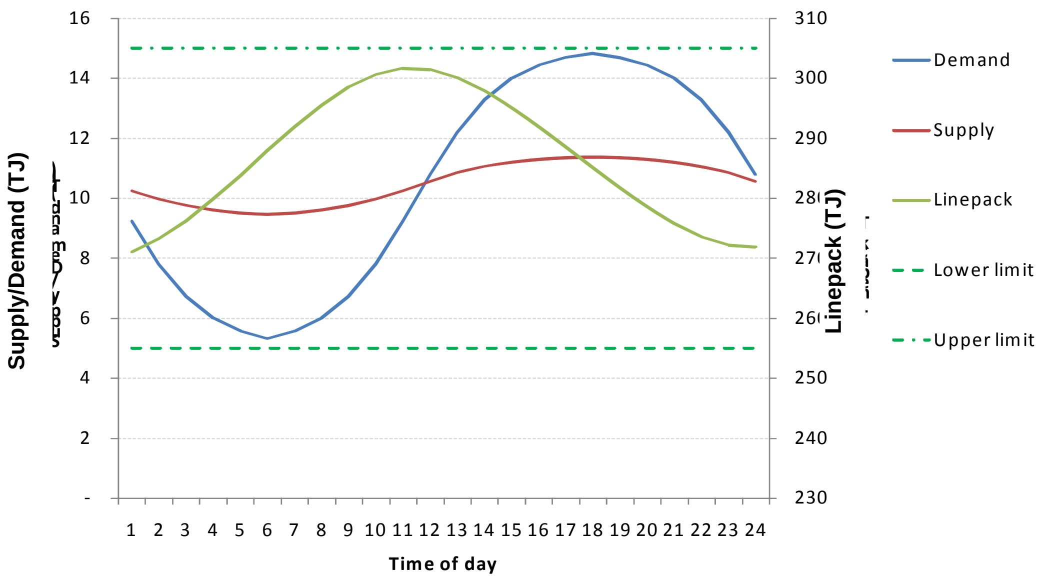


[1] The Maui operator has discretion over when and whether to release the contingency linepack.
[2] For further detail see presentation entitled 'Industry Forum #2 - Pipeline Flexibility' available at https://www.oatis.co.nz/Ngc.Oatis.UI.Web.Internet/Common/Publications.aspx

2.3 Daily Linepack Variations

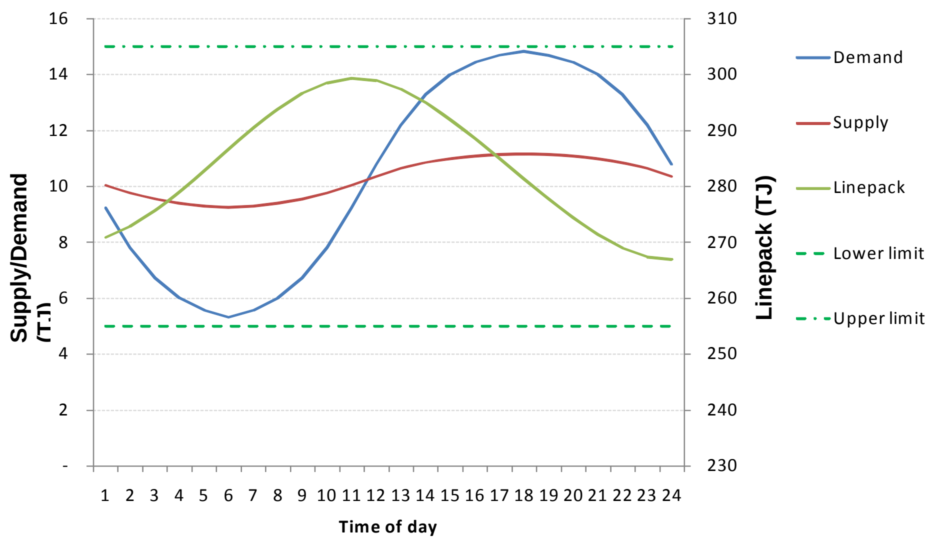
Differences between real-time injection and offtake levels will inevitably occur during the day due to a mismatch between supply and demand profiles. Typically demand will cycle throughout the day, whereas production will exhibit a flatter profile. However, provided the total daily demand equals total daily production, pressure at the end of the day will end up back at the same level at which it started and the pipeline will have stayed in balance. This is illustrated in Figure 2.

Figure 2 – Illustration of end-of-day linepack matching start-of-day linepack



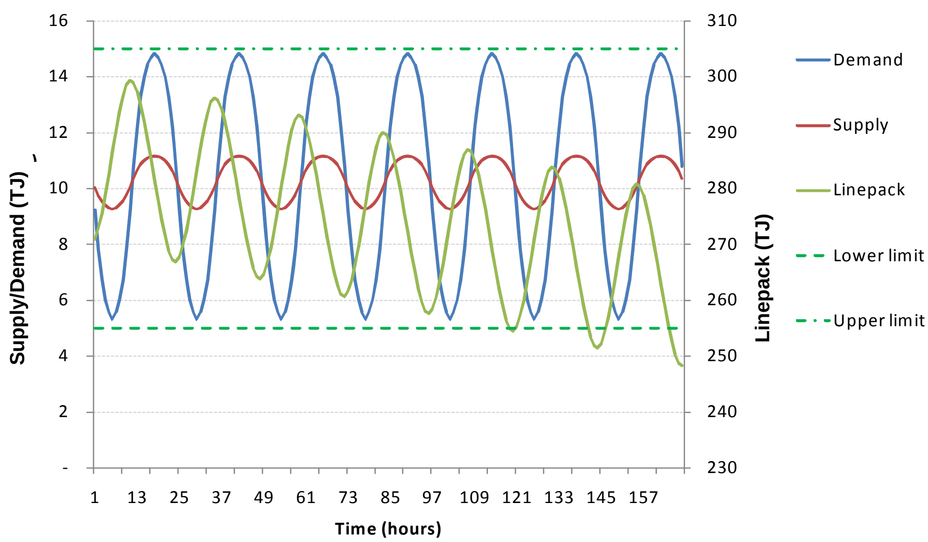
However, there are inherent difficulties with accurately forecasting the amount of gas that will be consumed on a given day. If demand was greater than expected, then at the end of the day, linepack will be lower than where it started, as illustrated in Figure 3:

Figure 3 – Illustration of end-of-day linepack being less than start-of-day linepack



If repeated forecasting errors were to continue over several days then, left unchecked, the variations between supply and demand can accumulate to the extent that the pipeline will reach its upper or lower linepack limit as illustrated in the following graphic:

Figure 4 – Illustration of compounding loss of linepack over a week



Balancing is needed to ensure that the pipeline is brought back into balance, both within a day, and across days[3].

[3] Balancing is a common feature of 'pooled' transportation systems such as those used in electricity, gas and water supply. In electricity supply it is referred to as 'frequency control' as electricity imbalances cause changes in mains frequency just as gas imbalances cause changes in linepack pressure. Electricity systems have very limited 'linepack', and so balancing actions take place on timescales of seconds and minutes, rather than hours and days.

2.4 Balancing Tools

Aggregate linepack can only be controlled by varying the level of injection or offtakes through:

- the purchase or sale of gas in addition to the scheduled gas flows (balancing gas);
- the sculpting of the input profile to more closely match demand variations;
- withdrawing gas from gas storage facilities at times of peak demand, or injecting gas into storage at times of low demand;
- the use of Operational Flow Orders (OFOs) to require parties to flow to nominations[4]; and
- demand or production curtailment.

Typically, balancing becomes increasingly heavy-handed as linepack approaches its operational limits. Limited or no balancing may be needed when linepack is in the middle of its operating range; OFOs and curtailment will be deployed when limits are reached.

2.5 Balancing Responsibility

Historically, in gas systems around the world, balancing actions were principally undertaken by a central body, typically a vertically integrated utility. Balancing was essentially a bundled and non-transparent element of the overall transmission service.

However, as systems have been liberalised, the function of balancing has been increasingly 'unbundled': ie performed and charged as a separate service to normal transportation. Unbundling allows users to be charged explicitly for the balancing costs that they create and, in so doing, encourage each user to reduce its individual imbalance by matching its injections to its offtakes. As a result, the aggregate level of imbalances, and the extent of balancing actions required, may be reduced.

Responsibility for balancing, therefore, is distributed. Each user has some responsibility to manage its own imbalances. A single, central body (a 'balancing agent') then has responsibility for managing the residual, aggregate imbalance.

2.6 Design of Balancing Arrangements

Balancing arrangements should be designed to minimise the total cost of balancing. However there is no single, agreed 'best practice' design to achieve this objective, since the design appropriate to a particular pipeline will depend upon both the physical characteristics of that pipeline (in particular, the level of linepack flexibility as a proportion of daily throughput) and the commercial arrangements for buying, selling and transporting gas on it.

[4] To date the use of OFOs on the Maui pipeline has not proved very effective. They have either been ignored or acted on very slowly. Where an OFO is issued and not acted on MDL may suspend injections or offtakes, but this extreme response is usually impractical.

3 Is there a case for Regulatory Intervention?

3.1 Market Failure

It is good regulatory practice to only intervene where there is a market failure: that is, where unregulated practices do not achieve, and are unlikely to achieve in the future, efficient outcomes. Even then, intervention should only occur where there is a net benefit: ie where the costs of the market failure exceed the costs of regulation.

There are a number of characteristics of the balancing 'market' which may make it susceptible to market failure. In particular:

- natural monopoly elements;
- vertical integration concerns; and
- externalities.

These are discussed in the following sections.

3.2 Natural Monopoly Elements

Residual balancing is provided by a pipeline owner. Although users can to some extent avoid using the service by self-balancing, there are economic and practical limitations on them doing this. Most users will need to use the residual balancing service to some degree.

For a market the size of New Zealand, gas transmission pipelines are to all intents and purposes natural monopolies: ie the economies of scale of gas pipelines are such that it is generally not possible (or efficient) for a 'new-entrant' pipeline provider to build a competing pipeline.

Without the discipline imposed by competition, a pipeline owner may provide an inefficient or overpriced balancing service.

3.3 Vertical Integration Concerns

The two TSOs in New Zealand (Vector and MDL) have affiliates who are pipeline users or who are active in upstream or downstream gas markets. A TSO may therefore have an opportunity to discriminate in favour of its user affiliates, thereby giving them an unfair advantage in competitive upstream and downstream markets.

The nature of such discrimination might take the form of:

- favouring affiliated sources of flexibility above more competitive alternatives;
- providing affiliates with more favourable commercial terms for transportation services (in this instance for the provision of residual balancing services), and/or
- information asymmetry, whereby the pipeline arm gives access to information to its upstream or downstream affiliates that is not available to other market participants.

3.4 Externalities

Balancing actions by any party – balancing agent or user – affect the level of linepack and therefore affect all other users. Such indirect effects are known as externalities. Externalities often cause market failure, because bilateral agreements between buyer and seller will generally fail to take account of the costs or benefits to third-parties. Given the opportunity, a user may 'free ride' by not contributing to balancing but nevertheless enjoying the benefits of a managed linepack provided by other parties' balancing actions.

Because of the 'common pool' features of balancing, and the extreme consequences of failure (users may suffer curtailment and pipeline operation may become unsafe), all parties must agree to common balancing arrangements. However, reaching such agreement is difficult. Each party will seek to 'free ride' by minimising its share of obligations.

Whilst the monopoly power of a Transmission System Owner (TSO) may allow it to impose an agreement, it will similarly design such an agreement in pursuit of its own interests. Where such an agreement provides that all balancing costs are passed to users, the TSO may have limited incentive to ensure that balancing costs are minimised.

3.5 Evidence of Market Failure

The above points are theoretical indicators of potential market failure and do not in themselves demonstrate such failure. However, some evidence of market failure has been documented in previous Gas Industry Co discussion papers and other industry documents[5]. For completeness the current situation is also reviewed in Chapter 6.

Evidence of the failure of the balancing market is seen where balancing costs:

- are socialised rather than being charged to users who caused the costs to be incurred (causers), thus lessening the incentive on individual users to efficiently manage their balance positions;
- are misdirected to parties who have not caused the costs to be incurred;

[5] See the various 'Industry Overpressure Forum' documents at https://www.oatis.co.nz/Ngc.Oatis.UI.Web.Internet/Common/Publications.aspx

- are higher than they need be, possibly because of more balancing actions being taken than are necessary, or because not all market flexibility is offered for use; and/or
- do not reflect underlying economic costs, for example where ‘free’ balancing has been provided from Maui thereby discouraging investment in flexibility and causing inefficient dispatch of available flexibility.

Some possible evidence of market failure includes:

- generally poor user nominations requiring pipeline operators to take balancing actions almost on a daily basis, suggesting that balancing costs may be higher than necessary;
- in April and May 2008, during which large quantities of gas (of the order of 0.5PJ in the two month period) were taken from the Maui pipeline in excess of nominations, suggesting free riding and prompting MDL to threaten to withdraw its balancing services;
- overpressure problems in the 2006 and 2007 summer seasons, causing high balancing costs to be imposed on ‘innocent’ parties; and
- in December 2007, MDL interpreted the MPOC in a way which allowed it to issue daily ILONs. Vector considered this to be a change to the MPOC which should have been made through the MPOC modification process. On this basis Vector disputed the validity of daily ILONs issued by MDL.

While this evidence strongly suggests that balancing is currently inefficient, and may require regulatory intervention, caution is warranted on two counts. First, to the extent that problems are caused by legacy Maui gas arrangements, these will disappear in time. Second, TSOs and users are fully aware of the problems and it is possible that they may agree to make the necessary changes without regulatory imposition.

Gas Industry Co does not discount this view, but notes that, despite industry efforts, there has been limited concrete progress to date.

3.6 Conclusions

Balancing has a number of economic characteristics which create theoretical concerns of market failure. This theory is reinforced by evidence of significant shortcomings in the existing balancing arrangements, and limited evidence that the industry will be able to voluntarily identify and agree ways to address these.

For these reasons, Gas Industry Co is concerned that the Gas Act objectives discussed in Section 4.2 may not be achievable without regulatory intervention to address balancing issues.

4 Evaluating balancing arrangements

4.1 Need for an Evaluation Framework

An evaluation framework is needed to assess and compare the desirability of alternative balancing arrangements – including the status quo. Such a framework is used in this paper to identify and categorise shortcomings with the existing arrangements. The framework will also be used in any later Options Paper to formally compare alternatives and identify a preferred way forward.

4.2 Gas Act and GPS Objectives

For Gas Industry Co, the starting point for developing an evaluation framework must be the objectives set out in the Gas Act 1992 (the Gas Act) and the Government Policy Statement on Gas Governance, published on 18 April 2008 (the GPS).

Gas Act objectives

Subpart 2 of Part 4A of the Gas Act provides for co-regulation of the gas industry by the Government and Gas Industry Co (as the approved industry body under 43ZL(1) of the Gas Act). Regulation-making powers relevant to balancing are set out in section 43F(2) of the Gas Act. The principle objective of Gas Industry Co in recommending gas governance regulations and rules under section 43F is to:

> '…ensure that gas is delivered to existing customers in a safe, efficient, and reliable manner.'

The other objectives are:

- 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;
- barriers to competition in the gas industry are minimised;
- incentives for investment in gas processing facilities, transmission, and distribution are maintained or enhanced;
- delivered gas costs and prices are subject to sustained downward pressure;

- risks relating to security of supply, including transport arrangements, are properly and efficiently managed by all parties; and
- consistency with the Government's gas safety regime is maintained.

