

# **TRANSITIONAL MEASURES FOR REFORMS TO THE VICTORIAN DECLARED WHOLESALE GAS MARKET**

**AUSTRALIAN ENERGY MARKET COMMISSION**

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**FINAL REPORT**

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**TPA Solutions**

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## ABBREVIATIONS

ACCC	Australian Competition and Consumer Commission
AEMC	Australian Energy Market Commission
AEMO	Australian Energy Market Operator
AER	Australian Energy Regulator
CEPA	Cambridge Economic Policy Associates
DTS	Declared Transmission System
DWGM	Declared Wholesale Gas Market
GBJV	Gippsland Basin Joint Venture
GSA	Gas supply agreement
GSOO	Gas statement of opportunities
LDZ	Local distribution zone
LNG	liquefied natural gas
mcm	Million cubic meters
MP	Market participant
NWE	North West Europe
OCM	On the day commodity market
OTC	Over-the-counter
POS	Individual shipper's cumulative balancing position
RBA	Residual balancing action
SAP	System average price
SBS	System balancing signal
SMP	System marginal price
SO	System operator

## EXECUTIVE SUMMARY

The Australian Energy Market Commission (AEMC) has been undertaking a detailed review of the Declared Wholesale Gas Market (DWGM) in Victoria. This review was requested by the Victorian Government in 2015 and its purpose has been to consider whether the existing gas market arrangements in Victoria:

- allow participants in the DWGM to effectively manage price and volume risk;
- provide appropriate signals for investment in and use of pipeline capacity; and
- facilitate the efficient trade of gas to and from adjacent markets.

Following a series of public consultations, the AEMC is now proposing to replace the DWGM with a voluntary continuous commodity trading market and balancing regime underpinned by a mandatory residual balancing function.

The Australian Energy Market Operator (AEMO), the system operator (SO), would undertake this residual balancing function and would also be expected to establish exchange-based trading to provide another source for Market Participants (MPs) to procure gas for balancing purposes or otherwise alongside bilateral 'Over the Counter' (OTC) contracts and traditional Gas Supply Agreements (GSAs). The proposed reforms also include an entry-exit system, where entry and exit capacity rights would be purchased and traded by MPs, in order to create a new "Southern Virtual Hub" in Victoria.

Cambridge Economic Policy Associates (CEPA) in association with TPA Solutions (TPA), has been commissioned by the AEMC to investigate and report on transitional mechanisms in relation to the balancing regime which might be implemented upon the introduction of the new market arrangements.

### The AEMC's proposed balancing regime

The AEMC's proposed "target model" for balancing at the new Southern Hub is typically referred to as a continuous market-based balancing arrangement, and is modelled largely on the current system in the Netherlands. Under this approach, shippers' individual gas balance positions would only be relevant if action was necessary to reduce any imbalance of Victoria's Declared Transmission System (DTS). AEMO would provide each shipper with its cumulative inventory balance position as well as the arithmetically aggregated system balance position<sup>1</sup>, on an ongoing, near real time, basis during the gas day. The information would signal to shippers when AEMO is required to take a system residual balancing action (RBA), the costs of which would then be imposed on the shippers causing the imbalance. Individual shipper's action to mitigate their exposure might alleviate the requirement for RBAs by keeping the system within an acceptable operating envelope.

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<sup>1</sup> The system balance position is the sum of the individual shipper balance positions.

## Expected role of transitional measures

Whilst the AEMC envisages a number of benefits from the new gas market arrangements, there is also a concern that during the transition, at least in the early stages, there may be insufficient trading liquidity to support the new balancing arrangements.

This may create a self-reinforcing cycle of low liquidity if certain MPs seek to manage their commercial exposure under the continuous balancing regime within their own portfolios, rather than by trading through the exchange. In addition, the disciplines of the regime could leave other MPs (particularly small MPs) who do not have a portfolio that meets their own gas requirements, financially exposed when trying to balance their physical positions, by the direct attribution of costs to the causers where AEMO is required to take RBAs. AEMO would also need to have access to the necessary tools to undertake RBAs, without inappropriate recourse to emergency measures.

Transitional measures could, therefore, be used to:

- stimulate liquidity in the newly redesigned commodity market and help to develop a robust and transparent traded reference price at the Southern Hub;
- during an interim period, reduce the negative impact of low liquidity on MPs (particularly small MPs), the SO and ultimately end consumers of gas; and
- support the eventual cut-over to the target market model and balancing regime for the new Southern Hub.

## Transitional measures considered

We have considered a range of transitional measures that could help support evolution to the proposed target model for trading and balancing at the new Southern Hub.

We have grouped these measures into:

- **Market design measures.** Measures which would be associated with ensuring that sufficient volumes of gas will be traded at the new Southern Hub and that a robust set of reference prices will be available for balancing purposes, both for MPs and the SO in conducting its residual balancing role. These measures include market-maker/must-offer supplier obligations, transitional choices on the balancing period applied, or more structural interventions to the basis on which trading could in the interim take place at the Southern Hub.
- **Financial relief measures.** These measures would provide transitional protections for MPs against the full commercial disciplines of market based balancing. This could include the use of tolerances as an interim measure (note that the design of an imbalance “tolerance” regime in Victoria may differ depending on decisions that are made on other aspects of the new market design elements), or choices of the

approach used for targeting balancing costs on individual MPs. The intention would be to reduce MPs financial exposure to RBA cost targeting during a transition period.

