The types of pipeline balancing and related concerns

MDL Commercial Operator, 8 April 2014

Executive summary

The purpose of this document is to identify and contrast the three types of pipeline balancing – **commercial**, **primary** and **physical** – that are carried out to maintain operational stability in gas transmission networks. Having clearly demarcated the three, we will observe the nexus between them. That is, as commercial balancing regimes become stronger and therefore the incentives on system users to undertake primary balancing become stronger, the need (for TSOs) to have fortified physical balancing tools weakens. An appreciation of the three elements and their relationship with one another is, in the Commercial Operator's view, a necessary precondition for informed discussions about how a balancing framework might be evolved.

Introduction

Gas transmission regimes around the world use different terminology to describe what are essentially the three types of pipeline balancing: "commercial" (**CB**), "primary" (**PrB**) and "physical" (**PhB**). The fact that all three fall under the 'balancing umbrella' tends to cloud a fundamental distinction between them, being the direct imperative driving each.

CB is best identified first. This is the mechanical imbalance cash-out activity undertaken by system operators (usually, at the end of the balancing period). CB transactions have no physical effect on the system itself. Instead it is just a matter of transferring title and money according to predetermined rules.

These rules create incentives on users to maintain a balanced position. The resulting user activity, in response to those incentives, is PrB. To the extent that users' PrB fails to keep the system as a whole in balance, the TSO may step in by undertaking PhB actions.

On a transmission day then, PrB is a concern for shippers; PhB is a concern for TSOs.[1] All parties have one key thing in common: they make their money through reliable transmission being maintained at an efficient cost. With that in mind, shippers balance their position (this is PrB), so as to avoid incurring imbalance charges (these are CB), and TSOs (if required) balance the pipeline, to defend operational limits and/or manage linepack to ensure gas is transported most efficiently (this is PhB).

	Commercial	**Primary**	**Physical**
Undertaken by	TSO	Users	TSO
Purpose	Incentivise shippers to primary balance; recover costs of PhB actions[2]	Maintain balanced position to avoid charges	Maintain system physical conditions within operational limits; daily linepack management
Physical concern?	No	No	Yes
Physical effect	No	Yes	Yes

Straightforward as this set of propositions may be, the nature of pipeline balancing has proved to be a fractious issue in this country for some years now. The recent establishment of spot markets has acted as a

[1] Both are, ultimately, concerned with both (i.e. TSOs also with their position; shippers also with the physical state of the pipeline) but for present purposes we focus on what are effectively their primary concerns.

[2] In some cases the cost recovery element will stem only indirectly from a PhB action (and more immediately from another CB action). For example, the TSO at the end of the day may have cashed out 30TJ of positive imbalance and 20TJ of negative imbalance (leaving it with a +10TJ position). That position may then be sold as a title trade on the market.

catalyst for the apparent divergence of views, ostensibly because a cheaper product[3] has become available (and questions arisen as to why MDL would consider using anything but the cheapest available product, to balance its pipeline). MDL can understand why the industry wishes to revisit the related subjects of what is Balancing Gas and how does/should MDL source it.

This paper has been prepared in response to that demand. In it MDL draws on experience here and overseas in order to make clarifications that, it is hoped, enhance the industry's understanding of pipeline balancing and provide a common language through which issues can be clearly discussed. Given the apparent Shipper appetite to continue evolving the balancing framework[4], MDL would like to ensure as best as possible that the industry is well informed before it takes any further steps forward.

We find ourselves in a curious position, which might be summarised as follows. Our impression is that no one in the industry seems to hold the view that there is *no* physical element to TSO balancing (that is, there is a general awareness that MDL balances to maintain pressure to provide transmission services). However there seems to be a keen focus on what may not be the most helpful question; that is:

> *Is Balancing Gas a specific product as distinct from other gas transmitted through the Maui Pipeline?*

Put in more pointed, concrete fashion the question is effectively this:

> *Given the 'current' MPOC balancing framework, should MDL, in order to meet its RPO obligations, require anything above and beyond a bare nomination (from any source) to the tune of the required Balancing Gas quantity?*

These questions in our view somewhat miss the point – although to an extent we can understand why they are being asked. We will return to them at the end of this paper and answer both with a broad and qualified 'yes'. (Apart from anything else, the distinct character of Balancing Gas was a clear underlying premise of the ICD Process that gave birth, ultimately, to the 2011 B2B Change Request). Before doing so we will, as noted above, explore the three types of pipeline balancing; their relationship with one another; and how they manifest in the most advanced balancing systems overseas.

Commercial and primary balancing

The most advanced balancing regimes – for example, those reflected in the UK's Uniform Network Code[5] (**UKUNC**) and the recently promulgated European Network Code on Gas Balancing of Transmission Networks[6] (**EBNC**) – are designed based on a key fundamental premise: the most efficient way to maintain system balance is for the users to do it themselves, by trading with each other. Strong incentives are put in place such that, commercially, it is in users' best interests to proactively balance their deliveries and offtakes on the day[7]

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[3] By cheaper, we mean both that the 'buy' price on emTrade tends to be lower than the 'buy' price on the BGX; and that the spread on the BGX is wider than we have seen to date on emTrade. At the time of writing, NZX's New Zealand Gas Market has not yet seen any trading.