GPS objectives and outcomes

The GPS sets out the objectives and outcomes that the Government wants Gas Industry Co to pursue in relation to the governance of the gas industry. The GPS is published pursuant to section 43ZO(3) of the Gas Act. Under section 43ZO(4), Gas Industry Co must have regard to those objectives and outcomes when making recommendations for gas governance regulations.

Paragraph 9 of the GPS requires Gas Industry Co to take account of fairness and environmental sustainability in all its recommendations. Paragraph 12 of the GPS adds five new general policy objectives for Gas Industry Co to apply to its recommendations as follows:

- energy and other resources used to deliver gas to consumers are used efficiently;
- competition is facilitated in upstream and downstream gas markets by minimising barriers to access to essential infrastructure to the long-term benefit of end users;
- the full costs of producing and transporting gas are signalled to consumers;
- the quality of gas services where those services include a trade-off between quality and price, as far as possible, reflect customers' preferences; and
- the gas sector contributes to achieving the Government's climate change objectives as set out in the New Zealand Energy Strategy, or any other document the Minister of Energy may specify from time to time, by minimising gas losses and promoting demand-side management and energy efficiency.

The GPS also sets out some outcomes which it expects Gas Industry Co to pursue. Those of relevance to balancing arrangements (to a greater or lesser extent) are:

- accurate, efficient and timely allocation and reconciliation of downstream gas quantities;
- an efficient market structure for the provision of gas metering, pipeline and energy services;
- the respective roles of gas metering, pipeline and gas retail participants are to be clearly understood;
- efficient arrangements for short-term trading of gas;
- accurate, efficient and timely arrangements for the allocation and reconciliation of upstream gas quantities;
- gas industry participants and new entrants are able to access the following physical assets and services:
  - third party gas processing facilities;
  - transmission pipelines; and

  - distribution pipelines;

  on reasonable terms and conditions;

- sound arrangements for the management of critical gas contingencies;
- good information is publically available on the performance and present state of the sector; and
- gas governance arrangements are supported by appropriate compliance and dispute resolution processes.

4.3 Adoption of ERGEG Balancing Principles

Gas Industry Co is considering using the balancing principles contained in the European Regulators Group for Electricity and Gas (ERGEG) 'Guidelines of Good Practice for Gas Balancing' as the basis for an evaluation framework. These principles were discussed in some detail in Gas Industry Co's Research Paper on Transmission Pipeline Balancing - April 2008. They are also discussed further below and presented in full in Appendix A.

There are several reasons for adopting the ERGEG principles.

Firstly, the underlying objectives of the ERGEG guidelines – which contain the principles – are to provide 'guidance on the design of gas balancing mechanisms' that deliver safe, secure, efficient, reliable, and fair' outcomes, are very similar to the Gas Act and GPS Objectives.

Secondly, we believe that the design principles for gas balancing arrangements are *generic*. That is, the same principles should apply to balancing on all gas pipelines, irrespective of the characteristics of the associated gas markets.

Thirdly, the ERGEG principles have been designed to be applicable to all gas pipelines in the EU, including some pipelines (eg in Portugal and in Eire) with similar characteristics to those in New Zealand.

Fourthly, the ERGEG has put in substantial effort over a number of years to develop these principles. We do not think it desirable that the New Zealand gas industry puts in a similar effort simply to 'reinvent the wheel'.

Finally, the principles are specific to gas balancing and so will be easier and more meaningful to apply than generic criteria of the kind contained in the Gas Act and GPS objectives.

4.4 Overview of the ERGEG principles and guidelines

The initial phase of the ERGEG process was to develop a series of principles, which were then used to develop the final guidelines. The full text of the principles is provided in Appendix A[6], but a high-level summary is provided below.

[6] Also available for download at:

Principle 1 - Balancing responsibilities

The primary responsibility for balancing should be with the users to balance their own inputs and offtakes; but the TSO will still retain the overall responsibility for the efficient operation of its system, and thus should retain a residual role to maintain physical balance.

Principle 2 - General requirements for balancing rules

Balancing rules should be designed in a fair, non-discriminatory and transparent manner, based on objective criteria and analysis.

Balancing rules should minimise the residual physical balancing role of the TSO subject to the safe and economic operation of the network, and they should facilitate competition and avoid undue barriers to entry.

Principle 3 – Frequency of balance

The choice of an appropriate balancing period needs to consider a number of objective criteria including:

- operational capabilities of the system;
- the flexibility and tools to balance that market participants have, including linepack;
- the interaction of gas balancing period with external commercial incentives to balance in other markets, in particular electricity;
- interactions with connected systems;
- availability of information for shippers;
- implementation and operational costs (eg IT costs and transactions costs); and
- compatibility with nomination procedures.

Daily balancing is preferred unless hourly balancing is needed for operational reasons.

Shippers should not be exposed to undue risks that they cannot manage or inefficient costs that create a barrier to entry. However, where it is not possible to provide appropriate information and access to flexibility within the balancing period, then the users risks should be mitigated in some way (eg tolerances or through imbalance charge limits).

Principle 4a - Balancing costs and incentives for the TSO

TSOs should have commercial incentives to ensure residual balancing actions are efficient.

TSOs should procure flexibility in a transparent and non-discriminatory manner using market based mechanisms where possible.

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http://www.energy-regulators.eu/portal/page/portal/EER_HOME/EER_CONSULT/ARCHIVE/GAS/GGP%20Balancing%202006,

Principle 4b - Charges for imbalances

Imbalance charges should not result in a distortion of competition and/or trading in wholesale, storage and flexibility markets.

Imbalance charges shall be, as far as possible, cost-reflective, whilst providing appropriate incentives on network users to balance their position such that, in aggregate, the participants face strong incentives to physically balance the system in an efficient way.

Balancing and operation costs should be charged to causers. Any costs that can't be targeted to causers should be allocated back to users in a non-discriminatory manner.

Principle 4c – Trading of imbalance positions

Where flexibility tools, information, or a well functioning/liquid within-day market are not available, then other mechanisms should be introduced to allow users to manage their positions including ex-ante trading, pooling of imbalance positions, and ex-post trading.

Principle 5 – Tolerance services

Tolerance levels weaken balancing incentives and should only be used where access to flexibility or information is such that risk mitigation is necessary to ensure that barriers to entry and competition are not created.

As markets develop it should be possible to reduce (and minimise) the size of tolerance levels.

Where offered, tolerance levels should reflect the technical capabilities of the transmission system, but arrangements should avoid situations where users cause balancing costs that are subsequently socialised.

The secondary trading of tolerances should be facilitated by TSOs.

Principle 6 – Information and transparency

TSOs shall provide sufficient, well-timed and reliable on-line information on the balancing status of network users, reflecting the level of information available to the TSO.

Information should be provided to all participants in a format which is meaningful, quantitatively clear, and easily accessible.

Where necessary TSOs shall use provisional allocations in the calculation of imbalance charges to reduce the risk for shippers.

Principle 7 – Harmonisation of balancing rules

TSOs should ensure compatibility of balancing regimes to facilitate gas trade across different TSO systems.

TSOs shall endeavour to harmonise balancing regimes and streamline structures and levels of balancing charges in order to facilitate trade.

Principle 8 – Provision of flexibility

A balancing regime needs to provide an appropriate balance of risk and incentive for market participants to manage their imbalance positions to avoid barriers to entry and competition.

Flexibility services and tools should be made available on a non-discriminatory basis reflecting the underlying technical characteristics of the transmission system.

Market participants should have access to appropriate flexibility tools (including the associated information) to manage their risks efficiently (eg provision of linepack on an unbundled basis).

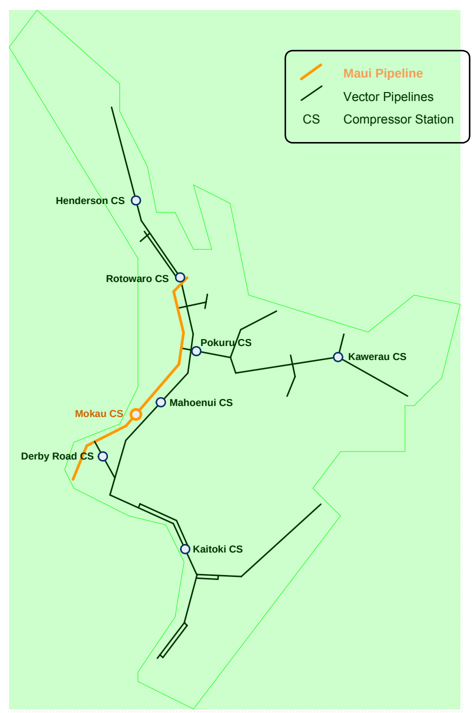
Question 1: Do you agree that the ERGEG guidelines are appropriate to use as a framework to evaluate alternative balancing market design options for New Zealand? If not, which of the principles do you think are not appropriate and why?

5 Existing Situation

5.1 Physical and Ownership Context

The original transmission system in New Zealand was constructed by NGC (now Vector) in the late 1960's to take modest quantities of Kapuni gas in Taranaki north to Auckland and south to Wellington, using 200mm diameter pipelines. The much larger 750/860mm diameter Maui pipeline was constructed in the late 1970's to carry Maui gas to major new power stations in New Plymouth and Huntly, and also to provide additional gas to the NGC pipelines and on into the expanding reticulated sector. During the 1980s NGC extended its pipelines to Northland, Bay of Plenty and Hawkes Bay, and added a further 350mm pipeline from Huntly to Auckland.

Figure 5 – Schematic of Pipelines



Hence there are two gas transmission systems in New Zealand. The Maui system is owned by the Maui joint venture partners – Shell, Todd and OMV – who also have interests in other production facilities and, in the case of Todd, downstream gas retailing and infrastructure businesses. The Vector system is owned by Vector Gas Limited, who also owns the Kapuni Gas Treatment Plant, is a gas wholesaler, a gas retailer, and owns various downstream distribution networks. The Maui and Vector transmission systems are heavily interconnected.

The Maui field dominated the gas market for 25 years and is now in decline. More recently, other gas producers have also entered the market, with the Maui pipeline being opened to third party access ('open access') in 2005. The Vector system had previously opened for third party access in the mid-1990s when deregulation of the energy sector encouraged the unbundling of the gas utility companies served by its pipelines.

Currently all gas enters the transmission system in Taranaki. The Maui and Pohokura fields are the largest producers and are connected to the Maui pipeline. Other producers are connected to the Maui or Vector pipelines at various locations around Taranaki. The Maui and Vector systems are interconnected within Taranaki at the Frankley Road interchange.

The Maui pipeline dominates capacity north as far as Rotowaro (near Huntly), although the smaller Vector pipeline runs in parallel. The transmission pipelines north of Rotowaro, east into the Bay of Plenty and south of Taranaki are all part of the Vector system and are small pipelines relative to the Maui pipeline, typically in the 100 to 300mm diameter range.

The maximum allowable operating pressure of most of the Maui pipeline is 72.4 bar, but the laterals to the New Plymouth and Huntly power stations are only rated at 49.6 bar. The Huntly Power Station lateral is separated from the main Maui pipeline by a pressure control valve, but there no separation for the New Plymouth lateral. A consequence of this is that the effective maximium operating pressure of the Maui pipeline south of the Mokau compressor station is currently 49.6 bar.

A further constraint on the operating pressure of the Maui pipeline south of Mokau is clause 2.19 of the MPOC, which states that: 'For as long as MDL determines that Maui Gas is being injected into the Maui Pipeline at a significant rate the Target Taranaki Pressure shall be between 42 and 48 bar gauge, except as may be required as a result of a Contingency Event, Force Majeure Event or Maintenance.'

It is understood that producer compressors injecting gas into the pipeline in Taranaki are designed to inject gas within the 42 to 48 bar range. Any increase in the operating pressure would require the New Plymouth lateral to be pressure controlled as well as further investment in producer compressors.

The Maui system from Mokau north has a maximum operating pressure of 72.4 bar and a minimum delivery pressure of 30 bar, and most of the Maui linepack flexibility is in this section of pipeline. Increasing the achievable flexibility would require investment in the Mokau compressors.

The Vector systems connected to the Maui pipeline at Rotowaro (serving Vector's North pipeline, and Kapuni to Rotowaro pipeline), and Pokuru (serving Vector's Bay of Plenty pipeline, and Kapuni to Rotowaro pipeline)[7] all have maximum allowable working pressures of 86 bar, and Vector compresses gas as it enters the northern or Bay of Plenty systems.

Vector's other major interconnection with the Maui Pipeline is at Frankley Road, close to New Plymouth. Vector's Kapuni to Frankley Road pipeline has a maximum allowable operating

[7] There is also an interconnection station at Te Kowhai, which can serve Vector's Morrinsville pipeline, but since that pipeline is commonly supplied from Vector's Kapuni to Rotowaro pipeline, gas rarely flows through this station.

pressure of 66 bar, and the Frankley Road interconnection station has been engineered to permit bi-directional flow.

The Vector pipeline system is comprised of much smaller diameter pipes with correspondingly smaller linepack storage. This reduced linepack is offset by smaller gas flows, but there is a great deal of variability between the linepack flexibility of the pipelines. The Vector transmission system that connects the Maui pipeline to Auckland has very low linepack flexibility relative to the flow. Consequently, Vector uses the Maui pipeline flexibility to provide additional flexibility for gas flows to Auckland. The linepack that is stored within the different parts of the Vector system are effectively isolated from each other (for example, linepack in the Bay of Plenty system cannot be used to support the Rotowaro to Auckland pipeline).

Historically, balancing of gas pipelines has been relatively straight forward in New Zealand due to the size and relatively high flexibility of the Maui gas field, and the flexible Maui gas contract. Imbalance was effectively managed for users and the cost of this service bundled into the Maui gas price. The introduction of open access on the Maui pipeline theoretically exposed pipeline users to a daily balancing regime. However, because of the way in which the legacy Maui contract provisions had been accommodated into the MPOC, the regime was prevented from operating effectively.

There are a number of transformational factors occurring in New Zealand which are going to make balancing a lot more challenging in the future. These are:

- the end of the legacy Maui gas contract and its impact on the open access regime;
- the anticipated decline of flexible Maui supply, and its replacement with multiple fields with less physical and contractual supply flexibility;
- the anticipated emergence of unbundled[8] flexibility arrangements and
- the development of peaking gas-fired generation and gas storage. This is not just being driven by the need to meet periods of peak demand, but is also to act as balancing generation for increasing quantities of variable and unpredictable generation on the system, particularly wind. Gas balancing for variable generation will be challenging, as such, generation is hard to forecast, and may involve significantly larger gas flow swings than peak demand generation. These features may require such balancing arrangements to be ‘special’, ie compatible with, but not identical too, the standard balancing arrangements.

5.2 Pipeline Operators

Both Vector and MDL divide their pipeline management functions between three ‘operator’ roles. Broadly the roles encompass the following activities:

Commercial Operator (CO)

- negotiation and management of user contracts;

[8] ie where flexibility is purchased as a separate product and not bundled as an integral feature of an underlying gas supply arrangement.

- managing commercial transactions with users including the billing of transportation and balancing services;
- managing balancing gas purchasing arrangements;
- operation of the Incentives Pool (MDL), or Balancing and Peaking Pool (Vector); and
- issuing instructions to System Operator.

System Operator (SO)

- forecasting and scheduling gas flows; and
- data acquisition and title tracking.

