

Daily Cash-Outs on Maui Pipeline:

Outline of a Cost-Benefit Analysis

Prepared for

Gas Industry Company

Authorship

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Executive Summary

This is the first draft of a cost-benefit analysis of a code change request lodged by Maui Developments Limited (MDL) in respect of the Maui Pipeline Operating Code (MPOC). It was commissioned by the Gas Industry Company (GIC) which is required to either support or not support the code change.

At this point, we have not attempted any quantification. Rather, we seek to expose our initial analysis for industry review and comment before going further. Accordingly, this document aims to:

- Record some relevant background;
- Describe the scenarios to be evaluated in a cost benefit analysis; and
- Identify major categories of costs and benefits associated with each scenario.

Three scenarios are considered:

- The status quo;
- Back-to-back balancing (B2B) as described in MPOC code changes recently supported by the GIC; and
- Daily cash-outs (DCO) being the regime MDL now proposes.

In reviewing these scenarios, we have spoken with a number of industry stakeholders including pipeline owners, upstream producers, shippers and major users. This has not been an exhaustive canvassing of views but has nevertheless allowed us to gain a deeper understanding of the issues. We found that participants were generally supportive of moving towards more efficient pipeline management; however there is less agreement as to the processes that should be used. There are also a range of views over the merits of the DCO proposal.

It seems generally agreed that it would be desirable to have stronger *incentives* for primary (i.e. self-initiated) balancing by shippers on a daily basis. However parties are concerned that their *ability* to achieve this is currently limited by poor information (e.g. about demand patterns and conditions on non-Maui pipelines) and by limited access to management tools (e.g. shippers cannot trade with one-another on the BGX).

This tension appears central to the cost-benefit analysis. Risks are efficiently allocated to those best placed to manage them, which requires both an incentive and an ability to manage.

1 Introduction

The Maui gas pipeline is economically crucial infrastructure carrying gas from Taranaki to several geographic markets including the greater Auckland area. End users include gas-fired power stations, major industrial customers such as NZ Steel and Methanex, a commercial sector and residential customers.

The pipeline is owned by a consortium of upstream interests, Maui Developments Limited (MDL). Its revenue is regulated by the Commerce Commission under Part 4 of the Commerce Act 1986. Use of the pipeline is governed by a multilateral agreement, the Maui Pipeline Operating Code (MPOC).

MPOC prescribes a common-carriage system for pipeline users. Welded parties are required to make daily nominations of injections and offtakes and these must balance, meaning that injections equal offtakes on a daily basis. In making these nominations, welded parties aggregate the plans of shippers into a single nomination.

Under current practices, there are only weak incentives for parties to “run to nomination”. If a welded party is in an imbalance position at the end of a day, the pipeline operator can issue an imbalance limit over-run notice (ILON) and the user then has two further days to get its position back into balance. This arrangement results in frequent imbalances as users effectively use the pipeline as a communal buffer: depending on conditions in other markets, they may either store gas in the pipeline (i.e. run a positive imbalance) or borrow gas from the pipeline (running a negative imbalance).

These imbalances can only occur because the Maui line has, on average, enough spare capacity to accommodate them without breaching its operational tolerance limits for high and low pressure. When imbalances threaten prudent operational limits, the pipeline operator will generally buy or sell balancing gas.¹ These trades occur through the Balancing Gas Exchange (‘BGX’), which is in effect a tendering system with tenders initiated by the pipeline operator.

MDL has recently sought to reform MPOC by introducing a system known as back-to-back (B2B) balancing which would sharpen the incentives on pipeline users to adhere to daily balancing. As industry regulator, the Gas Industry Company (GIC) has approved the introduction of B2B balancing. However MDL has now promulgated an alternative reform known as daily cash-out (DCO) which is currently being considered by the GIC and industry stakeholders.

From preliminary discussion with industry stakeholders we are aware of a range of views on the DCO proposal. Among the issues that have been raised with us are:

- The impact of DCO-stimulated trades on liquidity in the recently introduced gas spot market;

¹ In extreme low pressure situations the operator can declare a “critical contingency” which allows it to order particular conduct from users.