[4] As evidenced by the draft 'Spot Market Alignment Change Request' circulated by Vector, Contact and Genesis in February 2014.

[5] See http://www.gasgovernance.co.uk/TPD

[6] Commission Regulation (EU) No. 312 of 2014 establishing a Network Code on Gas Balancing of Transmission Networks. Articles relevant to this paper are reproduced in full in *Appendix 1*. The Code is a key output in the implementation of the Commission's Third Package of Legislative Proposals for Electricity and Gas Markets, adopted on 19 September 2007. It was developed by ENTSOG – an organisation comprising 39 TSOs from 23 European countries – at the invitation of the EC in November 2011 to draft a code in line with the Framework Guidelines on Gas Balancing in Transmission Systems issued by ACER on 18 October 2011. The Regulation passed on 26 March 2014. See http://ec.europa.eu/transparency/regcomitology/index.cfm?do=search.dossierdetail&bZAhvt4vmMv5RqBrsGBOFFmzW9LnMHQDlSdOTGSm69bWJFyB0GCVkjysM19P9kVB . The 'base case' deadline for implementation of the Code by member states into national law was recently given as 15 October 2015. The working expectation is that 5 countries (including the UK, France and the Netherlands) will meet that target. A further year's grace can be allowed where the national regulatory authority gives its consent at the request of the TSO(s). This is expected to be the case in six countries. A five year grace period can be allowed in the absence of sufficient liquidity on the short-term wholesale market, and subject to national regulatory approval following assessment of the same. Eleven countries are expected to be in this boat. See http://www.entsog.eu/public/uploads/files/publications/Balancing/2013/BAL510_%20130913_Implementation%20of%20the%20BAL%20NC_FINAL.pdf

[7] Generally, in Entry-Exit systems (which are common in Europe), shippers are required to balance their net deliveries and offtakes over the system over the day, but not necessarily at specific Entry and Exit points. This is one of the reasons why locational balancing products are sometimes called upon by the TSO.

(that is, manage their positions to be as close to neutral as possible). This is to avoid imbalance charges, scheduling charges and the like. These incentives exist perpetually and, crucially, are not contingent on TSO PhB actions. The resulting user activity – using the tools provided, for example a liquid spot market – is PrB.

Europe, which New Zealand has long looked to for inspiration as far as international good practice goes, is moving towards a balancing system that explicitly acknowledges the overarching emphasis should be on PrB. Article 4(1) of the EBNC[8] –

> *The network users shall be responsible to balance their balancing portfolios in order to minimise the need for transmission system operators to undertake balancing actions set out under this Regulation.*

Article 4(2) speaks (albeit broadly) to what, then, is required for the system to function –

> *Balancing rules established in accordance with this Regulation shall reflect genuine system needs, taking into account the resources available to transmission system operators and shall provide incentives for network users to balance their balancing portfolios effectively.*

Bringing these principles together: users have the primary responsibility, backed by incentives[9] and corresponding tools, to balance the system. To the extent that they fail to do so, the TSO has a residual role in addressing genuine system needs with the resources available to it.

These after all were among the premises of the UK Network Code (**UKNC**), when it was introduced in March 1996 (and later, of the UKUNC, when it replaced the UKNC in 2005). Significantly, the primary balancing incentive came first. As Heather notes, the UKNC "created the system of daily balancing and thereby a need for a short term traded market."[10] That daily balancing system was given with a staggered implementation, first with a 7-month 'soft landing', followed by a 6-year 'hard landing'. During the former shippers were obliged to begin balancing on a daily basis, but were given generous tolerances – and imbalances were cashed out only at the "System Average Price". From the commencement of the 'hard landing', cash-outs were based on the "System Marginal Price" – and, over six years, the tolerances gradually reduced to zero.[11]

Other European jurisdictions have different sets of CB arrangements, in some cases more severe. In Belgium, for example, if during the day the market position[12] breaches an upper or lower threshold, the TSO settles the market excess or shortfall by selling or buying an equivalent quantity of gas. Those shippers with an imbalance in that direction are immediately cashed-out[13] *pro rata* their contribution.[14] Not only that; a further cash-out occurs at the end of the day – regardless of whether any balancing actions were taken – whereby all user imbalances are settled to zero.[15] This effectively overlays a full daily cash-out regime on top of a galvanised B2B regime.

Physical balancing

We have observed so far that the TSO's PhB role should be residual. Logically, the next question follows: when the TSO steps in, what specifically is the purpose of its intervention? Here the EBNC speaks succinctly to the matter –

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[8] Article 4 is titled "General principles". It is the first article in Chapter II ("Balancing system").
[9] As far as the CB regime in the EBNC is concerned, see Chapters V ("Daily imbalance charges") and VI ("Within day obligations")
[10] *The Evolution and Functioning of the Traded Gas Market in Britain*, Patrick Heather, The Oxford Institute for Energy Studies, NG44 August 2010, p.7
[11] Above, p.8. Both System Average Price (volume weighted average price) and System Marginal Price (highest and lowest trade) are determined by all the trading that National Grid NTS conducts on a given day on the market in its capacity as TSO and its obligation to physically balance the system.
[12] That is, the sum of all individual shipper positions. These thresholds vary on a seasonal basis.
[13] This stands in marked contrast to the B2B system, under which those users which 'caused' the balancing action to be taken can escape charges if they can remedy their position by the end of the day.
[14] The cash-out price for those who received (gave) gas is the lower (higher) of the gas price and the weighted average price of the corresponding transaction(s), plus an incentive margin (initially set at 10%).
[15] Note that behind these CB mechanisms the TSO also has the ability (if necessary) to undertake PhB actions.