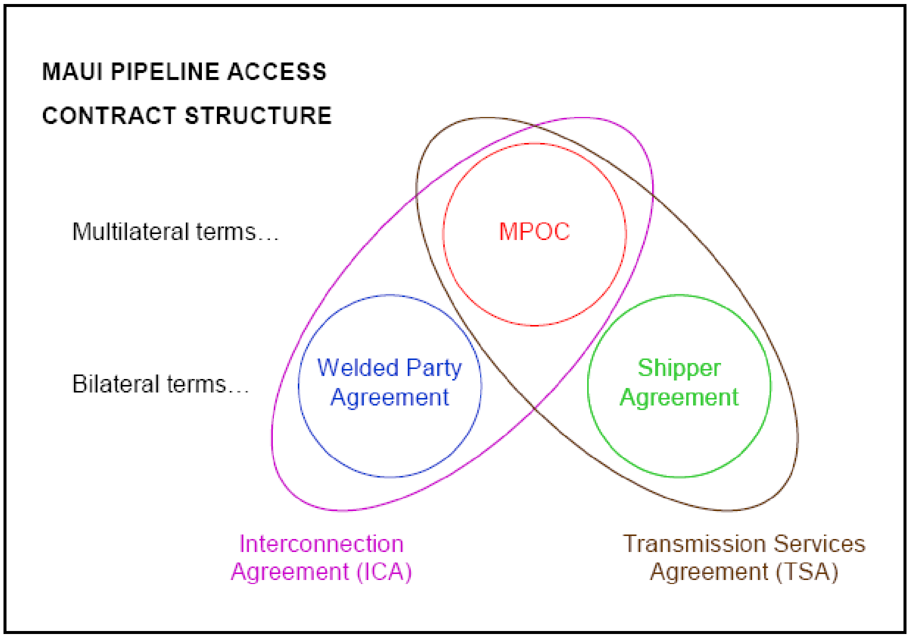
Technical Operator (TO)

- managing the physical operation of the pipelines ('gas control');
- modelling pipeline flows;
- scheduling pipeline maintenance; and
- setting technical standards.

Vector performs all three roles for its own pipelines in-house. MDL contracts Vector to perform its System and Technical Operator roles, and contracts Transact Limited to perform its Commercial Operator role.

5.3 Contractual Framework

Open access to the Maui pipeline commenced on 1 October 2005. The multilateral access arrangements, which apply to all system users, are set out in the Maui Pipeline Operating Code (MPOC). The bilateral terms, which are specific to individual users, are contained in welded party agreements and shipper agreements. The combination of the MPOC and a welded party agreement forms the entirety of an interconnected party's agreement and is known as an interconnection agreement. Similarly, the MPOC and shipper agreement combine to form a shipper's transmission services agreement. This arrangement is illustrated below.



Vector introduced its open access regime in 1997. Unlike the Maui arrangement, the multilateral and bilateral terms of transport on Vector's system were initially bundled together in a single document. However, in 2007 Vector and its shippers worked together to unbundle the multilateral terms of their agreements into a 'shipper code' known as the Vector Transmission Code (VTC). The VTC was introduced on 1 December 2007. Vector does not have a similar multilateral agreement that applies to parties physically interconnected to its pipeline system.

5.4 Overview of Current Balancing Arrangements

A narrative description of the broad operation of the MPOC and VTC regimes as they relate to pipeline balancing is provided below. Appendix A provides a more detailed description of the various clauses relating to balancing within the transmission codes.

Maui pipeline balancing arrangements

On the Maui pipeline, each shipper nominates in advance the quantities of gas it wishes to receive and deliver. Nominations must be balanced – meaning that the sum of offtake flows must match their sum of injection flows. This is the primary obligation on shippers to balance and is enforced by the OATIS information system.

Provisional nominations are provided one week in advance and can be changed up to 2pm[9] on the day prior to flow, with values finalised at 6pm on that day. Four intraday cycles are provided on the day of flow for amending nominations, with some restrictions[10].

[9] The 2pm deadline is currently being changed to 4pm.
[10] Essentially only the future portion of a day's approved nomination is able to be changed and retrospective adjustment excluded (other than legacy gas).

The aggregate of all shippers' nominations at a particular receipt or delivery point (a welded point) becomes the scheduled quantity agreed between MDL and the welded party (ie not the individual shippers). Vector is the welded party at locations where its pipelines interconnect with the Maui pipeline. The other welded parties are the producers directly connected to the Maui pipeline, and a few large users including the New Plymouth and Huntly Power Stations, and Methanex.

The difference between the scheduled quantity and the actual quantity of gas measured flowing through a welded point on a day is known as the daily operational imbalance (OI). On any given day the sum of all daily OI should equal the overall change in linepack[11].

Running operational imbalance (ROI) is the aggregate of daily OI over time and represents the total gas borrowed from, or parked in, the Maui pipeline.

Each welded party has an obligation on each day to inject or off-take a quantity of gas equivalent to its Scheduled Quantity (although the MPOC also acknowledges that this may not be achieved). Each welded party is also obliged to use reasonable endeavours to manage flow so that its ROI at each point 'tends towards zero over a reasonable period of time'. These are the primary obligations on welded parties to balance.

MDL has an obligation to act as a reasonable and prudent operator to maintain sufficient total linepack necessary to deliver approved nominations, to provide capacity consistent with its capacity forecast, and to provide the posted flexibility limits. MDL also has an obligation to make gas available for offtake at greater than 30 bar. These obligations define the current residual balancing role.

As nominations must be balanced[12], the main source of imbalance on the Maui pipeline occurs where the quantity of gas flowed through a welded point is different to the scheduled quantity. The incentive on welded parties to keep in balance derives from two commercial arrangements within the MPOC related to balancing: a long-run imbalance regime, and a liquidated damages regime.

Maui pipeline long-run imbalance regime

If a welded party's ROI exceeds tolerance levels (currently set at the daily OI tolerance levels), MDL may notify the welded party to return or take away the excess gas within a defined timeframe by issuing an Imbalance Limit Overrun Notice (ILON). The defined timeframe can be between one day and a week, although typically MDL has been requiring timeframes of one day.

MDL has the option to enforce this by buying or selling the imbalance ('cashing-out'), to the extent the user does not comply with the notice within the specified timeframe.

[11] Except for second order features such as unaccounted for gas (UFG).
[12] Other than after a contingency event where contingency linepack has been released, where shippers can end up with unbalanced nominations.

The cash-out price is required to reflect MDL's Balancing Agent's costs of buying and selling balancing gas.

Cash-out prices were originally set at $3.50/GJ for positive imbalance and $15/GJ for negative imbalance. These have been revised and are currently set at $1/GJ and $6/GJ respectively. Such levels were expected to be reasonable estimates of the costs of going long or short of gas. However, at times, the $6/GJ 'penalty' for taking too much gas out of the pipeline may actually be a discount to what users would likely have to pay for spot gas.

Another factor influencing the operation of the cash-out regime is that ILONs cannot be issued where legacy gas has flowed through a welded point. This has been the source of considerable confusion and dispute, and has the effect of removing the effectiveness of the incentive. On 20 June 2008, Gas Industry Co received a request from MDL to consider and make a recommendation in respect of proposed changes to the MPOC which would effectively remove the legacy provisions. It is expected that, following consultation, Gas Industry Co will make a recommendation to MDL on this matter before the end of November 2008.

To date, increasing or decreasing output from the Maui field has been the sole source of flexibility called upon by MDL. However, it is understood that MDL is seeking a more diversified portfolio of balancing arrangements.

It is anticipated within the MPOC that if a liquid gas market develops, the cash-out prices will reflect the buy and sell spot prices in that market. But MDL is also required to give welded parties seven days notice of any change to the cash-out price. This would severely restrict the ability of MDL to use short term markets or on-the-day gas prices.

During certain circumstances (such as unscheduled maintenance, a contingency event, or a force majeure event) nominated quantities may be curtailed and MDL may release gas from linepack to cover the market during the event. This quantity would then manifest as shipper mismatch, and shippers are then responsible to return the gas. This is the only way Maui shippers can be put into unbalanced positions.

During contingencies, MDL can issue an OFO to a shipper or welded party to flow gas at a particularly level. This tool can be used to prevent an emergency, or to prevent one welded point that is outside its tolerances from affecting MDL's ability to deliver to, or take receipt from, another welded point.

Welded parties have the ability to manage their ROI through title trading of imbalance positions with other parties. For example, if Party A has a 5 TJ negative imbalance, and Party B has a 3 TJ positive imbalance, they can trade such that Party B clears its imbalance, and Party A is left with a 2 TJ negative imbalance. However, if both parties have negative imbalances they are prevented from trading such that one of the parties agrees to take on the combined imbalance of both parties. It should also be noted that trading imbalance between Vector welded points is problematic since the Vector shippers responsible for the imbalance at one welded point could be different from those at another welded point.

Maui pipeline liquidated damages regime

The Liquidated Damages regime provides compensation to parties damaged by the actions of others.

This regime applies to welded parties that breach the daily or hourly limits (tolerances)[13], or are damaged as a result of such breaches. Daily and hourly (peaking) tolerances provide a 'safe harbour' from potential damage claims for welded parties who stay within them. If a welded party breaches a tolerance, it will be liable to pay liquidated damages into the incentives pool, but only if:

- the pipeline operator has used balancing gas to manage the excess imbalance, in which case it recovers the costs from the incentives pool; or
- another user is actually damaged (egwhere a welded party's off-take entitlement is wholly or partly curtailed), in which case it can claim liquidated damages from the incentives pool.

The level of liquidated damages is set at the maximum of:

- the cash-out price used in the long-run imbalance regime (although it is not a cash-out because the imbalance position is not bought or sold); and
- an index to the electricity spot price (to prevent perverse incentives for generators). However, the electricity spot price provisions only take effect if users are damaged.

The Maui imbalance regime only applies to negative daily imbalance and high hourly flows and therefore does not apply well to high pressure situations[14], thereby distorting users' incentives not to cause positive imbalance situations.

Where multiple shippers use a welded point, the causer of a breach at that WP may not be determined until a month-end reconciliation has been completed. This is the case at the Vector welded points. Vector operates separate cost allocation pools, known as Balancing and Peaking Pools (BPPs) (see description of Vector regime below), to allocate the payments and compensation to shippers, effectively passing through their commercial position to the shippers (but only to the extent that each shipper is found to be responsible for, or is damaged by, an imbalance).

Maui legacy gas

The Maui Gas Contracts will expire when legacy gas entitlements are exhausted or on 27 June 2009, if they are not exhausted before then. They are therefore not considered in the discussion of future balancing arrangements. However, the effect that Maui Legacy gas has had on

[13] Daily tolerances, as a percentage of scheduled quantities, were initially set based on 10% for mass market consumers, and 3% for consumers with controllable load. The aggregate tolerance for a welded point (and associated welded party) is based on the weighted average of the consumers associated with that point. These daily tolerances are one-sided and only apply to imbalances that deplete linepack.
Hourly tolerances, known as peaking limits, are set as a percentage above an equivalent flat within-day profile for a given scheduled daily quantity. They are set at 125% for delivery (offtake) points, and 150% for receipt (injection) points.

[14] Other than potentially for high hourly flows from producers exceeding peaking limits

balancing arrangements since the commencement of Open Access provides some important insights.

The MPOC provides for shippers of Maui Legacy gas to retrospectively adjust their nominations (up to certain limits) at the month's end. Legacy gas is exempt from the incentives pool and an ILON cannot be issued during the month for any welded point where legacy gas has been delivered. Calculation of imbalance and peaking, and the associated incentive pool debits, is performed after the legacy gas re-nominations have been made.

These provisions for Maui Legacy gas have a profound impact on the balancing regime. During a month, the uncertainty caused by Maui Legacy gas flow exposes the TSO to the risk that balancing costs incurred may not be recoverable via the cash-out mechanism. This reduces the effectiveness of the ILON process, and the incentive on users to balance.

Vector pipeline balancing arrangements

Vector's balancing arrangements are substantially influenced by the introduction of Maui pipeline open access and, in particular, the introduction of OBAs. On the Vector pipeline, shippers, not welded parties, have the contractual responsibility to maintain a balanced position.

Also, unlike Maui, shippers are generally not required to make nominations (the exception being for certain large users), but are required to use reasonable endeavours to maintain a balanced position. This is the primary obligation to balance.

Shippers reserve capacity on the Vector pipeline and may face overrun fees for any day where they exceed their reserved capacity. Vector also sets hourly peaking limits but these limits are only used as a trigger for possible forced curtailment. Where the Vector pipeline connects to the Maui pipeline, the Maui welded point tolerances are effectively applied to the aggregated shipper flows through that welded point.

Vector needs to manage both its imbalance at the connections to the Maui pipeline and the linepack levels in the Vector system. If Vector needs to increase linepack on its own pipeline, it can buy balancing gas, or draw on the Maui system and increase the negative imbalance at that welded point. This latter action may result in the need for the Maui pipeline to purchase balancing gas to manage its linepack. In either case, the Vector imbalance will be reflected as Vector shipper mismatch.

If Vector buys or sells balancing gas, it will do so by means of a tender process if time allows. A request for tender is issued to shippers and other relevant gas industry members with the offer prices and volumes being posted on OATIS. If Vector accepts one or more tenders, it must select the best price (the lowest price for a purchase and the highest price for a sale). The cost of the balancing gas is passed through to the relevant shippers via the Balancing and Peaking Pool (BPP) based on shipper mismatch position.

Vector uses five BPP balancing zones to allocate costs or revenues, and associated gas title, from balancing gas purchases and sales to responsible shippers. There is one major Maui welded point per BPP (except for the small delivery points which are a special case), and costs are allocated in proportion to each shipper's contributing running mismatch balance.

As well as allocating Vector's balancing costs/revenues, the BPPs are used to allocate costs/revenues arising from the Maui incentive pool. For example, a Vector shipper who cannot uplift its gas due to the actions of other shippers can claim for liquidated damages at the Maui damages price and receive any Maui contribution via the Maui incentives pool and from other contributing Vector shippers in proportion to their contribution to the imbalance.

Processes for calculating receipts, deliveries, imbalance and mismatch

Receipts

At each month end, the daily allocations to each shipper are calculated. Upstream receipts are calculated in accordance with the provisions of gas sales agreements and, where gas is traded, the Gas Transfer Code (or Schedule 6 of the Vector Transmission Code[15]).

While this process is currently performed monthly, it could be performed daily for all receipt points except Kapuni. Receipts at Kapuni are determined by summing downstream deliveries, which require allocation data which can only be calculated after the end of each month.

Deliveries

Large consumers such as power stations and industrial loads constantly monitor gas flows and record meter readings hourly, but residential and many commercial consumer meters are only read monthly or bi-monthly and daily consumption is inferred using algorithms prescribed in the Reconciliation Code[16]. The Reconciliation Code will be replaced on 1 October 2008 by the Gas (Downstream Reconciliation) Rules 2008. The downstream reconciliation processes are only conducted after the end of each month.

Imbalance

Although 'imbalance' is loosely used to mean differences between flows into a pipeline and flows out of a pipeline, Operational Imbalance (OI) has a more specific meaning in the context of the Maui pipeline. The MPOC defines OI as being the difference between the actual quantity of gas that flowed through a welded point on a day and the scheduled quantity for that Day.

Although OATIS calculates operational imbalances daily, the OIs at points where legacy gas is taken are currently subject to an adjustment after the end of the month. Once the legacy arrangements are removed from the MPOC, this month end revision will no longer be required, and OI will mostly be known on the day after gas flow.

[15] Each shipper's receipts onto the Vector transmission system is calculated by a Gas Transfer Agent in accordance with the terms of a Gas Transfer Agreement, the requirements for which are set out in Scuedule 6 of the VTC. The requirements substantially match those of the Gas Transfer Code.

[16] Broadly this involves the allocation of the residual gate profile (ie after subtracting time-of-use metered usage) across non time-of-use demand.

Mismatch
A mismatch is the difference between a shipper's receipts and deliveries. Once each shipper's daily receipts and deliveries have been determined, shipper daily mismatch positions can be determined, and these are used to allocate costs or credits arising from the Maui incentive pool and Vector BPP.