These ideas and proposals for transitional measures (rather than prescriptive solutions) have drawn from experience of how transition and regime evolution has been effected in other countries and regions, in particular North West Europe.

Ultimately, however, what is required in Victoria is a fit-for-purpose regime and transition process, that takes account of the specific features of the DTS and the structure of Victoria's wholesale gas market. Therefore, we have focused on how learning from other countries might be used and adapted to establish best practice in Victoria's local context.

As a consequence, we developed two alternative transition *packages*; i.e., combinations of individual financial relief and market design transition measures that could form a coherent package of measures to address the concerns identified with the transition process:

- **Package 1** – would involve implementation of all the main features of the AEMC's target market model for Victoria from day one, including continuous day-ahead and within-day trading market and continuous balancing. However, the AEMC would look to administer a 'soft-landing' for MPs, i.e. financial relief, supplemented as needed with additional measures (e.g. a market maker role) to facilitate liquidity if this was expected or deemed to be inadequate to achieve eventual cut-over to the target continuous balancing model. Given that continuous balancing disciplines would by design be suppressed during the transition process (because of the financial relief offered), there would also need to be a form of end-of-day balancing discipline applied so as to apply a minimum level of regular balancing discipline and to encourage trading at the daily product level from the outset.
- **Package 2** – would allow an immediate move towards day (and further) ahead trading through an exchange, but with a process where instead of undertaking a *residual* balancing role (as per the target model) the SO would take over all balancing responsibilities after a 'Gate Closure' point to tackle within-day flexibility<sup>2</sup> needs during an initial interim transition phase. A form of balancing platform / flexibility mechanism would be used by AEMO to meet variations from the aggregate of MPs' physical nominated flows at Gate Closure and to physically balance the system. Over time, this interim market design with directed SO balancing would be phased out to cut-over to the target continuous balancing model with residual SO balancing. This might be achieved by rolling the gate-closure point back through the gas day in stages<sup>3</sup> or by measures to introduce greater MP within-day trading flexibility over time.

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<sup>2</sup> Note, we use the term 'flexibility' to refer to within day gas 'products' or 'services' that provide an increase or decrease in gas supply that can be used by the SO or MPs for balancing purposes.

<sup>3</sup> To extend the period for which MPs have primary scheduling and balancing responsibility.

## Assessment of transitional measures

Overall our conclusion is that if the wider policy goal and commitment is and remains to adopt the continuous balancing and target market model for Victoria, then there is merit in adopting a version of the Package 1 approach.

Package 1 has the distinct advantage that it would allow the AEMC's target market model to be implemented from day one, albeit with supporting measures to ensure the market functions from the outset. In addition:

- the financial relief measures can be structured to help support flexibility being offered by MPs to the market under the target model design from day one;
- transitional measures can be used *progressively* to migrate balancing responsibilities to MPs through steps / trials before cut-over to the target end model; and
- therefore, it offers a transition process where financial relief can be phased out over time in a transparent manner to agreed milestones and/or targets for the Southern Hub's development.

In contrast, Package 2 would require significant additional work to develop a new market design for Victoria's wholesale gas market, solely as a transition measure, meaning that during the interim period there would be a market design in place that would be less aligned with the reform objectives for the DWGM. This additional effort could perhaps be justified if the transition process was seen as a potentially quite lengthy journey towards an evolving and currently somewhat uncertain destination.

However, we believe that the transition process, once initiated, should be measured in months, not years, because:

- the AEMC has clarified that there is a commitment to delivering the target model rather than a need to "feel the way" towards some emergent solution;
- the Victorian gas market already starts from a strong base that includes years of:
  - reliable DWGM operation and sourcing of flexibility products to balance the DTS;
  - active retail market competition;
  - experienced MPs and SO;
- unnecessary delay in moving to the target model prolongs the period during which there is a "trade-off" between financial relief measures and adapting to new market disciplines; and
- this will limit the extent of cost socialisation arising from transitional financial relief measures.

Furthermore, we would expect this focussed transition process to comprise planned steps with defined criteria for progression, rather than a more open-ended “voyage of discovery”. The latter approach might have some attraction in a different environment where there was less commitment to a particular target model, but obviously implies greater unpredictability for network users as well as delay and cost.

### **Proposed Package 1 design**

If Package 1 is the preferred transition approach for Victoria, there is then the question of what specific transition measures this should comprise and how they should be designed.

Package 1 is based around three elements:

- a soft landing (i.e. interim financial relief from balancing risks);
- end-of-day balancing discipline; and
- if required, a role for market making obligations.

Recognising expressed concerns about initial market liquidity and adequate SO access to flexibility, we conclude that the regime should begin with an emphasis on limiting the balancing risks facing MPs as a means to encourage them to make most if not all of their flexibility available to the SO in its residual balancing role.

Primarily this would take the form of financial relief from the disciplines of the target continuous based balancing regime. However, for the reasons set out above, there would also need to be a form of end-of-day balancing discipline transition to ensure that there was a minimum level of regular balancing discipline from the outset at the Southern Hub.