Chapter III (Operational balancing)

Article 6 (General provisions)

(1) The transmission system operator shall undertake balancing actions in order to:

(a) maintain the transmission network within its operational limits;
(b) achieve an end of day linepack position in the transmission network different from the one anticipated on the basis of expected inputs and off-takes for that gas day, consistent with economic and efficient operation of the transmission network.

Immediately it is clear that the imperative is to manage linepack and pressure, on the day as a matter of urgency; or for the day ahead, based on expected flows. (Readers might also note that paragraphs (a) and (b) essentially mirror what have been commonly referred to as "section 3" and "section 2" balancing respectively[16].) The physicality of the concern emerges yet more clearly in paragraph 2 of Article 6, which lists the minimum considerations the TSO must have regard to while undertaking balancing actions:

(2) While undertaking balancing actions the transmission system operator shall consider at least the following in respect of the balancing zone:

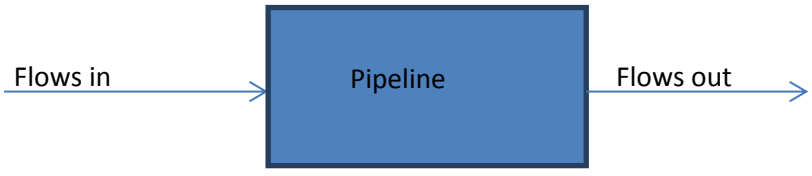
(a) the transmission system owner's own estimates of demand of gas over and within the gas day for which the balancing action(s) is (are) considered;
(b) nomination and allocation information and measured gas flows;
(c) gas pressures throughout the transmission network.

The UKUNC requires National Grid NTS to have regard to very similar considerations.[17] Having taken into account the above, the TSO then decides, on a case-by-case basis, what action (if any) is required to address the situation. This is a matter of having available and selecting the right tool. But before we assess what balancing products are available to TSOs in mature markets, it's fitting at this point to step back and consider the matter through a wider lens. That is, to acknowledge that buying and selling balancing gas is only one means by which the operator can manipulate system pressure; interruption of supply is another – and the overlap between the two may be greater than commonly perceived.

Interruptions or curtailments

In order to have the maximum physical effect on a pipeline, TSO-initiated actions should create a flow imbalance in the opposite direction to the pipeline issue. For example, during a high pressure event a TSO will endeavour to create a flow mismatch such that less is flowing into the pipeline than out of it; in a low pressure event, the TSO will endeavour to create a flow mismatch such that flows into the pipeline become greater than flows out. There are two ways to achieve this result:

1. Increase the flows on one side (the side that alleviates the issue)
2. Reduce the flows on one side (the side that intensifies the issue)



The physical condition of the pipeline can be crudely simplified as follows:

Flows in – Flows out = Change in pipeline position

[16] These terms refer to MDL's Standard Operating Procedures (Maui Balancing Gas Instruction)
[17] Refer section D1.3.1

Some operators around the world have control of at least some of the inputs into their system[18] – and hence can manage high pressure situations by reducing their own flows into their system (by winding back on compressors).

In scenarios where the low pressure issues are the prevalent problem, load shedding mechanisms (curtailments on the user side) are a very effective tool. These are used regularly in capacity allocation style pipelines, as well as by the Critical Contingency Operator here in New Zealand. End user curtailments have the following effect:

Flows into the system will *ceteris paribus* remain the same, whilst the flows out will reduce. This will result in the pipeline increasing in Line Pack and hence in pressure. The net result will be a stabilisation of the pipeline. Clearly, the changes in flow must be actual changes, not notional "book values" or un-backed nominations. TSOs using load shedding mechanisms (curtailment of selected users) must see a physical reduction in flows at the relevant points – in a timely manner – to ensure that the pipeline conditions can be effectively managed. In order to achieve this, these TSOs have access to services with special conditions requiring counterparties to show evidence of reduction in gas usage. These services can be provided through an auction, whereby end users will set a price at which they are willing to reduce their load. Often the price of such a service will exceed the market price of gas – but its use is nonetheless perceived as one of the most effective way to manage physical issues on the system.

The interruption of an end user is a useful tool when:

1. when the pipeline is at maximum capacity (and other users, which value the transmission service more, have secured firm capacity),
2. when the pipeline conditions are threatening the transmission service (and one party, which values the transmission of their gas less than others, may be willing to ramp down), and
3. all other measures have failed and the pipeline has entered an emergency state (e.g. a critical contingency). At this point certain users are interrupted – not based on purely commercial considerations, but rather on the ability to affect change quickly without risk to an essential service.

Interruptions/curtailments vs. Balancing Gas

Despite the different terminology and perception gap the terms create, there is significant overlap between curtailments and balancing. Let's look at this in the context of both high and low pressure events:

A. ***High Pressure***. The pipeline contains too much gas. The operator needs to change the flow balance to ensure there is more gas leaving the pipeline than entering it. Balancing gas is sold to whichever party is offering to offtake it at the highest price.

    a. If this is a production station (or other source of gas), they will curtail their injection to reduce the amount of gas entering the pipeline.
    b. If this is an end user (consumer), they will increase their consumption rate to increase the amount of gas leaving the pipeline.