- The efficiency benefits of signalling to stakeholders the potential cost of their conduct on other parties;
- Information constraints that may make it difficult for pipeline users to ensure balanced positions and hence avoid cash-outs;
- Costs incurred by upstream gas producers under the status quo as pipeline pressures increase;
- Costs that would be incurred by shippers in an effort to gain better information under a DCO regime;
- An increased need for reform of downstream allocation systems so that shippers have greater certainty over the treatment of demand-related imbalances; and
- The potential impact on end-user pricing if shippers effectively bear more risk under DCO;

Alongside these specific issues are related ones concerning the relative merits of B2B balancing and DCO and the potential merits of other reforms that might be expected under any scenario. On this latter point we noted a degree of discomfort with the processes for changing MPOC.

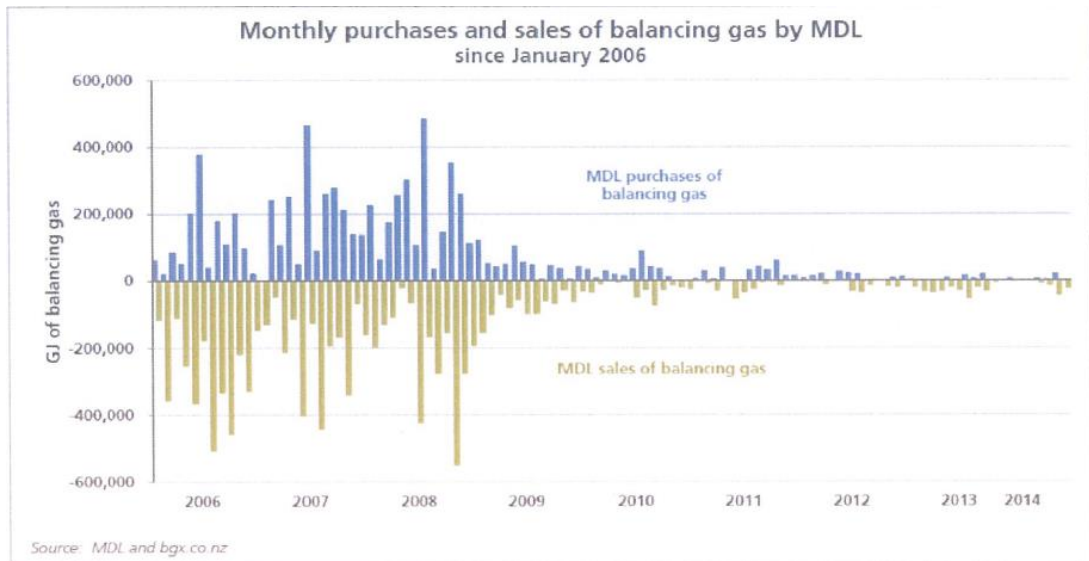
1.1 Background

The gas industry comprises a small number of quite large firms with rather diverse interests. It is largely self-managed including through two multilateral pipeline access codes: MPOC and VTC. As industry co-regulator, the GIC therefore potentially has two roles in respect of code changes.

First, under s29.4(a) of MPOC the GIC's support is required for code changes which cannot proceed unless/until the *"GIC (or any entity granted formal jurisdiction) has made a written recommendation, following appropriate Gas industry consultation, supporting the Change Request"*

It seems however that this obligation does not permit GIC to consider modifications that might improve a change request. Rather, the GIC must decide whether a particular change is either "supported" or "not supported". This contrasts with the GIC's role under the Gas Act 1992, which requires that GIC's Ministerial advice has considered all practicable options.

Pipeline balancing has been discussed for many years. Six years ago, the GIC published a research paper on balancing, after which there was considerable discussion and debate within the industry, particularly in 2008-09. This work-stream was ultimately put on hold and it appears that balancing gas transactions have declined since that time.



1.2 Current Status

GIC has asked Covec to undertake a cost-benefit analysis (CBA) of the DCO proposal, and this is the first draft of our independent report. A CBA of a rule change needs to compare alternative future scenarios with and without the change. At this point in our analysis we are solely focussed on the framework for the cost benefit analysis. The aims of this report are to

- (a) Clearly describe the relevant future scenarios to be evaluated; and
- (b) Identify the categories of cost and benefit associated with these scenarios.

Feedback is sought on our description of the scenarios and the categories of costs and benefits. We also welcome suggestions regarding information and data that may be relevant to the next stage of this analysis, which involves quantifying the costs and benefits.