Since shippers on the Maui pipeline are required to submit balanced receipt and delivery nominations, there are only a few special circumstances (such as interruption) which can give rise to a mismatch. Furthermore, since a shipper's mismatch is the difference between that shipper's receipt and delivery nominations, no gas flow data is required to calculate it.

In contrast, a shipper's mismatch on the Vector pipeline is the difference between that shipper's allocated receipts and allocated deliveries. Where a Vector shipper is delivering gas to a dedicated delivery point, the allocated delivery quantity will be the metered quantity, so that shipper will generally be aware of its mismatch position each day. However, for a shipper delivering gas to the mass market, delivery allocations are only calculated after the end of the month, so that shipper will be much less certain of what its mismatch position is on a day to day basis.

During the month, the mass market demand is difficult to predict and is influenced by weather conditions. The aggregate uncertainty in mass market allocations during a month can exceed linepack flexibility and would result in balancing gas transactions that are incurred on behalf of the sector but only allocated at a later date such as month end. The optimum balance between this market sector investing in more sophisticated metering and/or allocation arrangements rather than relying on balancing gas will be determined by the price premium of balancing (through the BPP) and the ability of the user to manage or hedge this risk.

6 Issues with current balancing arrangements

6.1 Overview

The current set of gas balancing arrangements has been assessed in two ways:

- Gas Industry Co compared the current arrangements against the ERGEG, Guidelines for Good Practice for Gas Balancing, principles to identify areas where there may be potential gaps or inconsistencies, and published the results in a research paper[17]; and
- the TPBAG has looked at the arrangements from the perspective of users and providers of gas balancing services in New Zealand. The Group used its knowledge and expertise (with input from Gas Industry Co and an adviser) to identify key problem areas and issues.

In each process, issues arising as a direct consequence of legacy arrangements were discounted, since these should disappear in the medium term.

6.2 Review against ERGEG Principles

In reviewing the current balancing arrangements against the ERGEG principles, Gas Industry Co's April 2008 Transmission Pipeline Balancing research paper found that the main issues were as set out below.

1. **Inability to Reform**: Previous approaches to addressing pipeline balancing concerns have not been successful, and TSOs seem to be unable to resolve the issues.
2. **Insufficient User Incentives**: Although the MPOC and VTC both place obligations on users to maintain balanced positions, these obligations are weak when compared to European practice.
3. **Asymmetric Incentives**: Users are charged sufficiently for positive imbalances and are not compensated for damage associated with overpressure;
4. **Insufficient TSO incentive**: The incentives on the TSOs to use the most efficient balancing arrangements appear to be weak.
5. **Poor transparency**: There may not be sufficient transparency of balancing transactions.

[17] http://www.gasindustry.co.nz/Downloads/Documents/Publications_Presentations/Transmission_Pipeline_Balancing.pdf

6. **Competing Balancing agents:** There appears to be potential for the two TSOs to individually take balancing actions which would be sub-optimal from a total system perspective.

7. **Pricing Lag:** The delay required in the MPOC between posting prices on OATIS and buying or selling balancing gas is likely to prevent cash-out prices from accurately reflecting costs.

8. **Multi-day Balancing Period:** The MPOC arrangements allow a user to correct its position within the ILON period, although balancing action may be required before this.

9. **Allocation of fixed costs:** There is the potential for the cost of any fixed price component of a balancing contract to be socialised in both the Vector and MDL regimes. Welded Party obligations: the commercial obligations on Vector as a welded party may not be compatible with the most efficient balancing arrangements.

6.3 TPBAG Assessment

The TPBAG identified 12 main issues that were seen as actual or potential problems. Its focus was on the mechanics of the balancing arrangement rather than its governance (eg how changes are agreed). The TPBAG also contrasted the existing situation with 'desired outcomes'.

The issues are as follows:

The recovery of balancing costs is not efficient

Issue: The inherent slowness of the ILON processes mean costs may not go directly to causers and incentives on users to self balance are weakened. In particular, ILONs are issued on the day following an excess imbalance, and generally allow a further day to correct the position. In the meantime, TSO balancing actions could have been taken as a result of the excess imbalance, the costs of which would be socialised.[18] Also, since nominations to correct imbalance positions are not distinguished from other nominations, the system operator is not well placed to forecast gas flows, and may take unnecessary balancing actions as a result. Again, the costs of such actions would be socialised. Risks are therefore not with the users best able to manage them.

Desired outcome: Users should receive the full costs of balancing action resulting from their behaviour to allow efficient investments in information and business systems to be made. Any balancing cost needs to go to the causer of the cost, ideally in a back-to-back transaction at the time the cost is committed to. However, it was recognised that an exact match will not always be practical.

Balancing roles are unclear

Issue: The scope of the residual balancing role and the level of security of supply required are not clear. This leads to uncertainty and the potential for inefficient outcomes.

[18] In fact two balancing actions may have been necessary; one to accommodate the original excess imbalance, and another to accommodate the user correcting that imbalance position.

Desired Outcome: The scope of the residual balancing role of each TSO must be clear including establishing the level of security of supply to be provided.

Compensation for damages is not comprehensive

Issue: The incentives pool only applies where an over-take or under-injection of gas causes damage. However, damage can also arise where under-take or over-injection causes pipeline pressures to rise to the point where one or more producers may be shut-in and forced into imbalance. Therefore not all users have access to compensation for damages. The result is that costs do not go to causers and incentives are weakened. This is inefficient.

Desired Outcome: The incentives pool needs to be comprehensive.

Mass market allocations are delayed

Issue: Mass market allocations are delayed until the end of month. In the face of limited information, individual users may make inefficient balancing decisions during the month. The aggregate of such user balancing actions may lead to increased residual balancing actions being taken.

Desired Outcome: As with other imbalances, the mass market imbalance needs to be managed. Either this can be done by individual users each managing its own position. Or, if mechanisms are not available to allow for this, or where it is not cost effective to use such mechanisms, the risk should be managed by a single entity charged with that responsibility.

Poor incentives

Issue: The incentives on Maui Welded Parties to maintain balanced positions are weak due to the inherent slowness of the ILON issuing process (discussed in item 1), and the slow response of cash-out prices to market conditions (the seven day notice requirement).

The incentives on Vector shippers to maintain balanced positions are also weak since Vector has largely relied on balancing provided from Maui pipeline imbalance, and therefore subject to the same weaknesses discussed above. This may lead to larger than ideal imbalance positions (that exceed linepack flexibility) and unnecessary residual balancing actions, and therefore is potentially inefficient.

Desired Outcome: Incentives must be sufficient to ensure efficient balancing of the market, ie to avoid unnecessary balancing actions but without leading to users being unable to manage their risks.

User balance positions are not transparent

Issue: Users do not know who is responsible for an imbalance. Some users believe there is merit in a ‘name and shame’ policy which would involve publishing user balance positions.

Desired Outcome: There must be a balance between protecting users' private information, and the rights of users to know who is causing balancing problems which put all users at risk.

Tolerances may not be efficient

Issue: On the Maui pipeline the diversity assumed when tolerance levels were first established are not always there in practice. For example, unexpected cold weather is likely to result in all nominations underestimating actual demand. In this scenario there is no diversity and, although all users may be within their individual tolerances, balancing actions may still be required.

On the Vector pipeline, Maui tolerance at each welded point is allocated to Vector shippers carrying gas from that point in proportion to their mismatch positions, ie how out of balance they are. There is no ability to redistribute tolerance to users who may value it more highly. These arrangements also raise efficiency concerns.

Another concern is that the allocation of tolerance between market segments may not be efficient[19]

Desired Outcome: A process is required to allow for the open and transparent review of the size and allocation of tolerances. Such a review would consider the issues around tolerance trading and whether tolerances could be removed should an effective balancing market emerge.

Weak compliance with and enforcement of OFOs

Issue: The MDL CO has reported instances where OFOs have been issued but not acted on. Section 2.24 of the MPOC entitles MDL to suspend injections or offtakes of Gas at a Welded Point (by whatever lawful means are available to it) to the extent and duration of any non-compliance of an OFO to protect the operational integrity of the Maui Pipeline or the wider New Zealand gas pipeline system. However, in practice such an extreme response is likely to prove impractical. In addition, the delay and cost associated with enforcing OFOs through legal action as a contract breach means that OFOs are not effective.

Desired Outcome: OFOs need to be easier and more cost-effective to enforce.

The MPOC does not define a mechanism for sourcing balancing gas

Issue: Processes for sourcing and disposing of balancing gas are not set out in the MPOC, but are addressed from time to time by MDL issuing instructions to its CO. User needs may not be adequately considered prior to such instructions being issued. Users therefore lack confidence in the balancing gas trading and price setting processes.

Although the VTC provides a clear process for sourcing balancing gas, it has so far mostly relied on balancing being provided from the Maui pipeline.

[19] Schedule 7 of the MPOC sets out peaking and DOIL tolerances which are greater for Welded Points serving the reticulated market.

Desired Outcome: Residual balancing gas procurement or disposal processes need to be open, transparent and market based, and open to all potential users and providers. These processes should be developed through a consultative process and meet the reasonable needs of users.

The regime may be too complex and costly

Issue: For such a small market the overall system may be overly complex and costly.

Desired Outcome: Ensure new system costs and benefits are considered.

A significant proportion of the market demand is uncontrolled

Issue: Because it is too costly to directly control or monitor the usage of many small and medium sized gas users, the balancing arrangements need to be flexible enough to accommodate some variability in this demand from forecast.

Desired Outcome: Ensure balancing arrangements allow users with uncontrolled demand to manage their position and risk to the extent practical.

Independent balancing of the Vector and Maui systems

Issue: Although in practice Vector has relied mostly on imbalance at Maui welded points to balance its pipelines (ie relied on Maui pipeline balancing), potentially the Maui and Vector pipelines could each provide residual balancing. However, it may be more efficient to manage both pipelines as a single entity. Duplication of the residual balancing roles mean users could be exposed to extra balancing processes with unnecessary duplication of costs and potential for conflicting balancing actions.

Desired Outcome: A single balancing agent across both transmission systems would help in achieving optimal residual balancing outcomes. This party needs to be ring fenced or ideally independent. However, appropriate governance of this agent would be required to ensure all stakeholder interests are served where efficient and the agent acts efficiently and effectively.

6.4 Consolidated Issues

There is a reasonable overlap between the two lists above, which provides some confidence that the ERGEG principles provide a reasonable evaluation framework. The ERGEG review did not identify high transaction costs as a concern, but perhaps transaction costs would be lower if the ERGEG principles were better complied with.

Conversely, the TPBAG assessment did not highlight inability to reform. However, this is perhaps unsurprising, given that the TPBAG is intended to be part of the reform process.

Based on the issues described in the previous two sections, Gas Industry Co believes that the main balancing issues are as follows.

1. **Poor governance**: existing balancing provisions are unclear or hard to enforce; it is hard to gain agreement on changes needed;
2. **Role of balancing agent unclear**: security of supply obligations on the balancing agent are unclear;
3. **Poor information on balancing status**: users - especially mass market retailers – have poor information on current imbalances;
4. **Multi-day balancing and pricing period**: whilst nominally one day, the balancing period extends over several days, due to ILON provisions and pricing lags;
5. **Poor transparency**: it is unclear to users how balancing costs are incurred and how prices to users are set;
6. **Poor allocation of positive imbalance costs**: charges to users for positive imbalances are much less than the costs that these imbalances create;
7. **Competing balancing agents**: there is potential for the two balancing agents to be in conflict and add to balancing costs and complexity;
8. **High transaction costs**: the complexity of balancing arrangements may give rise to unnecessarily high transaction costs; and
9. **Inappropriate tolerances**: tolerances may be too high in aggregate (compared with linepack limits) and not allocated to those who value them most.

Table 1 lists the nine consolidated issues and cross-tabulates them against the ERGEG principles.

Each of the issues in the Table is discussed in more detail in the following Section 7 within the context of option design elements.

Question 2: Are there key issues that are not identified in Chapter 6? How would you prioritize the Chapter 6 issues?

Table 1: Summary of issues identified by TPBAG and Gas Industry Co review against ERGEG principles

Issue from Consolidated List	ERGEG Principles									
	Principle 1 Balancing responsibility	**Principle 2 General requirements for rules**	**Principle 3 Frequency of balance**	**Principle 4a Balancing costs and incentives for the TSO**	**Principle 4b Charges for Imbalances**	**Principle 4c Trading of Imbalance Positions**	**Principle 5 Tolerance services**	**Principle 6 Information on balancing status**	**Principle 7 Harmonisation of balancing rules**	**Principle 8 Provision of flexibility**
Poor Governance		✓								
Role of Balancing Agent Unclear	✓			✓						
Poor information on balancing status								✓		
Multi-day Balancing and Pricing Period			✓							
Poor Transparency		✓		✓						
Poor Allocation of positive imbalance costs										
Competing Balancing Agents	✓			✓					✓	
High transaction costs		✓								
Inappropriate tolerances					✓		✓			✓

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7 Option Design Elements

7.1 Overview

The TPBAG has gone beyond just identifying balancing issues, by considering a range of different balancing arrangements as possible options to improve the current design. This work will form the basis of a subsequent options paper. Nevertheless, in preparation for developing that paper, we would be interested to receive comments on whether the right design elements are being considered and whether the analysis of those elements is valid. In some areas, the discussion or analysis may go beyond that undertaken by the TPBAG.

The design elements can be grouped into major types, and are listed in Table 2.

Table 2: Main design elements for gas balancing regime

Design element
Balancing responsibilities • Residual balancing role • Single balancing agent
Balancing zones
Balancing period
Incentives on pipeline users • Mechanism for procuring gas and determining prices • Liquidated damages • Imbalance prices • Pricing based on marginal or average costs • Trading and cash-out of imbalance positions • Treatment of tolerances
Information for pipeline users • Information on overall balancing conditions • Information on balancing prices • Information on users own imbalance positions • Information on other users' imbalance positions

Design element
Incentives on residual balancing agent • Potential conflicts of interest • Incentives to minimise costs • Nature of resources that can be procured
Harmonisation
Governance

7.2 Balancing responsibilities

Residual balancing role

Current arrangements in New Zealand (as in many overseas regimes) place the primary balancing responsibility on pipeline users. However, it is noted that a residual balancing role is already provided for in the current regimes where both Vector and MDL have obligations to manage linepack and maintain pressure.

During the TPBAG process, the question was raised about the extent to which any residual balancing role is required, and whether any residual role was needed at all. In particular, if users who caused an imbalance faced the costs of their actions, could reasonable balancing performance be assured without the need for any residual balancing role?

In principle, no residual balancing role is required if pipeline users face the full cost of their actions, and have the information and sufficient means to respond. However, *entirely* eliminating the residual role is likely to yield inefficient outcomes – or at the very least entail significant performance risk.

A prudent approach would be to recognise that market imperfections do exist, such as:

- the inherent on-the-day uncertainty as to which parties are causing an imbalance, thereby impacting on users' incentives to take action in real time;
- the difficulty some users (especially small parties) are likely to face in procuring balancing resources at very short notice; and
- possible delays in obtaining effective enforcement – meaning parties may not act sufficiently quickly. This delay is important given that that balancing is a 24 x 7 operation.

Given the above, it is likely that deviations beyond normal operating pressures could occur more frequently than if a residual balancing agent were performing a coordination role (ie ensuring that users face the full costs of their actions and have the information and sufficient means to respond to imbalance), and an intervention role (ie taking balancing gas put and call decisions, and issuing OFOs).