B. ***Low Pressure***. The pipeline does not have enough gas in it. The operator needs to change the flow balance to ensure more gas is entering the pipeline than leaving it. Balancing gas is purchased from whichever party is offering to supply it at the lowest price.

    a. If this is a production station (or other source of gas), they will increase their injection rates to increase the amount of gas entering the pipeline.

[18] This can be through a contract for access to a storage facility; ownership of a storage facility; a contract with a gas producer to be the swing provider; or through other means.

b. If this is an end user (consumer), they will curtail/reduce their offtake of gas to reduce the amount of gas leaving the pipeline.

What is clear from the above is that balancing gas transactions will essentially result in a one sided targeted curtailment in two out of the four possible scenarios (Aa and Bb). By buying and selling balancing gas, rather than operating a one-sided curtailment market, an operator also allows the opportunity for users to increase their flows in situations where this will assist with the physical pipeline issues.

The reliability of the tool is subject to the operator having direct visibility down to metered flows at the producer or end user the 'actions' of which will have the effect contracted for. Taking the supply interruption example, in a system where a shipper bids into an interruption auction, the shipper will need to nominate which user(s) is (are) shedding load, so that the operator can verify a physical effect has been created through the transaction. Ultimately it follows that, for there to be an efficient price, only those that can provide the required service effectively should be able to participate in the market for it. The same logic applies as far as 'physical' balancing products are concerned.

Conclusions: curtailments and balancing

In substance, a one-sided curtailment has the same physical effect as a balancing gas transaction in which the counterparty ramps down on their injection/consumption. In both cases the operator needs to have visibility that the physical effect contracted for has actually materialised. This requires the counterparty to have both the *capacity* to have the required effect on the system and the *incentive* to take the required action.

The one occasion on which Shipper Mismatch was used to manage a situation led to a number of disputes that took some time to settle; and as a result, MDL has been reluctant to use it since. For reasons outside the scope of this paper (but well known to the industry), the 'two-sided' curtailment tools in section 15 of the MPOC are only useful in a very limited range of scenarios. Given these difficulties, MDL prefers not to draw on these tools – opting instead to draw on Balancing Gas buys/sells for as long as it is cost effective to do so.

Physical balancing (continued): having the right tools for the job

TSOs overseas – like the UK's National Grid NTS – have a range of balancing tools at their disposal. These include capacity buybacks[19]; storage withdrawals and injections; linepack flexibility; as well as balancing gas buys/sells. Focusing only on the latter, we see nonetheless that the UK TSO has several products to choose from on the Over-the-Counter-Market (operated by ICE-Endex):

- ***OCM Title Trades***
  - Most traded product
  - Traded between shippers; and between shippers and the UK TSO
  - Most trades are for titles of gas already scheduled for shipment (i.e. not for additional gas to balance the system)
- ***OCM Physical Trades***
  - More urgent and detailed notification by ICE-Endex
  - Creates an obligation on the counterparty to alter the nominated rate of delivery/offtake to/from a System Point (failure to nominate in accordance with required criteria attracts a penalty charge)
  - No specific location (balancing zone) for delivery/offtake specified by the UK TSO
- ***OCM Locational Trades***
  - As per the OCM Physical Trade, but the location is specified in the OCM Physical Order

[19] Initially interruptible contracts would be invoked; but in extreme cases, even capacity previously sold as 'firm' could be bought back. See Heather, footnote 9, p.10

For many years now, the UK TSO has drawn only upon OCM Title Trades (and occasionally, on OCM Locational Trades, where the pressure issue is limited to a particular balancing zone) to balance the system. This is a function of many factors – but above all, it is because the CB regime and the PrB incentives it creates are so strong (and the market so liquid) that the UK TSO can have confidence the physical (effect) will follow the deemed (effect). Nonetheless, the facility remains in place – as does the ability to go off-market, if the circumstances require.[20]

We see a similar framework under the EBNC:

> ***Operational balancing***
> *General provisions (Article 6)*
> - To meet their balancing needs TSOs shall use short term standardised products (on a trading platform) and/or bilateral contracts. *Paragraph (3)*.
>
> *Short-term standardised products (Article 7)*
> - These will be tradable on the day or day ahead in accordance with the trading platform rules as defined between the market operator and the TSO. *Paragraph (1)*.
> - There will be different types of product – title, locational and temporal – each with different requirements. *Paragraphs (3)-(6)*.
> - When establishing short term products, TSOs from adjacent balancing zones shall cooperate to determine the relevant products. *Paragraph (7)*.
>
> *Balancing services (Article 8)*
> - Bilateral contracts can be used in situations where short term standardised products will not or are not likely to provide the response necessary to keep the transmission network within its operational limits or in the absence of liquidity of trade in short term standardised products. *Paragraph (1)*.
> - In procuring bilateral contracts TSOs shall consider the costs and benefits of using them rather than short term standardised products, gas quality requirements and the extent to which their use may affect market liquidity. *Paragraph (2)*.
> - Bilateral contracts shall be procured through transparent, non-discriminatory public tenders and shall be reviewed annually, unless the national regulator permits otherwise. *Paragraphs (3)-(6)*.
>
> *Merit order (Article 9)*
> - While always having ultimate regard to cost efficiency, TSOs shall prioritise the use of short term title products. Other short term products (locational, temporal, temporal-locational) should be used in appropriate circumstances. Bilateral contracts should only be used where short term products will not or are not likely to provide the necessary response. *Paragraph (1)*.
> - As far as short term products are concerned, TSOs shall prioritise the use of intra-day products over day ahead products where and to the extent appropriate. *Paragraph (2)*.