Given such a discipline also exists as a permanent measure in other markets that have adopted continuous balancing, this would suggest the form of discipline adopted from the go-live of the new market in Victoria should also be incorporated within the ultimate end-market design. What form should the end-of-day discipline take?

Given the Victorian context includes a number of smaller MPs who have traditionally obtained gas from the DWGM, we would favour a form of end-of-day discipline like the Belgian regime that involves transfer of gas title rather than simply applying a fee for an end-of-day linepack “service”, as is the case in the Netherlands. But given the concerns of initial low liquidity at the Southern Hub, at least during the initial phase of the new market, it is likely this end-of-day balancing discipline would also need to accommodate a degree of tolerance for MPs from the outset – i.e. a reasonable volume of daily cash out at a reasonably attractive “neutral” price – as an additional transitional measure.

There would be a need for a regulatory policy to determine the initial end-of-day volume level that benefits from this tolerance and whether that should be reduced over time and/or subject to somewhat sharper pricing disciplines. There might also be a case to be made for

restricting MPs' access to this facility, but we currently assume that in the interests of non-discrimination the chosen level of tolerance would apply to all MPs.<sup>4</sup>

In determining which version of Package 1 to adopt, there is also a choice to be made between starting with market maker type obligations or holding them in reserve.

We lean towards the latter given that there are potential costs and complications (and potentially controversy) associated with such an approach, and, most importantly, that it simply might not prove necessary.

## Recommendations

In light of these conclusions and on the working assumption of a clear intent to adopt a voluntary trading and continuous balancing target model for Victoria, our recommendations to the AEMC are, therefore, as follows:

1. Financial relief should be offered to MPs from the risks / disciplines of the proposed intra-day balancing model during an interim period for the Southern Hub. Specifically, we would recommend an initial "shadow operation" of within-day balancing disciplines with the facility to introduce and increase cost targeting via simply varying the proportion (i.e. percentage) of targeted RBA costs on the "causer" MPs during within day period in question.<sup>5</sup>
2. During the first phase of transition, AEMO would operate to the defined balancing action zones and SBS method to determine the need for, timing, size and nature of residual balancing actions, but none of the costs and revenues arising would be targeted at individual "causer" MPs within day.
3. Instead, from the outset of transition, MPs should face an end-of-day imbalance cash-out discipline, with an initial absolute tolerance providing System Average Price (SAP) based relief<sup>6</sup> from what would otherwise be a stronger end-of-day imbalance cash-out price (for example, some form of marginal price).
4. The net difference between the costs and revenues arising from balancing actions, and the costs and revenues from imbalance cash out, should be accommodated by a suitable designed balancing neutrality mechanism that addresses MP concerns about unpredictable application of any socialised costs arising.

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<sup>4</sup> If nothing else, there may be need for some regulatory monitoring to avoid MPs creating spurious multiple subsidiary entities simply to exploit the absolute level of the tolerance.

<sup>5</sup> Applying cost targeting relief on a proportional basis has the advantage that it can be varied on a sliding scale basis to apply to all MPs and could, therefore, be used as a transparent basis to phase out the financial relief from within-day balancing disciplines in stages. However, other approaches of providing this financial relief, such as offering an absolute quantity of protected element of causer inventory, might also be investigated during the detailed transition regime design process as a way to provide further support to smaller MPs.

<sup>6</sup> The daily cash-out could offer a reasonably substantial tolerance to MPs during the interim where say shippers would be cashed-out at SAP +/- a very small adjustment – just enough to encourage MPs to trade out an anticipated imbalance in the market rather than allowing it to be cashed out.

5. End-of-day imbalance cash out should also be a feature of the ultimate target model to encourage ongoing trading in a daily title product as the most credible focus for future market liquidity and to help establish a clear daily reference price.
6. The further steps and precise parameter values of transition should ideally be pre-defined with clear criteria for progression, developed with industry workgroup involvement. These will focus on: the introduction and strengthening of intra-day balancing cost targeting (getting the proportion of RBA targeted costs from 0 to 100%); the phased reduction in the daily cash-out SAP based tolerance (if appropriate) or adjustment(s) to its precise pricing; and measures of progress in terms of general market liquidity and SO access to adequate flexibility.
7. Consideration should be given to providing the SO with a form of flexibility capacity agreement during the transition period. Further analysis would be needed to finalise any such arrangements as to form, timing and financing, and to ensure that as far as possible any potentially adverse impact on general market liquidity is mitigated.
8. In the event that market liquidity was deemed (preferably judged against pre-agreed criteria) to not be developing sufficiently at the Southern Hub following Go-live, a market maker role could then be introduced to help mitigate this situation. Criteria for subsequently suspending this role should be established prior to appointment, and a decision taken on whether costs arising should be allocated via the balancing neutrality or some other mechanism.

## 1. INTRODUCTION

The Australian Energy Market Commission (AEMC) has been undertaking a detailed review of the Declared Wholesale Gas Market (DWGM) in Victoria.<sup>7</sup> This review was requested by the Victoria Government in 2015 and its purpose has been to consider whether the existing gas market arrangements in Victoria:

- allow participants in the DWGM to effectively manage price and volume risk;
- provide appropriate signals for investment in and use of pipeline capacity; and
- facilitate the efficient trade of gas to and from adjacent markets.