1.2.1 Structure of this Document

In what follows, section 2 summarises the three scenarios of interest: the status quo, B2B balancing and the DCO proposal. These are not intended to be complete descriptions but rather to be focused on matters of relevance to evaluating the DCO proposal. We then set out the major categories of costs and benefits in section 3, which is followed by some brief concluding comments.

2 Scenario Description

One of the scenarios to be evaluated is the MPOC code-change proposal as promulgated by MDL. We refer to this as the “factual” scenario. Given the history, it seems appropriate to consider this scenario against two alternative “counterfactual” scenarios:

- B2B balancing; and
- The status quo

While it may be possible to sustain a legal argument to the effect that one of these counterfactuals is irrelevant, it seems more consistent with collaborative, industry-led development to include both at this stage. Accordingly, this section aims to describe each future scenario in enough detail to allow all of the potentially relevant costs and benefits to be identified.

2.1 Status Quo

To describe the status quo, we outline the way MPOC deals with pipeline balancing, and note current practices alongside these rules. We then offer some thoughts on the economic consequences of the status quo.

2.1.1 Code Provisions

Section 8 of the MPOC governs the making of nominations, their acceptance by MDL and a range of ways in which they can be adjusted by shippers or curtailed by MDL. Importantly, under s8.2, all nominations must be balanced at the shipper level – i.e. the amount nominated at receipt points must equal the amount nominated at delivery points.

Nevertheless, there are two ways in which physical flows may differ from nominations. One is called “mismatch” and occurs due to interruption actions taken either by MDL or by a welded party (sections 15.1, 15.2). In these cases section 11 of MPOC requires shippers to either trade back to a matched position with one another, or trade with MDL as the counterparty via the MDL IX. In the latter case, the prices are known as mismatch prices and there will typically be different prices for positive and negative mismatches.

The second type of deviation between nominations and physical flows is known as “operational imbalance” and is governed by section 12 of MPOC. Operational imbalances can arise for many different reasons including final consumers drawing gas in greater or lesser volumes than forecast. The DCO proposal is aimed at reforming the arrangements for these operational imbalances.

If a welded party has not run-to-nomination, MDL can (under s12.1) issue it with an Imbalance Limit Over-run Notice (ILON) which states a period of time (not less than one day) in which the welded party is required to return to balance. If balance has not been achieved within the stated time period, MDL may then cash out the welded party at the mismatch prices (s 12.11(a)), even if it has not taken any balancing action.

An incentives pool sits alongside these arrangements. There are two triggers for payments into the pool: for excess daily imbalances (s12.7) and for exceeding hourly peak flow limits (s13.3). There are also two triggers for claims on the pool: for forced operational imbalances (s12.6) and for payments to the balancing agent (s14.4) which are capped at the pool's level for any day.

2.1.2 Current practice

Under normal conditions² MDL can place a 24 hour time limit on the ILONs and enforce cash-outs after this period. However in practice, ILONs are not issued until 10am on the morning after the previous day has ended in an imbalance. Users then have 24 hours to restore balance, which in practice means the end of the next day. There is consequently a significant "grace period" of up to 72 hours available during which time AEOI can persist without fear of being cashed-out.

2.1.3 Economic commentary

Spare pipeline capacity has the economic characteristics of a common pool resource.³ The Maui pipeline can only allow users to borrow or lend gas over multi-day periods because it has spare capacity. If it was more congested, current practices in relation to balancing would already be more stringent.

The case for being more stringent therefore depends partly on whether the Maui pipeline is expected to become more congested over time. Dynamic efficiency considerations suggest that governance arrangements should evolve along with the issues that need to be addressed.

The current arrangements give rise to some inefficiency. For example, balancing gas costs can only be recovered through the incentives pool to the limit of funds available on a day; any other costs are socialised through the pipeline access tariff. GIC analysis of data from January 2009 – September 2011 showed that 57% of balancing costs were socialised in this way.⁴

Conversely, even when no balancing actions are taken, some welded parties can be cashed out if their scheduled quantity is curtailed due to another party being outside its tolerance. This practice could be viewed as efficiency-enhancing and broadly in line with the aims of a DCO regime, particularly if the cash-out prices are reasonable indicators of the true costs.