Lastly, the cost of any *actual* excursion beyond normal operating pressure could be high. Unless all those costs are recovered from the causers, some costs would end up being unrecovered or socialised. Such outcomes would be unlikely to meet the 'efficient' and 'fair' GPS outcomes test.

Accordingly there is a strong rationale for a residual balancing role. This is consistent with ERGEG Principle 1 - Balancing responsibilities – which states that '*the TSO will still retain the overall responsibility for the efficient operation of its system, and thus should retain a residual role to maintain physical balance'*.

However, a number of aspects of this design element require further definition. For example, the extent of the residual role (ie whether it should be just a coordinating role, or also an intervention role), what requirements for ring-fencing are appropriate, how to ensure that users face the cost of their actions, and how to ensure actions by the balancing agent are efficient. These issues are explored elsewhere in this chapter.

Single balancing agent

Assuming a residual balancing role, the question arises as to whether there should be a single balancing agent performing that role, or one balancing agent for the Maui pipeline and one for the Vector pipeline. Currently, on the Maui pipeline the residual balancing role is assigned to MDL's CO. On the Vector pipeline the balancing agent function is understood to be performed by the Vector CO[20].

Since both MDL and Vector have obligations to manage linepack they could both actively buy and sell balancing gas separately. Potentially this could lead to situations where:

- both pipelines could tender for the same need and even purchase balancing gas in conflict with each other;
- users may have to choose which balancing process to offer capacity without knowing which market will be cleared, losing the benefit of pooling scarce resource and losing the ability to hedge price risk;
- the lowest priced capacity might not be dispatched; and
- two processes need to be monitored and managed.

These outcomes would clearly be contrary to the Gas Act objectives.

Operationally the pipelines are tightly bound together. If both pipelines were owned by a single entity, there is no doubt that system linepack would be managed as a whole. The benefits of a single balancing agent performing the residual balancing role, compared with one agent for the Maui pipeline and one for the Vector pipeline, are:

- lower direct costs, such as;

[20] Although the separate operator roles have not been described in the VTC, we use the term CO here to describe that part of the Vecttor business responsible for commercial arrangements related to the operation of the open access regime.

- personnel;
- procurement (of balancing gas);

- no indirect costs arising from imperfect co-ordination, such as:
  - information costs; and
  - costs arising from conflicting or sub-optimal balancing actions;

Given separate ownership of the pipelines, the cost of introducing a single shared balancing agent would be:

- the costs of setting up, running and monitoring a joint balancing agent;
- possible additional agency costs where the interest of the agent do not perfectly align with those of the TSOs (however, to some degree agency costs already exist since Vector acts as MDL's TO and SO); and
- the cost of allocating the cost of balancing actions between the TSOs.

7.3 Balancing zones

A balancing zone is a set of pipelines within which gas injections and offtakes must be balanced. Physical balancing zones may be distinguished where one zone is physically isolated from other zones, or has different congestion considerations, or different gas specifications. Commercial balancing zones arise where the ownership or commercial obligations on users differ from one zone to another.

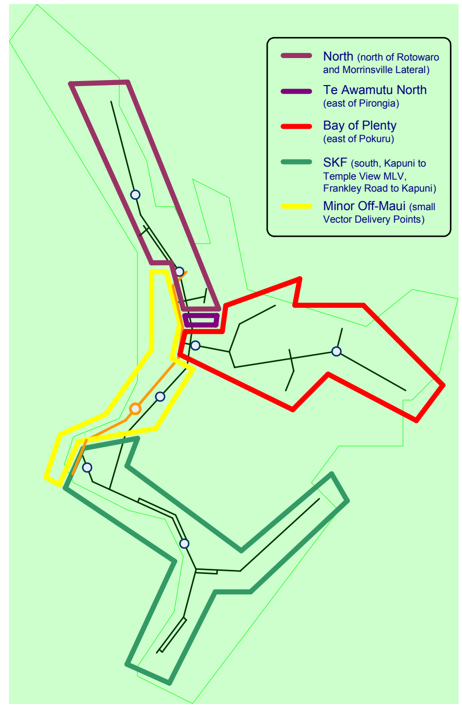
The New Zealand pipeline system can be treated as two physical balancing zones. The Maui pipeline and Vector's Kapuni to Frankley Road pipeline comprise one physical balancing zone because they both carry unodourised gas. All of Vectors other pipelines comprise the second balancing zone as they all carry gas which is odourised. Odourant is added to gas as it enters these pipelines.

At present, the existence of two physical zones is not a significant issue since gas supply tends to radiate outwards from the Maui pipeline. The unodourised gas is simply odourised as it enters the odourised pipelines, and this allows the system to be operated as if it were a single physical zone.

The benefit of operating pipelines without odourant is that petrochemical plants, which use the gas as feedstock, can operate without sulphur scrubbing facilities. The sulphur compounds present in odourant would otherwise contaminate chemical calalysts.

The New Zealand pipeline system is characterised by at least two commercial zones, because of the different ownership of the Maui and Vector pipelines, and their different access arrangements. This initial separation of the Maui pipeline then isolates the various Vector pipelines radiating from it. Thus, Vector has further subdivided into system into five BPPs, with shippers responsible for their balance positions in each pool separately. So it can be said that there are six commercial balancing zones in New Zealand, comprising the Maui pipeline and the five Vector BPPs.

Figure 6eline Balancing and Peaking Pools



It is interesting to speculate how the system might be different if both pipelines were owned by a single party with a single access regime. Quite conceivably it would then be possible to have a single commercial balancing zone.

This situation is also seen in Europe. For example, in France, where there are multiple TSOs, there are multiple balancing zones. In the UK, on the other hand, where there is a single TSO, and a single access regime, there is only one balancing zone.

The reason that the number of zones is considered to be an important design element is that more zones lead to more transaction costs and increased shipper risks, with a resultant reduction in market liquidity and competition.

7.4 Balancing Period

The choice of balancing period is a key design parameter. It involves a complex trade-off between achieving an economically 'pure' price signal to those parties who are causing an imbalance, and the costs associated with increased complexity. For example, even if there were significant within-day variation in balancing costs and the need for the balancing agent to take within-day balancing actions to manage diurnal swing, daily balancing might still be optimal compared to a shorter period if the transaction costs of managing a shorter period outweighed the loss of efficiency from socialising within-day balancing cost. In this context, one of the important cost considerations is the effect on gas market trading depth (ie liquidity) from increasing the number of balancing periods/locations. Given the inherently small size of the New Zealand market, further fragmentation would need to be carefully considered.

At present, both the Maui and Vector regimes specify a daily balancing period. In addition both regimes include some within-the-day profile limitations to manage excessive profiles while avoiding the costs of hourly balancing. Gas Industry Co is not aware of any analysis that suggests this choice is sub-optimal. This is consistent with many overseas regimes where the need for the balancing agent to take several within-day balancing actions is deemed not sufficiently frequent to move to within-day and/or sub-divided markets for the trading of balancing gas[21]. In such a situation, the costs of any within-day balancing actions are socialised to a certain extent rather than being targeted to causers.

Having said that, some aspects of the current arrangements appear inconsistent with a daily balancing period. In particular, under Maui arrangements, ILONs can only be issued based on the ROIL accrued on the day after the imbalance was caused, and parties are then given at least a day to rectify the situation before the balancing agent can act. This effectively extends balancing to a rolling 3 day period.

This appears inconsistent with the underlying design based on daily balancing and seems inconsistent with the level of linepack flexibility. The inconsistency arises from having tolerances that assume daily balancing but a design where there is not, in effect, daily balancing.

Looking further ahead, there may be value in reviewing the appropriateness of the balancing period. While any change could have significant costs and should not be considered lightly, the choice of balancing period has a direct effect on the level and incidence of balancing costs. There are also indirect effects on users. For example, a daily balancing period may not work for peaking power generation even if matched with gas production or storage.

Given these direct and indirect effects, it would be desirable to review the choice of balancing period and location against objective criteria at some future point, in particular if diurnal swings in demand become more marked requiring the balancing agent to take more frequent within-day balancing actions or significant constraints emerge on the network. However, such a review should not be treated as a priority issue, and indeed there would appear to be merit in accumulating some experience in a post-legacy environment before reviewing these issues.

7.5 Incentives on pipeline users

The pipeline access regimes in New Zealand (in common with other regimes) use price signals as the main mechanism to incentivise users to stay in balance and/or voluntarily go out of balance in a direction which would help the system at times of significant aggregate system imbalance. These incentives are currently provided by cash-out prices and the Daily Incentive Price which may be charged when parties are damaged as a result of the actions of others, and claim the liquidated damages provided by the Incentives Pool.

Getting these prices right is crucial. Indeed, Principle 4b of the ERGEG principles states '*Imbalance charges shall be cost-reflective to the extent possible such that, in aggregate, the participants face strong incentives to physically balance the system in an efficient way.*'

If imbalance prices are set too low, it is likely that there will be greater incidences of imbalance situations that may be more costly for a residual balancing agent to rectify than if users had self-

[21] In the British gas trading arrangements this is explicitly referred to as a 'gap' between the daily, single location nature of the wholesale market, and the need for the system operator to manage the system on a within-day and locational basis. The justification for this gap is to improve liquidity in the wholesale market.

balanced. Such outcomes would fail the 'efficient' leg of the GPS outcomes test, and may not lead to 'reliable' or 'fair' (to the extent that some of the imbalance costs are socialised).

If imbalance prices are set too high, it is likely that market participants will invest in an excessive amount of flexibility resource, and/or some gas users will be driven away from using gas altogether. Such outcomes would fail the GPS requirement for 'efficient' and (potentially) the 'fair' outcomes.

Some overseas regimes have penalty charges which are not reflective of costs but bring behavioural benefits. Examples include automatic fees for exceeding tolerance, even when there is no linepack problem at the time and therefore no underlying balancing cost.

Mechanism for procuring gas and determining prices

There are a number of mechanisms that could be used for procuring balancing resources and determining prices. These include:

- procurement of resources from an 'existing' market – for example a wholesale gas spot market (if it existed). The balancing agent would compete with other buyers and sellers for resource; and
- development of a 'dedicated' market by the residual balancing party – in which only the residual balancing agent would be able to accept offers/bids for balancing resource (for example ad hoc tenders called as needed or called regularly in advance in anticipation of need).

The result may be driven by the timeframes of the markets, for example a before-the-day market designed to allow users to manage nominations may be too early for balancing on-the-day and only suitable for managing long term linepack trends. In other words, if the reaction times to manage linepack are less than a day, then a dedicated market which clears at or after the close of nominations might be needed.

Within each of these options, there are many sub-variants. For example, tenders could be conducted for 'standing' resources (ie options), or only when resource is required.

The key requirements in each case are that:

- the mechanism is open – ie all credible resource providers can compete fairly to provide/dispose of gas in order to pool and make the most efficient use of the available resource;
- the mechanism does not inefficiently tie up flexibility in the market and thereby reduce the ability of users to self balance;
- users are able to manage price risk by either having the prices visible sufficiently ahead of time to manage their imbalance or by having mechanisms designed to allow price risk to be hedged; and
- prices reflect the costs incurred at the time balancing actions are taken (including any opportunity costs for resource providers) to ensure costs go to causers and that investment in resource and information is signalled.

Considerations in ensuring these principles work include:

- In order to maximise the available flexibility offered into a balancing process it would be beneficial if spare capacity not used in setting nominations can subsequently be offered to the balancing market
- In order to prevent tying up the market it would be beneficial if capacity was not locked in until as late as possible; and
- To the extent users are uncertain of their imbalance at the time they can participate in the balancing market and hedge their risk by receiving the same or better price in the market as they receive in any cash-out.

The existing Vector mechanism relies on periodic tenders and these may be adequate, at least in the near term. The Maui mechanism used to rely entirely on balancing provided by the Maui field but recent changes announced by MDL have made a distinction between 'operational' and 'secondary' balancing gas. Operational balancing gas is gas which is required at short notice, and will continue to be provided from the Maui field until alternative arrangements can be made. Secondary balancing gas would be nominated for at least one day ahead, and MDL is seeking put and call offers to supply this gas. In Gas Industry Co's view, this initiative is a step in the right direction towards ensuring contestable procurement of balancing gas.

Gas balancing costs will vary over time and volatility may become more pronounced in the future if gas supply is less flexible and/or demand is more volatile (especially if there is growth in peaking electricity generator demand). A shortcoming in the existing Maui arrangements is the requirement to notify imbalance charges at least seven days ahead of the time they will apply. In an environment where balancing costs don't vary significantly, this could be acceptable. However, this does not appear reasonable moving forward as the balancing agent inherently will be unable to know in advance the likely severity of an imbalance situation, and the consequent costs it will face to manage linepack. Accordingly, this requirement will frustrate the ability to provide price signals that are reflective of costs *at the time balancing resources are required.*

This suggests that consideration should be given to use market-based approaches in future, particularly if this can be achieved at relatively low cost through use of an existing mechanism (such as the platform being developed for spot wholesale trading).

Liquidated damages

Liquidated damages are currently used within the Maui and Vector regimes (called the Incentives Pool) and are payable by a party if its actions result in gas shortfall for another party, or the balancing agent has had to procure balancing gas to prevent a gas shortfall. With regards to the payment to 'injured' parties, the liquidated damages can be thought of as compensation which only applies if there is insufficient balancing gas to ensure that all legitimate gas flows occur as planned and one user therefore harms another user.

If balancing charges become more dynamic, this should help to minimise the likelihood of the balancing agent having to curtail legitimate flows[22] (if insufficient resources are voluntarily offered to a residual balancing agent). In particular, more dynamic pricing should encourage a greater range and depth of resources to be offered, including voluntary demand curtailment.

However, there is still a possibility that insufficient resources will be offered, and in that case, the balancing agent would presumably curtail innocent parties. In effect, this amounts to compulsory acquisition of a balancing resource, and some form of compensation is reasonable to the party who suffers a loss, payable by the party that caused it. This would be achieved by some form of liquidated damage provision.

However, any curtailment of demand (ie if there is under-pressure), is likely to fall within the ambit of the new gas contingency management arrangements. These arrangements provide for any parties that use gas for which they have no entitlement (because their supply was insufficient) to pay parties who suffer damages because their entitlement was 'diverted'. These provisions in effect provide an alternative liquidated damages and override and substitute for the MPOC Incentives Pool in a gas under-pressure situation.

The contingency management provisions do not apply in an over-pressure situation. Nor currently is there full recourse to liquidated damages under Maui arrangements in an over pressure situation. This could create perverse incentives if imbalance charges are insufficient to ensure self-balance. For this reason, some form of liquidated damages (or other incentive) would be desirable to address a situation where the balancing agent is unable to procure sufficient resources (in this case gas 'sinks') and a producer cannot inject its scheduled gas.

In short, Gas Industry Co's preliminary view is that the Incentives Pool arrangements should be reviewed to:

- work with any new balancing market or pricing mechanism to ensure there is no opportunity to arbitrage between imbalance charges and liquidated damages (For example, a party should not have an incentive to widen its imbalance position in the hope that this will reduce its costs because liquidated damages are lower than imbalance charges);
- review whether the Incentives Pool needs to apply in an under pressure situation, given that appropriate damage payments should arise through revised gas contingency management arrangements. (This review could occur after the new gas contingency management arrangements have been in place and proven effective); and
- institute a liquidated damages mechanism to address any over-pressure situations.

Imbalance prices

Residual balancing arrangements, such as those in Britain, cash-out users at different buy and sell prices. The intention is to provide stronger incentives on parties to self-balance, and to increase liquidity in the wholesale market as a result of users more actively managing their positions.

[22] This can occur through the issue of an OFO, curtailment of a Scheduled Quantity or by lack of pressure.