The DWGM is a virtual hub, covering the Declared Transmission System (DTS) where on a daily and intra-day basis, Market Participants (MPs) are required to submit price quantity pairs of bids and offers for all the gas they intend to inject and/or withdraw from the DTS for the remainder of the gas day. AEMO, as the DWGM market operator, then pools supply offers and matches demands bids to ensure that the system is balanced and generates a market price. Transmission capacity is bundled with the commodity product, and allocated on the basis of the outcomes of a reverse auction (under an approach known as market carriage).

The AEMC is now proposing to replace the DWGM with a voluntary continuous commodity trading market underpinned by a mandatory residual balancing function (which will be undertaken by AEMO (the hub operator / SO)). The current approach to capacity allocation is also expected to be replaced by an entry-exit system, similar to that in force in Europe, where entry and exit capacity rights would be purchased and traded by MPs. The proposed model for the new “Southern Hub” also includes the development of voluntary exchange-based trading which already applies at the Northern Hub at Wallumbilla in Queensland.

The AEMC expects the proposed market reforms to significantly improve the outcomes of Victoria’s wholesale gas market by:

- providing MPs with greater flexibility to physically trade gas in the market compared to the mandatory gross pool arrangements in the DWGM;
- establishing the preconditions required for financial risk management through the development of voluntary exchange trading and the creation of a robust and transparent reference price for gas;
- creation of market driven investment signals for investment in the transmission pipeline system<sup>8</sup>; and

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<sup>7</sup> See AEMC (2015): ‘Review of the Victorian Declared Wholesale Gas Market – Draft Report’

<sup>8</sup> A feature currently absent from the DWGM where there are no firm capacity rights.

- development of trading arrangements in Victoria that are more consistent with Australia's east coast's Northern Hub (the objective being to reduce the administrative costs of MPs operating across the east coast of Australia).

### 1.1. Terms of reference

Whilst the AEMC ultimately expects the recommendations for DWGM reform to improve outcomes in Victoria's gas market, there is also a concern that during the initial implementation of the new market there could be low commodity market liquidity. This would prevent: MPs from effectively managing the financial risks associated with the new market-based balancing regime; and reasonably efficient residual balancing by the SO.

In particular, there is a concern that low liquidity could:

- create a self-reinforcing cycle of low liquidity at the Southern Hub, and one of the key benefits of the market reforms – a reliable reference price for gas – could fail to materialise as an alternative (and complement) to existing gas supply agreements (GSAs);
- adversely impact the functioning of the competitive retail gas market in Victoria, as MPs who are currently able to source their gas primarily or exclusively through the DWGM may not be able to purchase sufficient gas through gas trading<sup>9</sup>; and
- *in extremis*, create a risk that AEMO is unable to purchase gas to balance the system when performing its intended 'residual balancing' role, therefore, potentially threatening the physical security of the system, or alternatively driving the need for more expensive fall back arrangements.

Cambridge Economic Policy Associates (CEPA), in association with TPA Solutions (TPA), has been commissioned by the AEMC to investigate and report on potential transitional mechanisms which might be implemented upon the introduction of the proposed new market design in Victoria to help address these concerns.

The intention of these transitional measures would be to:

- stimulate some initial liquidity in the newly redesigned commodity market and help to develop a robust and transparent traded reference price at the Southern Hub;
- during an interim period, reduce the negative impact of low liquidity on MPs (particularly small MPs), the SO and ultimately end consumers of gas; and
- support the eventual cut-over to the target market model and balancing regime for the new Southern Hub.

We have not been asked by the AEMC to consider any transitional issues within this report that might be associated with capacity rights for entry and exit to the DTS.

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<sup>9</sup> Potentially forcing them to face the cost of expensive balancing actions.

## 1.2. Our approach

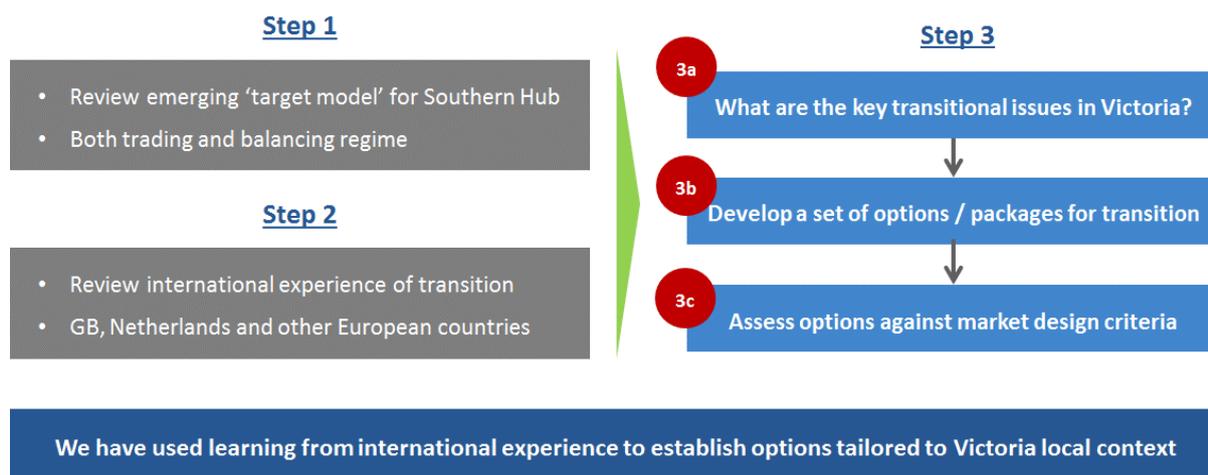
We have taken as a working assumption that change in Victoria’s market design is needed (in light of the DWGM review process) and that transitional measures should support evolution to the AEMC’s target model for trading and balancing at Victoria’s Southern Hub.