It's instructive to note the subtle differences between the UKUNC and the EBNC. Whereas the UK has a mature system with a settled and complete suite of incentives and tools, parts of Europe – for which the EBNC evidently caters – are not so advanced. The EBNC thus makes concessions recognising that not all systems have stringent CB regimes (creating strong PrB incentives), storage facilities and/or liquid spot markets. Because New Zealand is clearly 'not there yet', it's appropriate that these concessions be observed.

The most notable for present purposes is the caveat applied (in Articles 8 and 9) to the use of "balancing services" (i.e. bilateral contracts). Article 8(1):

[20] This is when a Gas Deficit Warning is issued by National Grid NTS. Refer section D3.1.2 UKUNC.

The transmission system operator is entitled to procure balancing services for those situations in which short term standardised products will not or are not likely to provide the response necessary to keep the transmission network within its operational limits or in the absence of liquidity of trade in short term standardised products.

Liquidity aside, the TSO's concern is the effectiveness of the response. This is a function of time and/or space (weighed against the ultimate cost-efficiency of the respective options[21]). Hence the mandatory considerations listed in paragraph (2) of Article 8:

For the purpose of undertaking balancing actions through the use of balancing services, the transmission system operator when procuring these balancing services shall consider at least the following:

(a) how balancing services will keep the transmission network within its operational limits;
(b) the response time of the balancing services compared to the response times of any available short term standardised products;
(c) the estimated cost of the procurement and use of balancing services compared to the estimated cost of use of any available short term standardised products;
(d) the area at which the gas needs to be delivered;
(e) the transmission system operator's gas quality requirements;
(f) to what extent the procurement and use of balancing services may affect the liquidity of the short term wholesale gas market.

The UK system operator takes a similar approach. In its Procurement Guidelines Statement (2014-2015)[22] the National Grid NTS when procuring System Management Services[23] applies (among others) the following principles:

- *In contracting for the provision of System Management Services, National Grid NTS will endeavour to purchase from the most economic and efficient sources available at that time, having regard to the attributes of such service and delivery, which may include assessed liquidity of the market, reliability, quality, quantity, location, lead time, deliverability, and diversity.*
- *In assessing the reliability of the service National Grid NTS will consider, for example, the historical performance of the provider and an assessment of the prospective effectiveness of the procured service.*
- *If National Grid NTS considers that there is either insufficient competition in the provision of a System Management Service or there is a more economic or efficient option, National Grid NTS may contract for such provision on a negotiated bilateral basis. National Grid NTS may wish to stimulate development of secondary markets by the use of bilateral contracts.*

The same theme carries forward in the section dealing with "tool usage":

The consideration of National Grid NTS whether to undertake actions within or outside of the trading systems will be based on an assessment of the level and cost of services expected to be available within such trading systems.

Contracts will be entered into to complement or substitute for trading system use when:

- *National Grid NTS anticipates there is insufficient service availability via the trading systems to meet requirements, and / or*
- *National Grid NTS considers that such contracts will lead to a reduction in cost or a more favourable risk profile for the community and/or National Grid NTS, and / or*
- *National Grid NTS considers that the required operational characteristics are not available through the trading systems.*[24]

[21] Again, cost-efficiency is mentioned in the proviso to Article 9(1): "The transmission system operator shall take into account cost-efficiency within the respective levels of the merit order referred to under (a)-(c)."
[22] See *Procurement Guidelines Statement, UK Transmission, 2014-2015,* National Grid NTS, February 2014 (v13.0), p.9. http://www2.nationalgrid.com/UK/Industry-information/Business-compliance/Procurement-and-System-Management-Documents/
[23] System Management Services are the services that National Grid NTS needs to procure in order to operate the National Transmission System. Special Condition 8A.33 defines SMS as "services in relation to the balancing of gas inputs to and gas offtakes from the NTS and includes balancing trades and balancing trade derivatives and constraint management services." Above, p.8

One takeaway point here is that, even in systems where the TSO has access to a liquid spot market, the products on that market may still not have the required characteristics necessary to give a TSO comfort their use will have the required physical effect on system conditions. A number of factors concerning the features of the products on offer feed into the efficiency assessment.