It seems that shippers and welded parties face uncertain consequences from running an imbalance. There is a risk of being cashed out but this may well not occur; the outcome depends on the actions of other parties including the balancing agent.

² i.e. excluding the special cases specified in s12.10 of MPOC.

³ Other examples include fisheries, irrigation water and clean air. Elinor Ostrom shared the 2009 Nobel Prize for economic science for her work on governance of such common property.

⁴ GIC, Draft Recommendation on 13 October 2011 MPOC Change Request, February 2012, page 18.

Using the pipeline as a storage facility is not necessarily inefficient. However the fact absence of a clear price for storage, and the fact that the effective price is often zero, may undermine incentives to build gas storage. More generally, it may be reasonable to characterise the status quo as not having a clear or efficient price for storage.

The physical flows delivered by upstream producers tend to be flat whereas many customers have demand profiles that “swing” according to weather patterns, production plans, and other changes related to the time of day. Under current arrangements, the common line-pack resource is used to provide much of the swing required by end-users.

It also seems that some gas producers bear increasing costs as pipeline pressures increase towards the maximum level of 48 bar. We understand that high pipeline pressures reduce the efficiency of recovering condensate, leaving some condensate in the gas stream and reducing the overall quality of delivered gas. Section 2.5 of MPOC requires MDL to “use reasonable endeavours to manage the Target Taranaki Pressure to be as low as practicable while maintaining sufficient Line Pack”.

2.2 Back-to-Back Balancing

In October 2011, MDL lodged a change request to introduce back-to-back (B2B) balancing. The main provisions of the proposal involved abandoning the ILO process and instead cashing out parties with operational imbalances directly at the end of any day where balancing actions were taken. A number of consequential amendments were proposed to give effect to this basic plan.

In supporting this proposal, the GIC noted that it would clarify the consequences of being imbalanced, limit the use of cash-outs to situations where balancing actions had occurred, reduce the socialisation of balancing costs by removing the grace period and reducing the imbalance (AEOI) threshold. It was also considered that B2B would result in costs flowing first to those most likely to have created the need for balancing (i.e. welded parties with AEOI).

We have also heard the view that B2B could create perverse incentives on participants. For example, once a balancing action has occurred, parties are effectively on notice that their end-of-day imbalance will be cashed-out. Assuming that the cash-out prices will be inefficient,⁵ parties will have a strong incentive to avoid them, either by rearranging their physical flows or possibly by financial trades.⁶ If physical gas flows were such that balance was restored by the end of the day, there would be no party to whom the cost of balancing gas could be allocated. Another possibility is that participants could over-react leading to imbalances in the opposite direction; this would have the same financial implications for allocating balancing gas costs.

⁵ There is typically a wide spread between call and put prices on the BGX. For example, the smallest spread for prices on 21 October 2014 is over \$6/GJ.

⁶ There is some risk that parties may seek to evade cash-outs by trading gas even if it is not delivered.

These situations would presumably result in balancing costs being socialised through the tariff. In extreme cases they might also cause balancing actions in the reverse direction.

It does seem that the incentive for primary balancing would be stronger under B2B, because the chance of being cashed out is higher. It is apparent however that some parties supporting B2B did so on a conditional basis, reflecting a trade-off between the positive benefits of moving forward with better incentives to self-balance which prevailed over views that more changes were needed or desired.⁷

Our preliminary view is that the risk of perverse incentives under B2B arises from the fact that it makes balancing actions the trigger for cash-outs while also allowing time for parties to react. This does sharpen the incentive for primary balancing (i.e. the incentive for parties to balance their own positions), but only on days when balancing actions are taken. B2B appears to set up a game in which shippers and welded parties try to predict balancing actions and then work hard to avoid bearing costs as a consequence of balancing actions that are taken.

2.3 Daily Cash-Out

MDL has now lodged an MPOC change request for a daily cash-out regime. In doing so, it takes the previously approved B2B change requests as given, so the proposed code changes mostly build on the earlier ones rather than displace them.