We have also drawn possible ideas and proposals for transition measures (rather than prescriptive solutions) that could be adopted in Victoria, based on experience of how transition and regime evolution has been effected in other countries and regions, in particular North West Europe (NWE).

Ultimately, however, what is required in Victoria is a fit-for-purpose regime, and transition process that takes account of the specific features of the DTS and the structure of Victoria’s wholesale gas market. Therefore, we have focused on how learning from other countries might be used and adapted to establish best practice in Victoria’s local context.

We have adopted a staged approach to the assignment, the key steps of which are summarised in the figure below.

Figure 1.1 – Overview of approach



Source: CEPA and TPA

Note, throughout the report we refer to how transition measures could be used to help address low liquidity and tackle MPs within-day ‘flexibility’ needs at the new Southern Hub. We use the term ‘flexibility’ to refer to within-day gas ‘products’ or ‘services’ that can provide an increase or decrease in gas supply that can be used by the SO or MPs for balancing purposes.

## 1.3. Report structure

The rest of the report is structured as follows:

- Section 2 summarises in further detail our understanding of the ‘target model’ which the AEMC is proposing for Victoria;

- Section 3 reviews the structure of Victoria’s gas market (supply and demand), the physical characteristics of the DTS and the specific issues related to transition that may need to be addressed in Victoria;
- Section 4 discusses a list of *possible* transitional measures that could be considered for Victoria and examples of their application through international case studies;
- Section 5 sets out a set of “packages” or “pathways” for how combinations of transition measures could be combined by the AEMC; and
- finally, Section 6 sets out overall conclusions from our work and proposed recommendations to the AEMC.

## **2. PROPOSED GAS MARKET DESIGN FOR VICTORIA**

The AEMC has developed a package of reforms for the DWGM and its associated market carriage arrangements. The AEMC's recommended changes will seek to develop a new "Southern Hub" in Victoria whereby gas trading would occur on a voluntary continuous basis (underpinned by a mandatory residual balancing mechanism) and access to transportation capacity to the DTS at the Southern Hub would take place on an entry-exit basis.

The objective of this new market model is to create an effective and competitive wholesale gas market in Victoria with a market based reference price, which minimises barriers to entry, lowers transactions costs and provides greater price transparency for MPs.

### **2.1. Trading gas at the Southern Hub**

The AEMC's proposed market design for the Southern Hub is referred to as 'voluntary trading with market-based balancing' since MPs would not be forced to make bids and offers for gas injections and withdrawals within the balancing period.

MPs will, however, have primary responsibility for balancing and will be incentivised to trade, or deploy<sup>10</sup> their own flexibility, to remain in balance. The SO – AEMO – will only take balancing actions in the event that MPs are not collectively balancing their injections and withdrawals sufficiently, a process known as 'residual balancing'.

### **2.2. Basis for trading**

As discussed in the introduction, the AEMC is recommending that exchange-based trading be established as part of the new arrangements for the Southern Hub. The expectation is that MPs, however, will be able to procure gas for balancing purposes or otherwise from various sources including:

- via the exchange<sup>11</sup>;
- bilaterally, using OTC contracts; and
- traditional long-term GSAs.

One of the AEMC's key objectives in creating exchange based trading is to create a daily price for gas at the Southern Hub which financial derivatives (hedging products) could potentially reference. It is the AEMC's expectation that:

*"the establishment of exchange-based trading allows for innovation in products offered and for standardised products to emerge (e.g. day-ahead products, monthly products and winter products) and market forces will determine the success of*

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<sup>10</sup> This means that MPs will exercise choice via nominations and renominations of physical flows at least at entry points and controllable exit points.

<sup>11</sup> In a range of products up to and including day ahead and within day.

*individual products – that is, products will be traded only to the extent that these are useful to participants. In well-established commodity markets, financial derivatives generally reference the price in the most liquid of these products ... Selection of the balancing period and strength of the incentive on participants are likely to be key determinants of the most liquid product.”<sup>12</sup>*

### **2.3. Balancing at the Southern Hub**

#### **Proposed design**

A number of choices must be made in designing a market-based balancing regime, including the size (or number) of the balancing zone(s), the balancing period duration for which shipper imbalances are assessed, the commercial incentives on shippers to achieve acceptably close inputs and offtakes to the system and calculating (and applying) the costs of operator balancing actions.