It's also interesting to note what the EBNC provides for with respect to systems yet to develop a liquid short term wholesale market. Article 47(1), which falls under Chapter X ("Interim Measures), provides as follows:

Article 47 (Balancing platform)

(1) Where the short term wholesale gas market has or is anticipated to have insufficient liquidity or where temporal products and locational products required by the transmission system operator cannot reasonably be procured on this market, a balancing platform shall be established for the purpose of transmission system operator balancing.[25]

If a trading platform does not exist or does not satisfy the TSO's needs, use of the balancing platform may be the most efficient outcome. As ENTSOG observes in its Accompanying Document to the EBNC[26], "this could for example be the case where the TSO needs to undertake a Balancing Action on very rare occasions and there are only a small number of Network Users active in the transmission network." Moreover, "Where the TSO has access to a Balancing Service the marginal cost of using such a service can be lower than the marginal cost of trading in [short term standardised products]… the use of [short term standardised products] might not always be cost optimal."[27]

Ultimately: "The effects of trading a [short term standardised product] and the use of a Balancing Service should be the same: to achieve a change in flows onto and/or leaving the transmission network."[28] We couldn't agree more.

What does all of this mean for New Zealand?

Thus far we have seen that, in Europe, systems with stringent CB regimes (creating strong PrB incentives) nonetheless reserve the right for TSOs to draw on a suite of balancing products to undertake PhB, some on the market and some off. Once liquid spot markets have developed in response to those CB incentives (becoming gradually stronger, as they did during the 'soft' and 'hard' landings the UKNC had between 1996 and 2002), and there is a perpetual incentive for users to maintain balanced positions, the TSO in most cases will be content to trade only in title products. This is because it can have confidence the physical will follow the deemed. Thus the nexus: as CB incentives become stronger, and therefore PrB more reliable, the (practical) need for fortified PhB products weakens.

In mature systems there is *always* an incentive (a strong one) for users to maintain balanced positions. At no point does that incentive become contingent on any PhB action by the TSO.

The elephant in the corner – kept there, until now – is the question: but what if a stringent CB regime (creating strong CB incentives) is not in place? Here we need to consider the B2B MPOC, which is significantly weaker than its European counterparts. Given it's acknowledged as the most developed balancing market, we take the UK for comparison purposes.

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[24] Above, p.10
[25] "balancing platform" is defined in Article 3(6) as "a trading platform where a transmission system operator is a trading participant to all trades."
[26] See p.7. http://www.entsog.eu/public/uploads/files/publications/Balancing/2012/BAL415-12_121026_Accompanying_Document_to_Network_Code_on_Balancing_FINAL.PDF
[27] As above
[28] As above, p.8

Feature	B2B (NZ)	Daily cash-out (UK)
Perpetual or conditional CB incentive?	Conditional (on the Balancing Agent taking a balancing action)	Perpetual
Full cash-out or only above tolerance	Only above tolerance	Full
Full cash-out regardless of other user imbalances or for proportionate share of balancing transactions?	Proportionate share of balancing transactions	Full
Cash-out at system average price or system marginal price?	System average price	System marginal price

At the time the B2B Change Request was submitted in October 2011, there was tacit acknowledgment that a direct leap to a full daily cash-out system was too burdensome given two fundamental obstacles: the lack of bilateral trading platform accessible to all users and the absence of a nominations regime (or at the very least, D+1 allocation) on Vector's system. Now that there are trading platforms established on both the Maui and Vector systems (NZX's New Zealand Gas Market and emTrade, respectively), the first obstacle is subsiding.

The second obstacle however remains. MDL is prepared to discuss with the industry how the system could move towards a mature, daily cash-out regime (and to that end, suggests taking the EBNC as a starting point). Like other members of the industry, we too would like to see the GIC make progress on the D+1 workstream, such that with Vector's cooperation the apparent obstacle to progress is removed (if the industry decides the cost is worth it, to them).

In the meantime, however, we have the current MPOC framework (and soon, we expect, the B2B framework). There may be tweaks which can be made, short of a complete overhaul, in order for the equilibrium to shift. We encourage the industry to share their views with us on how this can be achieved. Short of any strengthening of the CB incentives, though, MDL remains very much constrained:

- MDL does not control any of the inputs/offtakes to/from the Maui Pipeline (in particular, it does not have access to a storage facility).
- The curtailment tool it does have under section 15 of the MPOC is only of (some) use in a limited range of situations.
- MDL has no capacity buyback facility (because it does not sell capacity).
- MDL has no visibility and therefore no (virtual) certainty that:
    - those trading on the emTrade system will adjust their actual injections/offtakes within the required timeframe, because of:
        - the weak CB incentive which they are subject to through Frankley Road[29],
        - the lack of oversight by emTrade over imbalance trading, and
        - the fact that traders can go into significant mismatch positions to meet their trade obligations, so long as they have the required capacity; and
    - even if those users did adjust their actual injections/offtakes as required, the physical effect on the Maui Pipeline – through Frankley Road – would directly reflect that adjustment. (MDL is not tasked with balancing the entire New Zealand gas transmission system.)
- NZX's New Zealand Gas Market has no liquidity whatsoever, at the time of writing. emTrade's daily trading activity tends to be just a fraction of the Running Operational Imbalances we typically see at Frankley Road.
- MDL sources its balancing gas on the BGX, under contracts which during a recent review were found to be lacking in delivery incentives.[30]

[29] This is a function of both the MPOC and the VTC.

Taking these considerations into account, we hope the industry can appreciate where the obstacles to progress lie. To the extent the industry thinks it's commercially worthwhile to do so, MDL will play its part in a shared endeavour to remove those obstacles – provided that principles of sound international practice underpin that process. In the meantime, we accept that there is an educational role for us to play, to ensure that all parties are well informed before moving forward. That is the purpose of this paper and of the workshop held on 3 April 2014, although certainly more work and sharing will need to be done.