A further consideration is that the transactions that cash-out imbalances that support the system would be physically unnecessary, would increase the operational costs of the market, and may create additional unnecessary risks to users.

Pricing based on marginal or average costs

In order to take a balancing action, the residual balancing agent may have to call upon multiple sources of balancing gas, each with a different underlying cost. Imbalance prices could be charged to users based on the weighted average cost of all the different balancing gas sources used (assuming they are paid different amounts), or be based on the cost for the marginal unit. In this context, the marginal unit is the final resource required in that period – assuming resources are employed in merit order from least to highest cost.

If an average approach is used, the total money charged to out-of-balance users will exactly equal the amount paid to providers of balancing gas. Conversely, a marginal pricing approach may or may not result in a surplus of imbalance payments being collected which will need to be allocated back to users and/or providers in some way.

However, an average price approach would mean that users with an imbalance position do not see the true cost of their actions – it would suppress prices below marginal costs[23]. This would appear to fail the 'efficient' leg of the GPS outcomes test.

If marginal cash-out pricing were adopted, it could lead to the balancing agent recovering more in charges than it pays to providers (at least for some periods). This surplus should be passed back to users in some form, but in a manner that preserves marginal price signals as far as possible. A number of approaches are used in other markets, such as a rebate against fixed costs (proportional to some measure of participants' relative size).

However, marginal pricing would not give rise to a surplus if all of the accepted offers received the same marginal price. This use of marginal pricing would also have additional benefits by enabling users to manage risk and by sending more accurate price signals for investment in flexibility[24].

Parties with inherently uncertain positions (eg a retailer with 'uncontrolled' non-daily metered load) have exposure to imbalance charges that are difficult to manage. The Gas Act objectives require that risks are 'properly and efficiently managed by all parties'. However, if imbalances are priced on a marginal cost basis and that same marginal price is received by all sellers, then a user can offer gas into the balancing market to the extent of its uncertain imbalance position and thereby hedge its price risk. A worked example is included in Appendix A.

[23] For example, if the balancing agent had used up all the relatively cheap sources of balancing gas (50TJ priced at $10/GJ, say), and needed to call upon 20TJ of $100/GJ balancing gas, it could be more efficient for users whose value of gas was less than $100/GJ to voluntarily curtail their demand rather than call upon this expensive source of gas.
However, if a weighted average pricing approach was adopted, the expected imbalance price users would face would be $35.7/GJ, even though the last GJ of balancing gas cost $100.
[24] The marginal price is arguably the true price signal for investment in additional capacity.

Trading and cash out of imbalance positions

Some jurisdictions (including current Maui and Vector arrangements) allow ex-post trading of imbalance positions. For example, if one user had a negative imbalance of 5TJ and another had a positive imbalance of 3TJ, ex-post *title* trading[25] would enable the positive imbalance user to achieve a zero imbalance position, and the negative imbalance user to reduce its imbalance position to 2TJ. Concerns have been raised overseas as to whether this could weaken the incentive to provide accurate pipeline nominations[26].

However, provided eventual imbalance charges reasonably reflect imbalance costs and are allocated to causers, it appears reasonable to believe that ex-post trading should not unduly reduce users' incentives to provide accurate and timely nominations.

A related issue is that OATIS currently blocks imbalance trades that increases an imbalance at any point. One user has indicated that blocking these trades reduces the ability to accumulate imbalance at one point prior to reducing it. Given that trading does not change the gross pipeline imbalance and the price signals still exist, there seems no reason, other than for prudential reasons, to prevent a party willingly taking on another party's imbalance.

Treatment of tolerances

The Maui regime provides daily and running tolerances for users. It is common practice internationally to reflect linepack flexibility in tolerances, but this is not the only way or necessarily the most efficient way to ensure the pipeline system flexibility is fully utilised.

The Maui tolerances are 'free' to users in that they are not priced directly. However, linepack tolerances are not costless to provide, as provision of linepack tolerance is a product of investment in pipe work, compressors and gas inventory. There is also an opportunity cost in that the linepack capacity could be used to provide improved security or sold as flexibility services to individual users.

The Vector regime allocates Maui tolerances to users in proportion to their share of mismatch, rather than overall gas flows. It seems intuitively unfair that parties who have managed their positions least well should be rewarded by receiving the highest tolerance. It may also be inefficient.

One option for addressing this inherent inefficiency in the free allocation of tolerances is to allow users to 'trade' tolerances. This would provide a price signal and allow tolerance to go to the user who values it the most highly, thereby increasing efficiency.

Another option is to remove the tolerance. While tolerances can create potential concerns around inefficient outcomes, they do provide users with a 'safe harbour' which can reduce tranaction

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[25] Title trades involve a change in the ownership of the gas without any physical consequences, while physical trade require the counterparty to amend its nominations of the volume of gas to be flowed on the system. By definition, physical trade can only occur ex-ante, whilst title trades can occur ex-ante or ex-post.

[26] For example, '*Electricity and gas cash out review. A consultation document*', Ofgem, May 2004

costs. Furthermore, given the small market size and modest volume of tolerance (relative to market turnover), the efficiency gains from setting up improved tolerance allocation or trading mechanisms may be outweighed by the costs.

A further option is to remove the tolerance over time, once there is more confidence that balancing can be achieved through price-based mechanisms in an efficient manner. This would be consistent with the ERGEG principle 5, 'Tolerance services', which states that 'Tolerance levels weaken balancing incentives and ... as markets develop it should be possible to reduce (and minimise) the size of tolerance levels.'

7.6 Information for pipeline users

Parties need good information in order to make appropriate decisions. In a gas balancing context, this information includes:

- the overall balancing position on the pipeline, which enables users and sources of balancing gas to gauge the likelihood of any balancing action being required. Ideally this should include:
  - the current linepack situation;
  - the projected linepack situation in the absence of balancing actions; and
  - planned balancing actions;
- the likely cost of balancing gas – which is important to users exposed to imbalance charges, and to parties who might be able to provide balancing resources; and
- the position of individual users – so they can gauge their exposure to balancing charges and take any necessary corrective actions. In the absence of allocated delivery quantities (only available after the end of the month) real time aggregate flow information at each delivery point should be provided. Ideally this would be provided alongside projected (nominated) quantities.

Currently, both Maui and Vector provide information on pipeline linepack conditions. This information is provided in a timely way (hourly) and covers both the current linepack condition, and the linepack condition over the previous 24 hours. However no information is provided about the projected position or of what balancing actions are planned.

On the Vector pipeline, delivery point flow information is provided to the shippers that use a particular delivery point, where that information is available (ie where there is telemetered time of use metering). Vector also provides prior warnings of balancing actions where there is time to do so.

Options to improve the availability of information therefore include providing forecast linepack conditions and, on the Maui pipeline, notice of balancing actions.

Information on balancing prices

Current arrangements provide for Maui balancing charges to be posted on MDL IX, and for these charges to take effect with not least than seven days notice. In relation to a Vector tender, there is better transparency as to the cost of balancing resources available to a balancing agent. However, because Vector has relied on flexibility available from the Maui pipeline in the form of welded point imbalance to balance its own pipelines[27], this process is not used.

One option for improving the transparency of cost information would be for balancing gas to be procured through a wholesale market mechanism. If gas is purchased on spot, users may not know the price ahead of time; however, the increased efficiency of sourcing flexibility may outweigh the uncertainty in price. In addition this uncertainty in price can be manageable with appropriate design of the market (see prior discussion).

Information on user's own imbalance positions

Under current arrangements, only interconnection points serving large users with time of use metering have daily allocations, whereas those with mass-market users have allocations completed monthly. Thus, for load which doesn't have telemetry to give close to real-time consumption information, there could be a material delay before users understand the extent to which their actual consumption differed from their forecast consumption.

There are three potential negative consequences from this situation:

- Users will find it harder to pro-actively manage the financial risk associated with an unknown imbalance position;
- The residual balancing agent is likely to be called upon more because users are unaware of their actual position until well after the end of the balancing period; and
- Users' forecasts of consumption for future days may be less accurate if they do not have a good understanding of their consumption on recent past days.

One possible response would be to compile notional daily allocations at mass market delivery points, with a subsequent wash-up once customer meter data is collected. In some markets this provisional allocation is used in setting balancing charges, rather than the final allocation. This allows users to monitor their imbalances and saves complex 'washups' of balancing charges. Transport charges and gas reconciliation are still based on final allocations. However, this would need to be based on information provided by pipeline users, and it would be difficult to detect any data shortcomings (whether accidental or deliberate).

In some overseas markets, it is the responsibility of a central party such as the TSO to develop the forecasts of non-daily metered load. The advantages of this are that:

[27] Indeed the Maui pipeline is the only practical source of balancing gas for Vector pipelines which do not have producers injecting gas into them. However, that gas could be supplied by shippers from the Maui pipeline tendering for Vector balancing gas rather than by Vector using welded point imbalance. Also, Vector's balancing agent could become a shipper on the Maui pipeline and change the Scheduled Quantity at a Vector Welded Point by the use of a balancing gas nomination.

- if a TSO makes forecasts and then requires users to nominate in accordance with those forecasts then this would eliminate the possibility of 'gaming' by users: ie deliberately under- or over-forecasting to exploit any shortcomings in the balancing regime;
- a TSO's forecasts would be based on a single forecasting methodology, easily updated when new information comes to hand;
- a TSO has greater resources and economies of scale in forecasting;
- a TSO's forecasts would be subject to more scrutiny than individual shipper forecasts;
- a TSO will have incentives to forecast accurately since it would improve pipeline operations and security, and may improve pipeline utilisation by allowing greater availability/reliability of interruptible capacity;
- a TSO may be able to forecast aggregate mass market demand more accurately than individual users because it does not have to worry about customer churn; and
- a TSO could subtract off large daily-metered load from real-time pipeline information to improve the ability to forecast non-daily metered load, an option which would not be available to users due to confidentiality considerations.

However, it is questionable as to whether users are inherently less capable at forecasting such load compared with the TSO. Indeed, it could be argued that users have a stronger incentive and are better placed to develop accurate forecasts, since they would face the cost of inaccuracy (via exposure to imbalance charges), whereas the pipeline operator would be immune, and they know and have access to their own customers.

In this respect, it may be that the dulling effect of Maui Legacy gas on balancing costs has resulted in underinvestment in forecasting capability and information systems. With clearer price signals for balancing resources, this should improve the incentive on users to understand their customers' demand and result in optimal investment in information systems. On the other hand it may be that users are too small to invest in forecasting at a level which is optimal for the system as a whole.

Information on other users' imbalance positions

Some stakeholders have raised the issue of publishing information as to which parties are in imbalance (eg arising out of the recent significant imbalance excursions). Publically 'naming and shaming' in this way has been expressed by some as a means of encouraging good behaviour.

However, this too could give rise to commercial confidentiality considerations. Furthermore, naming and shaming is unlikely to be effective if there are insufficient financial incentives on users to act appropriately. Unless publishing such information helped other users to forecast their positions (which seems unlikely), it would appear more appropriate to focus on improving the financial incentives on parties to self balance.

7.7 Incentives on residual balancing agent

Potential conflicts of interest

The actions of the residual balancing agent can confer benefits or impose costs on other parties, and if the agent has an affiliation with some of those parties, there could be a conflict of interest. Such conflicts could arise in areas such as:

- the provision of information to pipeline users;
- decisions regarding the timing and choices in procuring balancing resources;
- decisions in setting balancing tolerances and prices (where the agent has discretion in this);
- decisions regarding the enforcement of balancing charges; and
- decisions regarding the design of balancing charges (which could favour affiliates where affiliates are different in kind (eg in size, diversity etc.) to non-affiliates).

In New Zealand, the potential for such conflicts exists because the owners of both the Maui and Vector transmission systems also have interests in the upstream and/or downstream sectors.

To address these potential conflicts, varying degrees of separation have been applied in other jurisdictions, ranging from complete ownership separation through to operational separation.

However, all forms of separation also have costs – which can be direct (eg the cost of change) and indirect (eg possible loss of synergies within a business). Examples of issues include:

- the provision of pipeline transmission services is reliant on linepack therefore the TSO has a keen interest to ensure appropriate service levels for linepack management and to protect against any potential principal-agent problem; and
- a separate agent would require a profit element and would be unlikely to take on significant risk without significant reward.

Incentives on balancing agent to minimise the cost of balancing

Even if the balancing agent has no direct conflict of interest, there is still potential for its interests to diverge from those of pipeline users. In particular, the balancing agent can affect the level of balancing costs incurred by users (for example through the choice of procurement mechanism), but may itself not be exposed to these cost (the agency problem).

In part, such concerns can be addressed by ensuring a high level of consultation and transparency around the balancing agent's processes and actions. This facilitates review of the agent's actions by users. Qualitative provisions can also be used to limit balancing agent's ability to recover any unreasonable costs.

Some overseas regimes have gone further and introduced financial incentives on the balancing agent that are intended to help minimise the costs of balancing[28].

Nature of resources that can be procured

In principle, it is desirable that the balancing agent has a full spectrum of options from which to procure balancing resources. This should help to minimise the cost of any resource.

However, some resources might only be available if the balancing agent entered into a long term contract with a fixed charge element. On the other hand other resources might only be available after the nominations deadline has closed.

Under a long term fixed charge contract, the balancing agent would pay the flexibility provider a standing availability fee (eg a certain $/month charge), in return for an option to take gas out of, or put gas into, the pipeline. If the option were exercised, the balancing agent would also have to pay a pre-agreed $/GJ fee.

Contracts of this nature raise some issues:

- The balancing agent is likely to seek to recover the fixed costs of the resource via fixed balancing charges – because it will otherwise tend to over- or under-recover such costs. This could expose the agent to financial cost, and/or the risk of challenge from users. Recovering some costs via fixed charges will tend to dull the marginal price signals during times of imbalance, thereby reducing the incentives on parties to take balancing actions (either self-balancing, or offering balancing gas for use by the balancing agent);

- Because of their term nature, there is a greater risk with such contracts that the balancing agent may over-procure resources, and yet the cost of over-procurement might be borne by users via balancing charges; and

- The balancing agent may tie up flexibility that would otherwise be available to the market and therefore force the market to use the residual balancing service, and increase dependence on the 'residual' role.

On the other hand, such contract structure may be particularly suitable for demand-side flexibility offerings, where a consumer needs to make some capital investment (eg in back-up fuel) in order to offer the flexibility. Restricting to 'spot' contracts may limit the amount of flexibility that can be procured.

The second concern is whether capacity that users retain for their own use can be offered at the nomination deadline, when it is clear the capacity is surplus. To maximise the efficiency of the market the design would ideally enable this capacity to be pooled in the balancing market.

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[28] For example, in Britain Transco's has financial incentives based on the spread between balancing buy and sell costs, and linepack performance. There is an annual limit on such payments / penalties of some +/- £3.5m.

7.8 Harmonisation

With two inter-connected pipelines there is the potential for problems to arise if they have different balancing arrangements. These could take a number of forms, including perverse incentives (eg interface issues resulting in muted price signals) or inefficiency and cost duplication.

The physical attributes of the system are also relevant, such as:

- the large size (in terms of linepack) of the Maui pipeline relative to the Vector system;
- the Vector pipelines radiate away from the 'hub' of the Maui pipeline; and
- most gas enters the system via the Maui pipeline.

An engineer would wish to manage the balance of the 'spokes' by controlling the pressure at the 'hub'. This is not to resile from the obligation of each TSO to manage its residual balancing role, but only to recognise that it would be expected that the Vector pipelines are likely to obtain a substantial proportion of balancing gas from the Maui pipeline.