The AEMC has stated that it sees merit in initially adopting a single continuous market-based balancing arrangement in Victoria (largely modelled on the system that applies currently in the Netherlands) as opposed to a fixed balancing period arrangement (as for example applies in Great Britain (GB)).<sup>13</sup>

Under this approach, MPs in Victoria would be collectively incentivised to keep the aggregate system within a pre-defined linepack range. MPs’ individual positions would only be relevant if and when an action by the SO was necessary to reduce imbalance of the overall transmission system.<sup>14</sup> AEMO would provide each shipper with its cumulative inventory balance position as well as the arithmetically aggregated system balance position<sup>15</sup>, on an ongoing near real time basis during the gas day. The information would signal to shippers when AEMO may soon be required to take a mandated residual system balancing action, the costs of which would then be imposed on the shippers assessed via their inventory position to be the “causers” of the balancing action. Individual shipper action to mitigate this exposure might alleviate the requirement for a balancing action to be taken by the SO (as residual balancer) by keeping the aggregate shipper position within acceptable ranges.

The key concepts of the regime are illustrated in Figure 2.1 below and can be broadly summarised as follows:

- A continuous balancing regime at the Southern Hub would seek to ensure that security of the DTS is maintained but also allow (and create appropriate financial incentives for) MPs to manage their own balancing.

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<sup>12</sup> AEMC (2015): Review of the Victorian Declared Wholesale Gas Market – Draft Report’

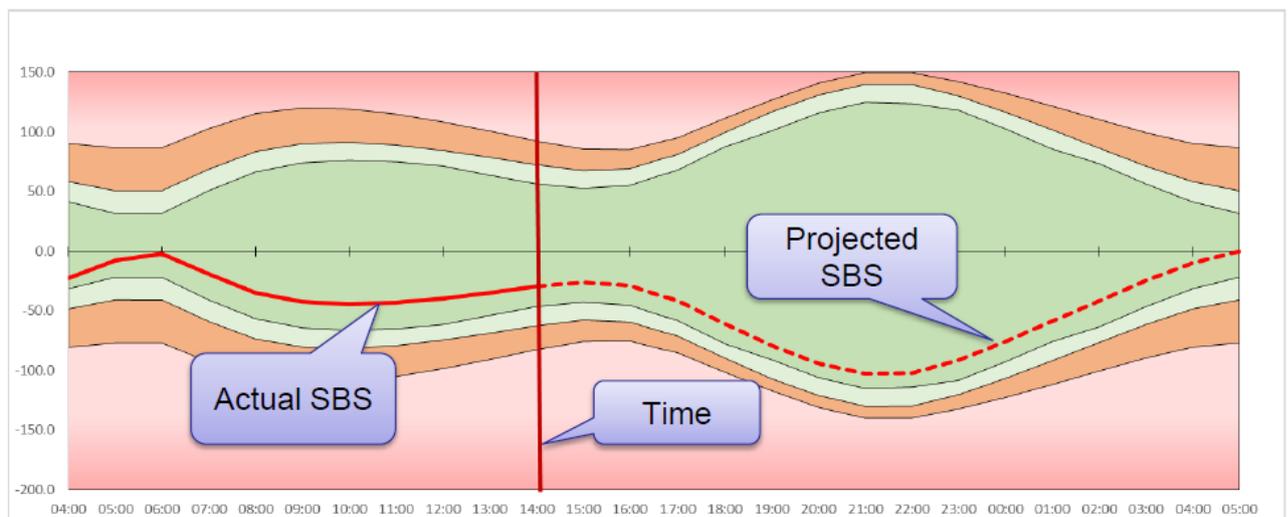
<sup>13</sup> We review both GB and the Netherlands balancing arrangements in Annex A and B of this report.

<sup>14</sup> The Declared Transmission System (DTS).

<sup>15</sup> The system balance position is the sum of the individual shipper balance positions.

- Under this approach, AEMO will be required to only take certain ‘residual balancing’ actions when the aggregated system balance position (the System Balancing Signal (SBS)) moves into defined linepack zones or bands.
- These bands are: Green (no action); Light Green (balance of day action); Amber (next hour action); and Red (SO makes directions (including curtailment)).
- The SBS would be calculated hourly (as the simple arithmetic aggregate of individual shipper positions (POS)) and the SBS projected using actual linepack and entry/exit nominations.<sup>16</sup>

Figure 2.1: Key concepts in the AEMC proposed continuous balancing regime



Source: The AEMC

While the SBS remains in the green band, MPs would be expected to manage their own entry and exit nominations, trade notifications, and the SO will monitor and report only.

Where actual or projected SBS moves into the light green band, action must be taken. In this case, the SO will buy (or sell) a balance of day product to encourage network users to keep projected SBS in the green band.