Is Balancing Gas a specific product? Concluding remarks

We return to this question only because it appears to be one which members of the industry would like an answer to. Throughout the sections above MDL's view, corroborated by international good practice, has been clearly put forward. That is, that no matter how mature and sophisticated a balancing system, there will always be a place for particular balancing products which, when called upon, have a more reliable physical effect than others. The key point however is that the practical need for these products diminishes almost to zero (especially in simple, small systems) when strong PrB incentives exist perpetually as a function of CB regimes such as that which exists in the UK. Weak CB regimes (like ours) increase the need for special PhB products, particularly when other balancing tools such as capacity buy-backs and storage adjustments are not available to the TSO (as they are not to MDL).

Bringing these strands together, the question is answered with a broad 'yes'. Incidentally, MPOC provides its own clues in support of this conclusion. A cursory examination of the curtailment priorities in section 8 makes plain that Balancing Gas quantities are treated differently from 'other' Approved Nominations. During both the Provisional and Changed Provisional cycles Nominated Quantities for Balancing Gas receive the highest priority of all nominations[31] – even above Category A Nominations (i.e. so-called 'firm capacity'). During each Intra-Day cycle Balancing Gas Nominated Quantities are second in priority only to nominations which were already approved by MDL at the start of that cycle (i.e. Approved Nominations).[32]

Pedantic as these clues may seem, the broader point alluded to in the Introduction remains. Throughout the ICD process that led us as an industry to B2B, Balancing Gas was clearly understood to be a specific product distinct from commercially traded gas. Granted it was envisaged that all transmission system users would have the opportunity to provide balancing services – but that was on the premise that Vector first implemented daily nominations and OBA allocation.[33] MDL continues to work on that premise and supports any industry endeavours to make headway in this context.

We hope the industry will find this paper informative and we invite feedback and discussions coming out of it. It is MDL's hope, also, that whatever discussions materialise take a holistic approach, acknowledging the system as a whole. At a minimum, this requires a working understanding of the nature of PrB, CB and PhB and the nexus between them. It also requires that the aforementioned obstacles to progress be borne in mind.

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[30] For various reasons, it was decided nonetheless not to renegotiate stronger contracts with the current counterparties, at least for a reasonable period following B2B implementation. If after that period MDL has cause for concern about delivery performance – and PrB incentives have not been strengthened through a galvanised CB regime across both codes – then MDL may revise its position.

[31] See sections 8.23-8.26 MPOC

[32] Section 8.27(a) MPOC

[33] *Memorandum of Understanding: Integrated Gas Balancing Regime*, see http://gasindustry.co.nz/work-programme/transmission-pipeline-balancing. Refer in particular Schedule 3. The MoU was largely supported by the industry (the only two parties who did not sign it were Vector Limited and Vector Gas Contracts Limited) and sets out the essential features of the integrated balancing arrangements that were substantially agreed to by the industry during the ICD process.

Appendix 1: European Balancing Code, (most) relevant Articles

Chapter II (Balancing system)

Article 4 (General Principles)

(1) The network users shall be responsible to balance their balancing portfolios in order to minimise the need for transmission system operators to undertake balancing actions set out under this Regulation.

(2) Balancing rules established in accordance with this Regulation shall reflect genuine system needs, taking into account the resources available to transmission system operators and shall provide incentives for network users to balance their balancing portfolios effectively.

Chapter III (Operational balancing)

Article 6 (General provisions)

(1) The transmission system operator shall undertake balancing actions in order to:
   (a) maintain the transmission network within its operational limits;
   (b) achieve an end of day linepack position in the transmission network different from the one anticipated on the basis of expected inputs and off-takes for that gas day, consistent with economic and efficient operation of the transmission network.

(2) While undertaking balancing actions the transmission system operator shall consider at least the following in respect of the balancing zone:
   (a) the transmission system operator's own estimates of demand of gas over and within the gas day for which the balancing action(s) is (are) considered;
   (b) nomination and allocation information and measured gas flows;
   (c) gas pressures throughout the transmission network(s).

(3) The transmission system operator shall undertake balancing actions through:
   (a) purchase and sale of short term standardised products on a trading platform; and/or
   (b) the use of balancing services.

(4) While undertaking balancing actions the transmission system operator shall take into account the following principles:
   (a) the balancing actions shall be undertaken on a non-discriminatory basis;
   (b) the balancing actions shall have regard to any obligation upon transmission system operators to operate an economic and efficient transmission network.

Article 7 (Short term standardised products)

(1) The short term standardised products shall be traded for delivery on a within day or day ahead basis seven days a week in accordance with the applicable rules of the trading platform as defined between the trading platform operator and the transmission system operator.

(2) The originating trading participant is the trading participant that posts a bid or an offer to trade on the trading platform and the accepting trading participant is the trading participant that accepts it.

(3) Where a title product is traded:
   (a) one trading participant makes an acquiring trade notification and the other makes a disposing trade notification;
   (b) both trade notifications shall specify the gas quantity transferred from the trading participant who makes a disposing trade notification to the trading participant who makes an acquiring trade notification;

(c) where an hourly notification quantity is used, it shall be applied flat to all the remaining hours of the gas day from a specified start time and shall be equal to zero for all the hours before this start time.