In explaining its DCO request, MDL draws heavily on a Network Code on Gas Balancing of Transmission Networks recently approved by the EU.⁸ This is potentially helpful in piggy-backing on negotiated developments in more complex markets, but also carries a risk that local participants may consider these more complex markets less relevant. We also note that while the EU code aims to *“increase(s) the financial responsibility of market players in balancing their portfolio”* it includes measures aimed at *“equipping them both with standardised short-term products and an information framework to do so.”*

The DCO change request defines two types of market: a balancing platform and a trading platform and permits the balancing agent to use either market, or an off-market agreement to trade balancing gas. Subject to conditions (suitability, availability and cost effectiveness) the balancing agent is obliged to trade standard products on a trading platform.

The main impact of the proposed DCO regime is specified in changes to sections 12.10 and 12.11 which effectively provide for daily cash-outs of AEOI at notional and physical welded points, excluding Small Station physical welded points. The proposed cash-out prices are marginal buy/sell prices (rather than averages). No balancing action is required to trigger cash-outs which are also independent of AEOI at other welded points.

⁷ We refer to submissions on the B2B change request, posted on GIC’s website on 17 October 2011.

⁸ http://ec.europa.eu/energy/gas_electricity/codes/gas_en.htm

Cash-outs in the proposed DCO regime are subject to specified tolerances, which will be higher during a transition period (doubled until at least 1 March 2016).

MDL proposes to delete references to the BGX and instead refer to a BGIX which is a “balancing gas information platform that displays information related to Maui Pipeline balancing”. It also proposes to drop explicit references to a balancing agent, including requirements for the agent to provide monthly accounts and audit reports.

2.3.1 Economic commentary

The DCO proposal creates strong incentives for primary balancing by shippers and welded parties. The impacts on market conduct are likely to take some time to emerge as participants gain familiarity with the new regime. If the change request succeeds, it is likely to have several types of flow-on impact.

There is likely to be a demand for better information. At present, shippers do not have complete information on their physical positions on any given gas day. It seems that even many of the time-of-use (TOU) meters are using manual dial-up reading systems rather than modern automatic pulse telemetry. Demand is more opaque in the mass market without TOU meters. A move to a DCO regime will likely provide new urgency to efforts to reconcile and allocate gas the day after delivery. However even “D+1” knowledge will only increase the statistical reliability of nominations; errors are likely to remain.

Final (end-user) contracts may well change. Since shippers will be bearing extra financial risk, it would not be surprising if end-user contracts reflected these costs. Such changes could be reflected through higher average prices or perhaps the addition of extra tariff steps that depend on the peaking characteristics of a customer’s load, or both.

Over-pressure situations, and the associated costs, may persist. If over-pressure is caused primarily by a preference for flat production patterns combined with weekday/weekend variability in demand, then more accurate nominations might not substantially reduce the frequency of high pressure situations. Alternatively, it may be that a DCO regime will provide strong enough incentives to upstream welded parties that over-pressure frequencies are reduced by throttling back production so that it better matches demand.

3 Costs and Benefits

At this stage of the process, we have identified the main categories of costs and benefits that seem likely to arise with both the B2B and DCO regimes. Feedback is sought on whether these categories are correctly identified and whether there are any material omissions.

In the next iteration of this analysis we will pay close attention to comparisons between the scenarios, and to adopt the industry/nation-wide perspectives indicated in the Gas Act 1992. However at this point it seems more helpful to look at each scenario in a degree of isolation, identifying the factors that give rise to costs and benefits for individual parties.

The items mentioned below have varying degrees of connection to pipeline balancing at a daily frequency (which is the target of the DCO proposal). Recognising that many different factors contribute to the incentives for primary balancing and the associated costs, we have tried to be relatively inclusive at this point.

3.1 Status Quo

There seem to be four main cost and/or benefit factors to consider in respect of the status quo.

User benefits from pipeline flexibility

Shippers and welded parties effectively use the pipeline to borrow and lend gas. This flexibility is valuable and is often unpriced. Participants as a whole gain a benefit from not being obliged to manage their positions to daily balance. Some participants also gain extra benefits from having the cost consequences of their actions or inactions shared across the wider industry via the pipeline tariff.

Costs from not pricing storage

The absence of a price for pipeline storage is likely to lead to excessive usage of this service, which amounts to an allocative inefficiency (i.e. storage is used more than it would be if priced).

Capital investments in storage that might provide load-following or 'swing' services are likely to be deterred by the availability of unpriced pipeline storage. In effect, the largely free pipeline service deters competitive entry.