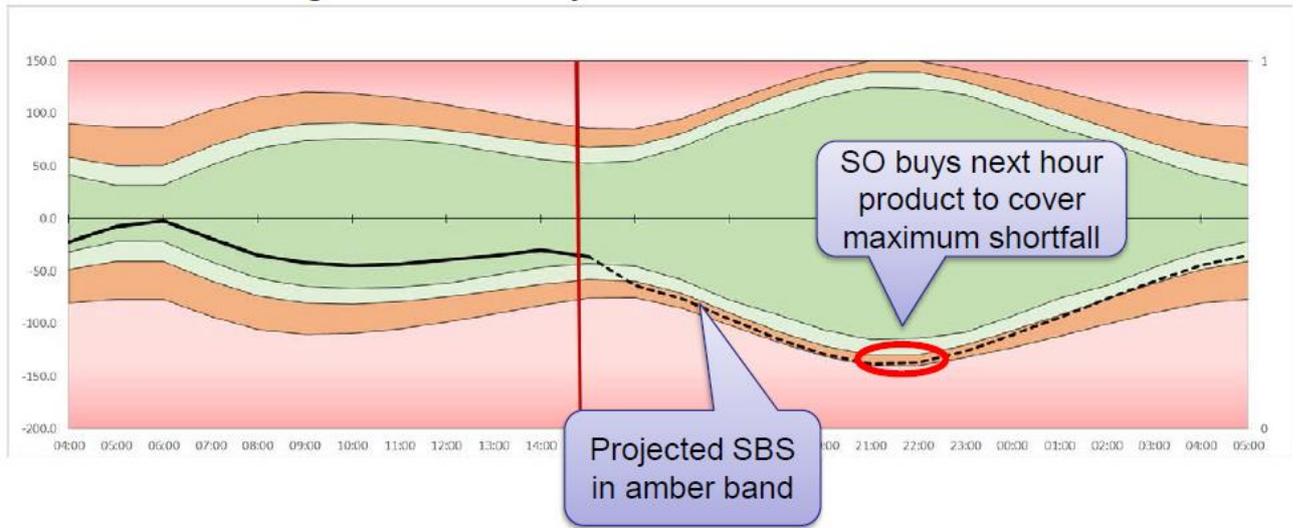
However, in the event that actual SBS moves into the amber band (see Figure 2.2 below) then the SO will purchase an hourly (or at least intra-day) product<sup>17</sup> to cover the shortfall to the light green boundary. The SO will also need to purchase a balance of day product to cover shortfall to the green boundary.<sup>18</sup>

<sup>16</sup> AEMC (2016): ‘Balancing at the Southern Hub – DWGM Stakeholder Working Group’

<sup>17</sup> Likely to be the LNG facility referenced in Section 2.

<sup>18</sup> AEMC (2016): ‘Balancing at the Southern Hub – DWGM Stakeholder Working Group’, p. 15

Figure 2.2: Illustration of RBA in event SBS moves into the amber band



Source: The AEMC

### 3. VICTORIA'S MARKET STRUCTURE AND TRANSITIONAL ISSUES

Having set out the proposed target market model and balancing regime for Southern Hub, in this section we provide background to Victoria's gas market structure and certain physical constraints and features of the DTS.

In light of the AEMC's proposed target market model, and specific features of Victoria's gas sector that are inherent to the physical characteristics of the DTS and the structure of the market, we also discuss the specific challenges Victoria may face during the transition process.

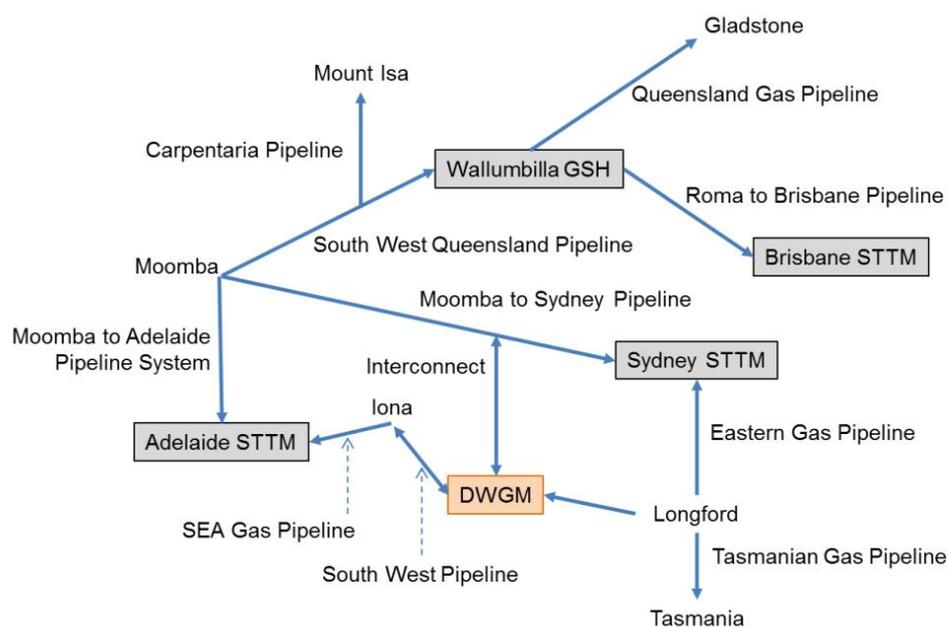
#### 3.1. Market participants

##### Victorian DWGM Structure

Established by the Victorian government in 1999, the DWGM is a virtual hub, covering the DTS. Under the current gross pool model, all gas injected and withdrawn from the DTS must be transacted through the DWGM. AEMO is both the market and SO.

While the Victorian system was initially established in isolation, it is now connected to other east coast markets, as shown in Figure 3.1 below.

Figure 3.1: Location of the Victorian DWGM



Source: The AEMC<sup>19</sup>

The conditions and objectives underpinning the current DWGM design and market carriage model are summarised below<sup>20</sup>:

<sup>19</sup> AEMC (2015a): 'Discussion Paper: Review of the Victorian Declared Wholesale Gas Market', page 6.