(4) Where a locational product is traded:
   (a) the transmission system operator shall determine the relevant entry and exit points or groups thereof that can be used;
   (b) all the conditions specified in paragraph 3 shall be fulfilled;
   (c) the originating trading participant shall modify the quantity of gas to be delivered to or off-taken from the transmission network at the specified entry or exit point by an amount equal to the notification quantity and provide evidence to the transmission system operator that the quantity was modified accordingly;

(5) Where a temporal product is traded:
   (a) the conditions specified in paragraph 3(a) and (b) shall be fulfilled;
   (b) an hourly notification quantity shall be applied to the hours of the gas day from a specified start time up to a specified end time and shall be equal to zero for all the hours before the start time and zero for all the hours after the end time.

(6) Where a temporal locational product is traded, the conditions specified in paragraph 4(a), and (c) and paragraph 5 shall be fulfilled.

(7) When establishing the short term standardised products, the transmission system operators from adjacent balancing zones shall cooperate in order to determine the relevant products. Each transmission system operator shall inform the relevant trading platform operators of the result of such cooperation without undue delay.

Article 8 (Balancing Services)

(1) The transmission system operator is entitled to procure balancing services for those situations in which short term standardised products will not or are not likely to provide the response necessary to keep the transmission network within its operational limits or in the absence of liquidity of trade in short term standardised products.

(2) For the purpose of undertaking balancing actions through the use of balancing services, the transmission system operator when procuring these balancing services shall consider at least the following:
   (g) how balancing services will keep the transmission network within its operational limits;
   (h) the response time of the balancing services compared to the response times of any available short term standardised products;
   (i) the estimated cost of the procurement and use of balancing services compared to the estimated cost of use of any available short term standardised products;
   (j) the area at which the gas needs to be delivered;
   (k) the transmission system operator's gas quality requirements;
   (l) to what extent the procurement and use of balancing services may affect the liquidity of the short term wholesale gas market.

(3) Balancing services shall be procured in a market-based manner, through a transparent and non-discriminatory public tender procedure in accordance with the applicable national rules, in particular:

(4) prior to any commitment to contract for a balancing service, the transmission system operator shall publish a non-restrictive call for tender indicating the purpose, scope and related instructions to tenderers, to enable them to participate in the tender process;

(5) the results shall be published without prejudice to the protection of commercially sensitive information and individual results shall be disclosed to each tenderer.

(6) Under specific circumstances a transparent and non-discriminatory procedure other than a public tender may be approved by the national regulatory authority.
(7) Unless a decision by the national regulatory authority allows for a longer duration of a balancing service, the duration of a balancing service shall not exceed one year and the starting date shall occur within a twelve month period from the related binding commitment of the contracting parties.
(8) The transmission system operator shall review the use of its balancing services annually in order to assess whether available short term standardised products would better meet the transmission system operator's operational requirements and whether the use of balancing services could be reduced for the next year.
(9) The transmission system operator shall publish annually the information with regard to the balancing services procured and the related costs incurred.

Article 9 (Merit Order)

(1) Subject to the principles set out in Article 6(4), when deciding upon the appropriate balancing actions, the transmission system operator, shall:
    (a) prioritise the use of title products where and to the extent appropriate over any other available short term standardised products.
    (b) use the other short term standardised products when the following circumstances are met:
        1. locational products when, in order to keep the transmission network within its operational limits, gas flow changes are needed at specific entry and/or exit points and/or to start from a specific period of time within the gas day.
        2. temporal products when, in order to keep the transmission network within its operational limits, gas flow changes are needed within a specific period of time within the gas day. The transmission system operator shall only use a temporal product when it would be more economic and efficient than the purchase and sale of a combination of title products or locational products.
        3. temporal locational products when, in order to keep the transmission network within its operational limits, gas flow changes are needed at specific entry and/or exit points and within a specific period of time within the gas day. The transmission system operator shall only use a temporal locational product when it would be more economic and efficient than the purchase and sale of a combination of locational products.
    (c) only use balancing services where short term standardised products will not or are not likely to provide, upon assessment of the transmission system operator concerned, the response necessary to keep the transmission network within its operational limits.

    The transmission system operator shall take into account cost-efficiency within the respective levels of the merit order referred to under (a)-(c).

(2) While trading in short term standardised products, the transmission system operator shall prioritise the use of within day products over day ahead products where and to the extent appropriate.
(3) The transmission system operator may seek approval from the national regulatory authority to trade within an adjacent balancing zone, and have the gas transported to and from this balancing zone, an adjacent balancing zone as an alternative to trading title products and/or locational products in its own balancing zone(s). When deciding on granting the approval, the national regulatory authority may consider alternative solutions to improve the functioning of the domestic market. The applicable terms and conditions shall be reconsidered on an annual basis by the

transmission system operator and the national regulatory authority. The use of this balancing action shall not limit the access to and use by the network users of capacity at the interconnection point concerned.

(4) The transmission system operator shall publish on a yearly basis the information with regard to the costs, frequency and quantity of the balancing actions undertaken in accordance with each of the requirements set out in paragraph 1 and of the balancing actions undertaken in accordance with paragraph 3.