Inefficient balancing market prices

Balancing actions are taken through the BGX which appears to be a very inefficient market. Typical spreads are several times larger than the quotes of buy prices for gas. As a consequence, the cost of balancing is likely to be inefficiently high.

Upstream costs from high pressure

While MPOC requires pipeline pressures to be minimised, there appears in fact to be a weekly pressure cycle with weekend pressures being high enough to impose costs on

some producers. This can be viewed as a balancing issue, though it has a weekly rather than a daily cycle.

We were informed (but have not verified) that average pipeline pressures would be in the 42 bar range if all parties were in balance, and that the costs of not achieving this are several times the cost of balancing gas transactions.

3.2 Back-to-Back

Under back-to-back balancing welded parties would be cashed out on any day that balancing actions occurred. The following costs and benefits seem relevant.

Benefit of better alignment of prices and costs

It is expected that B2B would result in less socialisation of balancing costs. That would improve allocative efficiency by aligning parties financial positions more closely with the impact of their actions.

Risk of perverse actions to avoid balancing costs

Once a balancing action is taken, welded parties will have a strong incentive to correct their positions before the end of the day. That could make pipeline conditions worse, or induce further balancing actions in the reverse direction.

Some improvement in incentive for primary balancing

Parties will prefer for balancing actions not to occur, but have an imperfect ability to influence such outcomes because the need for balancing actions depends on the actions of all parties. On balance, we expect some improvement in the incentive for primary balancing and a consequent improvement of allocative efficiency.

Some abatement of upstream costs from high pressure

To the extent that incentives for primary balancing are improved, it may mitigate the weekly pressure cycle and reduce the associated upstream costs from high pipeline pressures. Whether this occurs depends mainly on the incentives facing receipt point welded parties. It needs to be the case that the expected cash-out costs exceed the expected profit available from maintaining a flat production profile.

3.3 Daily Cash-out

The main costs and benefits of the DCO proposal appear to be as follows.

More efficient balancing prices

The DCO proposal requires balancing actions to be taken using the most cost effective methods which will in some cases require trades through the EMS/tradepoint market where prices seem more efficient (e.g. spreads are smaller)

Strong incentive for primary balancing

Because cash-outs occur regardless of balancing actions, all parties will have strong incentives to achieve balance on a daily basis.

No change to information needed for primary balancing

Although parties will want to balance daily, there is no apparent improvement in the information and/or tools available to them to achieve this, such as D+1 allocation algorithms and/or visibility of conditions on non-Maui pipelines. Until these are developed, DCO might therefore be an inefficient allocation of risk (i.e. not allocating risk to the parties best able to manage it).

One-off system upgrade costs

Most shippers will incur capital costs to adjust internal systems for monitoring demand and reconciling gas on a higher frequency.

Ongoing internal costs

Shippers also consider that they will need extra staff to run their business under the DCO regime. This may also be the case for Vector's pipeline managers, where it may be necessary to validate data on weekends for example.

Possible abatement of upstream costs from high pressure

There is potential for abatement of upstream costs from high pressure. If primary balancing is sufficient to manage these costs down to an efficient level, then the DCO regime will resolve this issue. However this is uncertain for the same reason as noted above: it may be more profitable for some producers to simply incur the cash-outs than to alter production plans.

4 Conclusion

The above analysis has sought to frame up the issues relevant to a cost benefit analysis rather than offer a complete draft of such analysis.

In consultation we encountered widespread endorsement of the need for ongoing refinement of industry arrangements, but much less agreement that the DCO proposal was desirable. On this point, it was considered that

- Balancing costs are much less significant than they have been in the past;
- In the absence of a clear problem definition, speculation is occurring as to the underlying motivation for change; and
- Shippers are concerned that they are being asked to manage their daily balances without having the information and/or tools to do that effectively.

Notwithstanding the GIC's limited mandate in respect of the DCO code-change request, some of these points are relevant to a cost-benefit analysis. For example, if upstream producers are facing costs associated with high pressures then the likelihood of the DCO regime reducing these costs is highly relevant. Similarly, if shippers cannot reasonably manage daily balances, then it may be inefficient to ask them to do so.

We look forward to discussing these and related issues with stakeholders during the next stage of this process.