Greater harmonisation of regimes could come about in a number of ways. One approach would be to encourage or require more harmonisation through regulatory action. Another approach would be to rely on commercial drivers (which, as previously noted, may be limited), recognising that the Vector system will require a substantial proportion of its balancing needs from the Maui pipeline. This should not be a concern to either TSO providing that the price of balancing reflects its costs and that Vector (as a welded party on the Maui pipeline) has appropriate mechanisms (such as the BPP) for passing balancing costs through to the users who are responsible for any imbalance.

In New Zealand the current regimes are integrated with the same balancing period and generally designed to work with each other. Although a key issue is that there are potentially two balancing agent roles, one for each pipeline regime. This matter was discussed above the heading 'Single balancing agent'.

7.9 Governance

Governance arrangements define the processes to be applied in designing, implementing and enforcing the operational contracts for gas balancing. For example, governance arrangements will define who can propose contract changes, who determines whether a proposed change will occur, and where any disputes about contract interpretation will be heard.

Governance arrangements have an important impact on outcomes because they provide the framework within which the operational rules of balancing are shaped. Irrespective of the formal mechanism for rule making, it is desirable that certain process standards be met. These include:

- balancing rules should be developed using a transparent process;

- rule making decisions should be based on application of objective criteria, and be made in a non-discriminatory manner; and
- the decision maker should consider the views of affected parties on proposed changes, as revealed through a consultation process.

Processes of this nature should help to foster stability and predictability in balancing arrangements, both of which are in the long term interests of TSOs and users.

An examination of existing arrangements suggests there may be governance shortcomings. These include:

- potential barriers to change - despite the repeated over-pressure incidents in late 2006 and early 2007, no specific proposals have been advanced to amend the balancing arrangements relating to over-pressure situations;
- enforcement – there appears to have been difficulty in enforcing OFOs issued pursuant to MPOC. Given the importance of OFOs to secure operation, this appears to be a significant weakness; and
- harmonisation – MPOC and VTC allocate decision rights on rule change proposals to different parties (in the case of the MPOC, to the TSO and Gas Industry Co. Under the VTC, changes require agreement by Vector and 75% of shippers). Furthermore, both codes contain provisions limiting the ability to make changes that create 'compatibility' issues with the other transmission code. These differing but inter-locking provisions mean that it could be very difficult to make changes in some areas, raising questions about whether the arrangements are overly complex and cumbersome.

Broad options for governance arrangements

One possibility would be to persist with the existing arrangements, on the grounds that they have not been in operation for long. However, as noted above, there is already significant doubt about their effectiveness.

Furthermore, balancing prices are expected to become more volatile as Maui legacy gas rolls off, and this may well put more pressure on governance arrangements.

An alternative approach would be for Gas Industry Co to be more active in influencing the development of gas balancing arrangements. It could seek to achieve this by preparing and issuing guidelines, in the expectation that these would help to shape the code change process. While this approach could be adopted relatively quickly, there is no assurance that guidelines would be followed – because of resistance from TSOs or other factors (eg the requirement to obtain support from at least 75% of voting shippers for VTC changes).

Another option would be direct regulation of balancing arrangements – which could take a number of forms, such as defining minimum terms in areas such as the procedure for determining cash-out prices, or fully specifying the arrangements for gas balancing.

Direct regulation is likely to take longer to establish than reliance on guidelines, and would tend to be less flexible because of the institutional processes entailed. However, these shortcomings may be judged to be less important when weighed against the uncertainties of other approaches.

It is also important to recognise that gas balancing fits within a wider transmission access context. The Gas Industry Co's preference had been to pursue an overarching governance arrangement for all access issues, including gas balancing[29]. However, for a variety of reasons, that is not practical at this time. Instead, Gas Industry Co is seeking to progress priority issues within the transmission access arena, such as gas balancing and interconnection arrangements. Although a common over-arching governance approach is not practical at this time, Gas Industry Co is nonetheless keen to ensure consistency in framing governance processes, as far as possible.

A full discussion of the relative merits of the different governance options lies outside the scope of this paper. However, it will be important to consider this issue further as work progresses on gas balancing.

Question 3: Are there any additional design elements, not identified in Chapter 7, which you consider should be addressed?

Question 4: Are there any balancing regime options which you consider Gas Industry Co should include in its forthcoming options analysis work?

[29] For example, see *Statement of Proposal, Transmission Access Framework*, October 2007, published by Gas Industry Co.

8 Next steps

Following an analysis of submissions on this issues paper, an options paper will be developed. The options paper will consider in more detail the transmission pipeline balancing options which are available to meet the requirements of the Gas Act, and consider the relative merits of those options.

Glossary

balancing	The management of linepack to ensure that it remains within acceptable operational limits.
balancing agent	The party responsible for providing residual balancing services, including buying and selling 'balancing gas' in order to manage linepack. The term balancing agent is used to differentiate a specific function of the TSO from its other functions.
BPP	'Balancing and Peaking Pool'. A mechanism in the Vector transmission regime to ring-fence and allocate balancing costs via a trust account.
cash-out	A forcible sale or purchase of gas by the TSO to resolve an outstanding imbalance position.
CO	'Commercial Operator'. An agent to manage the commercial arrangements of the open access regime and in New Zealand either the Maui CO or Vector CO.
damages	The loss to a users business caused by another user breaching its obligations. A damages claim is a claim for compensation for costs incurred.
delivery point	An interconnection point to a pipeline where gas is taken by the interconnected party (known as the 'welded party' in the MPOC).
DOIL	'Daily Operational Imbalance Limit' is a defined tolerance in the MPOC for acceptable DOI.
GPS	'Government Policy Statement'.
ILON	'Imbalance Limit Overrun Notice' is a defined notice under the MPOC where MDL notifies a welded party that it wants excess ROI resolved (ie gas parked or loaned in excess of the ROIL).
imbalance	Generically this means the flows into the pipeline do not match the flows out of the pipeline. This can be 'operational imbalance' in the MPOC which is the difference in scheduled flows and actual flows at an interconnection point. This can also be the difference between shipper receipt and delivery quantities in both the MPOC and VTC (where it is called 'mismatch'). A positive imbalance is one that increases linepack and a negative imbalance is one that

	decreases linepack.
incentives pool	A mechanism in the Maui transmission regime to ring fence and allocate damage costs via a trust account.
linepack flexibility	Flexibility in the level of linepack over and above that needed to transmit scheduled gas and set aside for security of supply, which is linepack flexibility potentially available for balancing.
legacy gas	The Maui gas contract for delivered gas over the Maui pipeline, that pre-existed Maui open access and retained its special rights.
linepack	The total amount of gas in a transmission pipeline at a point in time.
MDL	'Maui Development Limited'. A Maui joint venture company that operates the Maui pipeline (among other things).
mismatch	A shipper's allocated receipt quantities less their allocated delivery quantities. A mismatch represents an imbalance between inputs and outputs on the pipeline. A positive mismatch is an increase in linepack and a negative mismatch is a decrease in linepack.
MPOC	'Maui Pipeline Operating Code', dated 8 August 2005.
nomination	A request to the pipeline to transport a quantity of gas from a receipt point to a delivery point. On the Maui pipeline an 'approved nomination' is the agreed quantity by the shipper, welded party and TSO and represents the contracted transmission service. On the Vector pipeline nominations are not approved as such and are not binding.
OATIS	'Open Access Transmission Information System'. The information system and internet site used to manage the day to day operations of open access on the Maui and Vector pipelines.
OFO	'Operational Flow Order'. A binding notice by the TSO to a shipper or welded party during a contingency event.
OI	'Operational Imbalance'. The MPOC defines OI as being the difference between the actual quantity of gas that flowed through a welded point on a day and the scheduled quantity for that day.
receipt point	An interconnection point to a pipeline where gas is injected into the pipeline by the interconnected party.

ROI	'Running Operational Imbalance'. A defined term in the MPOC for the aggregate of imbalance at a welded point over time and therefore represents the total gas parked or loaned from the pipeline at that point.
ROIL	'Running Operational Imbalance Limit'. A defined term in the MPOC for tolerance of ROI, outside of which MDL may notify the welded party to take away or return the excess imbalance (see ILON).
RPO	'Reasonable and Prudent Operator'. A standard for performance of obligations, which in this case is a standard of performance equal to or better than good industry operating practice relative to recognised international practice.
running mismatch	A defined term in the VTC and VTSA for a shipper's aggregate mismatch over time.
scheduled quantity	A defined term in the MPOC for the days confirmed and committed scheduled quantity for a welded party, which is the sum of approved nominations at the welded point.
shipper	A user that has contracted for the TSO to transport gas (see TSA).
TSA	'Transmission Service Agreement'. The contract between a shipper and the TSO to transport gas.
UFG	'Unaccounted For Gas'. This is a change in linepack that cannot be identified to a user, and represents the inherent errors in metering gas.
VTC	'Vector Transmission Code' dated 19 November 2007.
welded party	An interconnected party to a transmission pipeline, particularly on the Maui pipeline. These parties are contractually separate from shippers and may or may not be the same entity as a shipper.

Appendix A ERGEG principles

The ERGEG principles for good gas balancing practice from ‘Gas Balancing An ERGEG Conclusions Paper’, E06-GFG-17-03, 20 April 2006.

Principle 1 - Balancing responsibilities

The primary responsibility of network users is to balance their own inputs and offtakes over the relevant period according to the rules and incentives of the respective balancing regime. The TSO retains the overall responsibility for the economic and efficient operation of its system and therefore should retain a residual role to maintain physical balance to ensure the efficient and safe operation of the system.

Principle 2 - General requirements for balancing rules

Balancing rules shall be designed in a fair, non-discriminatory and transparent manner and shall be based on objective criteria. The development of balancing rules and changes thereof should be subject to appropriate consultation with market participants and decisions should be supported by objective criteria and analysis.

Where balancing rules (including imbalance charges) are administered by the TSO they should be equally applied to its own commercial operations and affiliates, where part of a vertically integrated company, as to third parties. This includes ensuring that no information concerning the operation of the balancing regime are provided to an affiliate company of the TSO in advance of being provided to all market participants. The arrangements to meet this requirement should be made publicly available.

Balancing rules should be designed to minimise the residual physical balancing role of the TSO subject to the safe and economic operation of the network and the incentives, information and flexibility and tools provided to shippers to balance their individual portfolio. They should also be designed to facilitate effective competition and market participation between shippers and avoid discrimination particularly in creating undue barriers of entry to new entrants or smaller players.

Principle 3 – Frequency of balance

Daily balancing is preferable unless there are technical/operational reasons that mean that hourly balancing is necessary to ensure that system can be balanced and/or for safety/security reasons.

The choice of an appropriate balancing period clearly needs to be based on a balanced assessment of a number of objective criteria. These should include:

- the operational capabilities of the transportation system to balance the system;

- the flexibility and tools to balance that market participants have over the relevant period, including the availability of linepack services;
- the interaction of balancing period with effective commercial incentives to balance, in particular interactions of shorter balancing periods in electricity markets with potentially longer periods in gas;
- the interaction with balancing periods in connected gas systems to ensure that no undue barriers to cross border trade are created;
- availability and accuracy of the information over the relevant period that is made available to shippers to take balancing actions;
- the costs imposed by particular balancing regimes, for example the IT costs of providing more regular information flows over shorter balancing periods and the transaction costs incurred by shippers from potentially taking more frequent balancing actions; and
- nomination procedures complementary to the frequency of balance.

It is important that shippers are not exposed to undue risks that they cannot manage effectively and/or without incurring inefficient costs that could create a potential barrier to entry to the market.

Where hourly balancing is used, market participants have access to appropriate information and flexibility tools so that they can manage their imbalance positions (and therefore risk) efficiently.

Where it is not possible to provide appropriate information and access to flexibility, it is important to consider whether the risks that market participants are exposed to should be mitigated in some way, to ensure that barriers to entry are not created (for example through the use of tolerance bands or by limiting the size of the imbalance charge). Where possible incentive-based approaches that allow market participants to manage their own risk efficiently are preferable to solutions that mitigate risk.

Principle 4a - Balancing costs and incentives for the TSO

TSOs should have commercial incentives to ensure that the costs of taking residual balancing actions and associated operational costs that the TSO incurs are efficient. Unless a TSO is not permitted to accept bids and offers for balancing gas as a means to balance the system, it should procure flexibility (including gas) in a transparent and non-discriminatory manner using market based mechanisms where possible. The regime needs to ensure that the TSO remains broadly cost-neutral in relation to the balancing actions it takes so that any revenues or costs provide correct incentives to the TSO in relation to the timing and size of balancing actions to ensure a safe, reliable and economic system.

Where a TSO is not permitted to accept bids and offers for balancing gas as a means to balance the system, the TSO should be able to contract for gas in other ways, for example accessing gas from storage or with contracts with shippers. It is important that these cost are efficient and that they are charged back to shippers on a non- discriminatory basis. Information on the costs incurred by the TSO shall be made publicly available where this does not have a negative impact on the commercial position of the relevant market participants.

Principle 4b - Charges for imbalances

Imbalance charges should not result in a distortion of competition and/or trading activities in wholesale gas and storage and flexibility markets. Imbalance charges shall be cost-reflective to the extent possible, whilst providing appropriate incentives on network users to balance their input and offtake of gas. They shall avoid cross-subsidisation between network users and shall not hamper the entry of new market entrants. These incentives should be such that, in aggregate, the participants of the system face strong incentives to physically balance the system in an efficient way. They should also be fair and non-discriminatory and based on objective criteria and not hamper entry of new market participants. The method for calculating imbalance charges shall also be made public by the competent authority or the TSO as appropriate.

There should also be accurate targeting of system balancing and operation costs to those participants that caused them to be incurred. Any costs that cannot be targeted should be allocated back to shippers in a non-discriminatory manner.

Principle 4c – Trading of imbalance positions

Where direct access to flexibility tools and/or information is not sufficient (or there is an absence of a well functioning/liquid within day market) to allow market participants to manage their positions efficiently then other mechanisms should be introduced. This includes ex-ante trading, pooling of imbalance positions and ex-post trading.

The TSO should have systems in place to facilitate the trading/pooling of imbalance positions where these services are provided.

Principle 5 – Tolerance services

The use of tolerance levels aim to mitigate the level of risk that market participants are exposed to in balancing regimes but they can also weaken the incentive on shippers to balance within the specified limits. This weakening of incentives can lead to higher overall system costs. Therefore, tolerance levels should only be used where direct access to flexibility tools or information (or proxy flexibility tools) is such that a degree of risk mitigation is necessary to ensure that barriers to entry and competition are not created. This may particularly be the case in markets that are less well developed. Over time, as markets develop and access to information, and flexibility tools (both direct and proxy) improve it should be possible to reduce (and minimise) the size of tolerance levels.

Where offered, tolerance levels should be designed in a way which reflects the actual technical capabilities of the transmission system, for example taking into account daily effective temperature. However, particular account should be taken of the extent to which tolerances may be utilised by shippers to offer 'balancing gas' or cause balancing costs to be incurred by the TSO that are subsequently socialised. In particular, careful consideration is needed in sufficiently liquid and developed markets of the necessity of tolerance where this leads to a significant socialisation of imbalance costs. In any case, the secondary trading of tolerances should be permitted and should be facilitated by TSOs by the introduction of appropriate systems.

In the case of non-market based balancing systems, tolerance levels shall be designed in a way that either reflects seasonality or results in a tolerance level higher than that resulting from seasonality, and that reflects the actual technical capabilities of the transmission system. Tolerance levels shall reflect genuine system needs, taking into account the resources available to the transmission system operator. Where the balancing period is shorter than one day, tolerance levels can be a particularly useful tool for mitigating the balancing requirements on system users.

Principle 6 – Information on balancing status

In order to enable network users to take timely corrective action, TSOs shall provide sufficient, well-timed and reliable on-line based information on the balancing status of network users. The level of information provided shall reflect the level of information available to the TSO. Where they exist, charges for the provision of such information shall be approved by the relevant authorities and made public by the TSO.

Information should be provided to all participants on a non-discriminatory basis and in a format which is meaningful, quantitatively clear and easily accessible.

Where information flows are a problem, TSOs shall use provisional allocations in the calculation of imbalance charges to reduce the risk for shippers. The time period within which charges are confirmed and the method for calculating provisional allocations should be approved by the competent authority after proper consultation with the TSO and relevant shippers, as should any subsequent changes to charges once definitive allocations are available.

Principle 7 – Harmonisation of balancing rules

TSOs should ensure compatibility of balancing regimes (tolerances, imbalance charges etc) in order to facilitate gas trade across borders of different TSO systems. European TSOs shall endeavour to harmonise balancing regimes and streamline structures and levels of balancing charges in order to facilitate trade. Where it is justified that balancing regimes (tolerances, imbalance charges, balancing periods etc) remain different between interconnected networks, 'standardised agreements' and procedures between TSOs should be put in place in order to facilitate gas trade.

These agreements could include a number of things, including the way in which the balancing regimes interact; identify key differences and the reason why they exist; the impact of any differences on trade and the incentives provided to shippers and TSOs; and how any differences in arrangements for dealing with safety and security impact on trade, incentives and costs. They could also identify areas for harmonisation and a timetable for making changes. To ensure transparency, any agreements should be open to consultation with all market participants and fully involve the relevant NRA.

Principle 8 – Provision of flexibility

A balancing regime needs to provide an appropriate balance of risk and incentive for market participants to manage their imbalance positions – otherwise barriers to entry and competition can be created. Flexibility services and tools should be made available to shippers on a non-discriminatory basis, reflecting the underlying technical characteristics of the transmission system.

Market participants should have access to appropriate flexibility tools (including the associated information) to manage their risks efficiently. The provision of linepack on an unbundled basis is one way of providing flexibility to market participants – there are others. Where it is possible to provide surplus linepack on an unbundled basis, without undue costs/complexity and undermining the ability of TSOs to balance the system, then this should be considered as an additional flexibility tool that can be used by market participants to manage their risks efficiently. Any decisions on the provision of linepack on an unbundled basis should be objectively justified against these factors.

Appendix B Relevant MPOC/VTC Provisions

The wording in the following table is a paraphrase of the actual wording. The original wording should be used for strict interpretation of requirements.

	Maui Code	**Vector Code**
RPO	Notwithstanding any other provision, MDL, shippers and welded parties shall act as RPOs.	Vector and shippers shall act as RPOs.
Provision of services	MDL shall provide transmission services (2.4). MDL shall, acting as a RPO: • receive, transmit and deliver approved nominations (2.5(b)), and • use reasonable endeavours to provide Maui pipeline capacity consistent with its capacity forecast (2.5(e)). MDL will not individually contract storage services, other than to maintain a contingency volume (2.8).	Vector shall provide transmission services (2.1). Subject to reserved capacity limits, contingency events or maintenance, Vector shall receive gas at the receipt point and make an equivalent quantity of gas available for that shipper to take or transfer at the delivery point (2.2).
Users promise	Shippers must ensure nominated quantities balance (8.2) and are in good faith (8.3). Welded parties shall transfer their days scheduled quantity (which is the sum of approved nominations), although the sole consequence for imbalance is as per section 12 (12.1). Welded parties shall use their reasonable endeavours to manage flows so that Running Operational Imbalance (ROI) tends towards zero over a reasonable period of time, except to the extent that in the welded parties reasonable opinion it is attributable to legacy gas (12.9).	Shippers shall use all reasonable endeavours to ensure daily balance on each pipeline, other than to reduce running mismatch (8.1). Where shippers have more than one TSA they may aggregate their mismatch on a pipeline (8.8). Shippers shall enter Gas Transfer Agreements (2.9 – 2.13), which set rules for allocating gas received into the system or for insufficient quantities to result in negative mismatch (schedule 6).
Linepack management	MDL will act as a RPO to maintain sufficient total linepack necessary to deliver legacy gas and approved nominations and to provide the posted flexibility limits (18.1).	Vector will use its best endeavours to manage linepack within the acceptable operational limits for each pipeline (8.3). In doing this Vector is to:

	Maui Code	Vector Code
	MDL will make gas available for off-take at not less than 31 bar (18.2). Other than for maintenance, MDL shall not knowingly schedule operations which would; • result in pressures falling to operationally unacceptable levels; or • otherwise jeopardize the integrity or transmission services of the Maui pipeline or a connected transmission pipeline. (18.3) MDL shall, acting as a RPO, use reasonable endeavours to manage the Taranaki pressure as low as practical while meeting its obligations, and not more than the safe maximum (2.5 (c) and (f)).	• take steps, • use reasonable endeavours to minimise costs, • if there is time, to follow a defined tender process (see below) (8.4). Note the Vector delivery point interconnection agreements have a best endeavours obligation to deliver between the defined maximum and minimum delivery pressures. The receipt point agreements have a maximum operating pressure and obligations on the parties to ensure pressure remains below the defined maximum.
Excess imbalance	MDL may, at its sole discretion, give an Imbalance Limit Overrun Notice (ILON) to a welded party if their ROI is outside ROILs, and the welded party will comply (12.10). After the ILON notice period MDL may, at its sole discretion, cash-out some or all of any remaining excess ROI (12.11).	In respect of an ILON, shippers shall use reasonable endeavours to manage running mismatch towards zero on the relevant pipeline. When receiving an ILON Vector shall: • post it on OATIS, and • post an estimate of Vectors contribution to it.
Constraints on balancing costs	The cash-out buy and sell price (as above) will reflect the balancing agent's costs in accessing and disposing of gas. If a liquid gas market develops, these prices will reflect the buy and sell spot prices in that market. MDL undertakes that, as pipeline operator, it shall not seek to make a profit or loss from its activities in relation to the sale and/or purchase of balancing gas, or settling mismatches or ROI (11.10).	Vector shall only recover direct costs of balancing gas or MDL cash-out and may not add a margin, however Vector may levy administration costs on aggregate deliveries (8.20). When managing linepack outside limits, where there is time, Vector will (8.4 (c)): • issue a request for tenders to shippers and others, • publish the price, quantity and delivery point of each tender, and • accept the lowest priced tender if buying or highest price if selling. Vector shall be entitled to include direct transport costs (8.6). Vector shall use standard tender terms posted on OATIS (8.7).
Interruption of flow	MDL may: • interrupt or reduce transmission	Vector may curtail or shutdown receipts or deliveries, acting as a

	Maui Code	Vector Code
	and curtail approved nominations; and/or • give a welded party notice of an OFO to curtail or shutdown transfer of gas and the welded party shall comply, where necessary for various defined reasons (15.1). Welded parties may also interrupt flow for certain reasons (15.2). For interruptions MDL and welded parties will use reasonable endeavours to notify, consult and cooperate etc (15.3 and 15.4). Where an OFO is breached MDL may suspend injections of offtakes (2.24). MDL will use reasonable endeavours to maintain a contingency volume of gas for use during a contingency event, maintenance or Force Majeure (15.5 – 15.11).	RPO, for various reasons with conditions (10.1). Vector may for one of these reasons issue an OFO and the shipper shall use its best endeavours to immediately comply (10.2).
Small Welded Points[30]	Very small stations are grand-fathered pre-existing metering standards and do not have real time telemetry. This means imbalance is only determined at month end. At these small stations welded parties shall remove any excess imbalance by transferring it to a large station (12.5).	When required by MDL, Vector will transfer Vector shipper mismatch to another pipeline used by the shipper (8.9 to 8.11).
Damages	The parties have created an Incentives Pool to provide a system of liquidated damages (14.1) which is the sole and excusive remedy for any inability to take full scheduled quantity on a day (14.5). Welded parties incur liability to the Incentives Pool to the extent flow exceeds peaking limits (13.3) or daily imbalance depletes linepack in excess of the DOIL (12.7). If a welded party is unable to off-take it's scheduled quantity or is curtailed due to another welded party being outside tolerance then they may claim via the Incentives Pool at the defined daily incentive	To the extent Vector pays under MPOC 12.13 indemnity and Vector has been an RPO, shippers who have a negative running mismatch at the relevant time shall pay into the BPP account their portion of the payment (8.12). If Vector makes a payment to the MDL Incentives Pool arising from excess daily imbalance then Vector is paid out of the BPP account, such amount allocated to Vector and its shippers on the relevant pipeline in proportion to their contribution to aggregate negative mismatch (8.13 (a)). If Vector makes a payment to the

[30] The MPOC defines small welded points as a special class of interconnection points that are very small and do not meet the real time metering requirements of the major welded points.

	Maui Code	Vector Code
	price (12.16). The balancing agent may make a claim on the pool, within limits, to meet the costs of buying any gas on the day (14.4). The Maui mining companies may make a claim, within limits, for an inability to deliver legacy gas on the day. The trustee shall invoice each welded party that has incurred a liability in proportion to their contribution (14.11) and pay each welded party in proportion to their claim (14.12). Welded Parties indemnify MDL for direct costs incurred by the balancing agent outside of its supply arrangements to replace any ROI outside of tolerance (12.13 (c)).	MDL Incentives Pool as a result of exceeding a peaking limit then Vector is paid out of the BPP account. Vector, acting reasonably, determines the allocation of the cost to shippers in proportion to their contribution or where Vector is unable to identify which of them then to all shippers in proportion to their gas delivered on that pipeline on the day, except Vector pays to the extent it contributed. (8.13 (b)) Shippers not able to take their gas entitlement may claim damages from the BPP account, and Vector shall verify damage claims (8.14). Vector may determine part of the damages claim as contributed by an event on the Maui pipeline and any recovery from the Maui Incentives Pool in respect of damage claims will be allocated in proportion to relevant verified claims. Vector shall use all reasonable endeavours to pursue Maui Incentive Pool payments. (8.15) Verified damage claims are paid to shippers at the Maui daily incentive price reduced by the Maui pipeline contribution to the claim and limited to the recovery from causing shippers (8.16). Shippers and Vector shall pay to the BPP account any verified damage claims, in proportion to their negative mismatch on that day. Where Vector buys or sells balancing gas or has an MDL cash-out, each shipper will be cashed-out in proportion to their contributing running mismatch on the relevant pipeline at the relevant price (8.18 and 8.19). Vector shall not correct balancing allocations for corrections in information, but Vector will adjust receipt and delivery quantities (8.21).

Appendix C – Hedging example

This is an example of how users could hedge imbalance cash-out with appropriate design of spot market. The example is for excessive negative imbalance; however Gas Industry Co works similarly for excessive positive imbalance.

Assume Vector shippers have taken too much gas from the pipeline system, say in the north. The shippers are therefore in aggregate negative running mismatch.

Vector has an excessive negative Running Operational Imbalance with the Maui pipeline at the Rotowaro welded point. To simplify the example, assume all other welded points are within tolerance.

The Maui linepack is low and the balancing agent calls a tender for balancing gas to be delivered at Rotowaro.

Tenderers offer to supply gas to the balancing agent. Vector shippers in the north can be expected to tender at least the volume of their known negative mismatch and also probably sufficient to cover any of their own uncertain negative mismatch. Others may also offer for the opportunity value.

For illustration assume:

- A offers 10,000 GJ at $11/GJ delivered at Rotowaro.
- B offers 8000 GJ at $8/GJ delivered at another location on the Maui pipeline and the balancing agent will incur $1/GJ to ship this to Rotowaro, ie $9/GJ in total.
- C offers 6000 GJ at $7/GJ delivered at a remote location on the southern Vector system and the balancing agent will incur $3/GJ to ship this to Rotowaro, ie $10/GJ in total.
- The linepack has not been resolved by the time of acceptance of tenders and the balancing agent accepts sufficient tenders to resolve the problem, which in this example is 12,000 GJ.

Tenders B and C are sufficient to cover the 12,000 GJ sought by the balancing agent and the balancing agent accepts all 8000 GJ of B and 4000 GJ of the C. The clearing price is therefore set by C's delivered price at $10/GJ.

At the same time as the acceptance of tenders, the Maui regime cashes out the Vector Running Operational Imbalance at Rotowaro for 12,000 GJ at $10/GJ. Vector simultaneously cashes out the northern Balancing and Peaking Pool for 12,000 GJ at $10/GJ. All Vector shippers who are in Negative Running Mismatch receive their share of the cash-out by having their Running Mismatch Balance increased at the cash-out time.

The balancing agent submits balancing gas nominations to move B and C's gas to Rotowaro. As B is supplying from a producer connected to the Maui pipeline then B needs to arrange for the balancing gas nomination to be confirmed by the appropriate producer (Welded Party). As C is on the southern Vector pipeline they need to arrange for the balancing agent to allocate the gas at their interconnection point.

Assume that after allocations it is found the running mismatch positions are as follows:

- A has 10000 GJ running mismatch balance
- B has 8000 GJ running mismatch balance
- C has 6000 GJ running mismatch balance

The Balancing and Peaking Pool cash-out is therefore:

- A is cashed out 5000 GJ
- B is cashed out 4000 GJ
- C is cashed out 3000 GJ

From the balancing agent perspective:

- Negative mismatch shippers pay the Balancing and Peaking Pool and consequently the balancing agent $10/GJ for the total volume of 12,000 GJ.
- B gets paid $10/GJ less transmission charges or $9/GJ for 8000 GJ.
- C gets paid $10/GJ less transmission charges or $7/GJ for 4000 GJ.
- TSOs get paid $1/GJ for 8000 GJ and $3/GJ for 4000 GJ.
- The balancing agent is neutral (other than settlement risk).

From C's perspective

- C is in negative mismatch and is going to be cashed out.
- C tenders 6000 GJ at $7/GJ to hedge the price risk.
- C pays the Balancing and Peaking Pool $10/GJ for 3000 GJ.
- C gets paid from the balancing agent $7/GJ for 4000.
- C would have paid $3/GJ for 3000 GJ for transmission if they had cleared the position themselves. They also receive their tendered price so are neutral.

From B's perspective

- B is in negative mismatch and is going to be cashed out.
- B tenders in 8000 GJ at $8/GJ to hedge the price risk.
- B pays the Balancing and Peaking Pool $10/GJ for 4000 GJ.

- B gets paid from the balancing agent $9/GJ for 8000 GJ.
- B would have paid $1 transmission for 4000 GJ if they had cleared the position themselves. They also receive more than they tendered so they are effectively ahead by $1/GJ over 8000 GJ.

From A's perspective

- A is in negative mismatch and is going to be cashed out.
- A tenders in at 10,000 GJ at $11/GJ to hedge the price risk but is not cleared.
- A pays the Balancing and Peaking Pool $10/GJ for 5000 GJ but receives this gas at less than the $11/GJ they were willing to sell at, so they are effectively ahead and in the process their price risk was capped at $11/GJ.

Appendix D Format for Submissions

To assist the Gas Industry Co in the orderly and efficient consideration of stakeholders' responses, a suggested format for submissions has been prepared. This is drawn from the questions posed throughout the body of this consultation document. Respondents are also free to include other material in their responses.

Submission prepared by: ………………………………………………………………………………………… (company name and contact)

QUESTION	COMMENT
Q 1: Do you agree that the ERGEG guidelines are appropriate to use as a framework to evaluate alternative balancing market design options for New Zealand?	
Q 2: Are there key issues that are not identified in Chapter 6?	
Q 3: Are there any additional design elements, not identified in Chapter 7, which you consider should be addressed?	
Q 4: Are there any balancing regime options which you consider Gas Industry Co should include in its forthcoming options analysis work?	