<sup>20</sup> AEMC (2015b): 'Stage 1 Final Report: East Coast Wholesale Gas Market and Pipeline Frameworks Review', pages 253-254.

- Physical characteristics of the DTS, in particular:
  - meshed network characteristics;
  - relatively small storage, considered insufficient to manage significant deviations from planned demand and supply;
  - significant seasonal and daily variation in Victorian gas demand, reflecting the high residential load; and
  - difficulties associated with defining firm capacity rights for shippers.
- Support for retail competition by offering new entrant retailers an alternative to long-term gas transportation or supply agreements.
- Desire to promote diversity of supply and upstream competition through transparent market pricing in the DWGM and the market carriage model.<sup>21</sup>

### Market/system operation

AEMO currently performs the role of both market operator and SO, responsible for operating the scheduling/pooling arrangement in the DWGM and balancing supply and demand on the transmission system. AEMO also facilitates infrastructure planning through publication of the annual Gas Statement of Opportunities (GSOO) and biennial Victorian Gas Planning Review.

### Market participants

It is estimated that there are over 34 MPs in the DWGM<sup>22</sup>. An overview of the participants, based on AEMO’s market registration data as at July 2016, is shown in Table 3.1 below.

Table 3.1: DWGM registered MPs

Category <sup>23</sup>	Number of participants
Applicants	2 (1 retailer and 1 trader)
Retailers	17 (13 unique – no subsidiaries)
Traders	12 (6 unique, including 1 Producer)
Storage providers	3 (2 unique)
Market customers	3 (2 distribution and 1 transmission, all unique)

Source: The AEMC, AEMO.

The AEMC has noted that for the East coast gas market as a whole, the number of MPs “is likely to be sufficient to support a liquid gas wholesale market”<sup>24</sup> when compared, for

<sup>21</sup> Victoria was an early pioneer of retail liberalisation and competition in Australia.

<sup>22</sup> AEMC (2015c): ‘Stage 2 Draft Report: East Coast Wholesale Gas Market and Pipeline Frameworks Review’, page 25.

<sup>23</sup> Descriptions of the different categories provided [here](#).

<sup>24</sup> Ibid.

example, to the number of participants in the Victorian region of the National Electricity Market (NEM).

Further, the AEMC have noted that with the upcoming expiry of a number of legacy GSAs and the higher prices/reduced flexibility reflected in current GSA terms, it expects MPs to increasingly seek to obtain flexibility through trading markets.

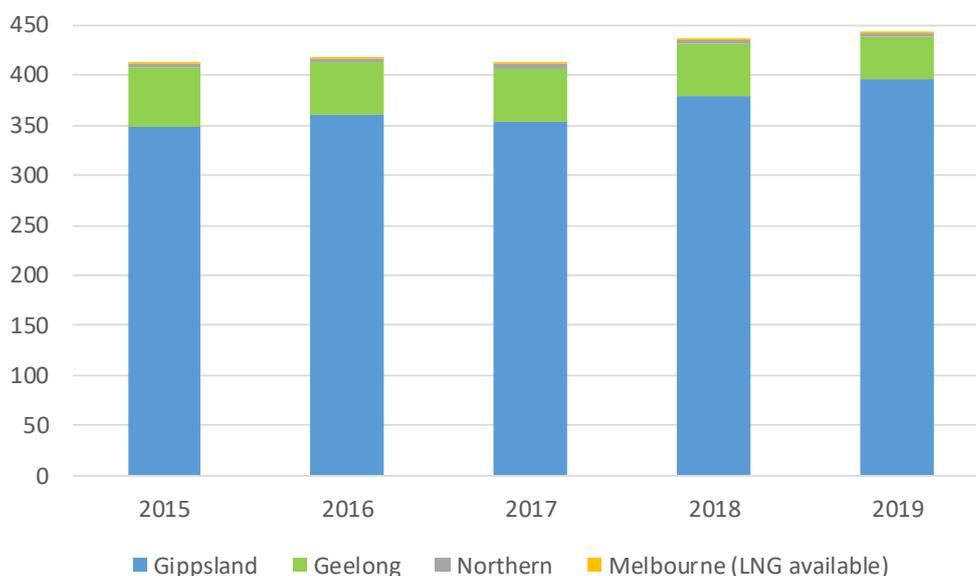
However, we note that the ACCC’s inquiry into the east coast gas market raised concerns regarding the increasing dependency of users in the southern states on gas from the Gippsland Basin Joint Venture (GBJV). The ACCC observed that “*competitive dynamics in the southern states are deteriorating considerably*” and that until this changes, “*the GBJV will have the bulk of market share and will hold significant market power*”<sup>25</sup>.

### 3.2. Supply and demand outlook

#### Supply

As noted above, the GBJV is the most significant source of supply to the DTS. This is indicated in AEMO’s supply forecast in the 2015 Gas Statement of Opportunities (GSOO), shown below.

Figure 3.2: DTS annual supply forecast, PJ/year (by System Withdrawal Zone (SWZ) and aggregated injection point)



Source: AEMO<sup>26</sup>

The AEMC note that the East coast gas market as a whole is facing significant change associated with growth of the LNG export industry. This may impact the Victorian market in several ways.

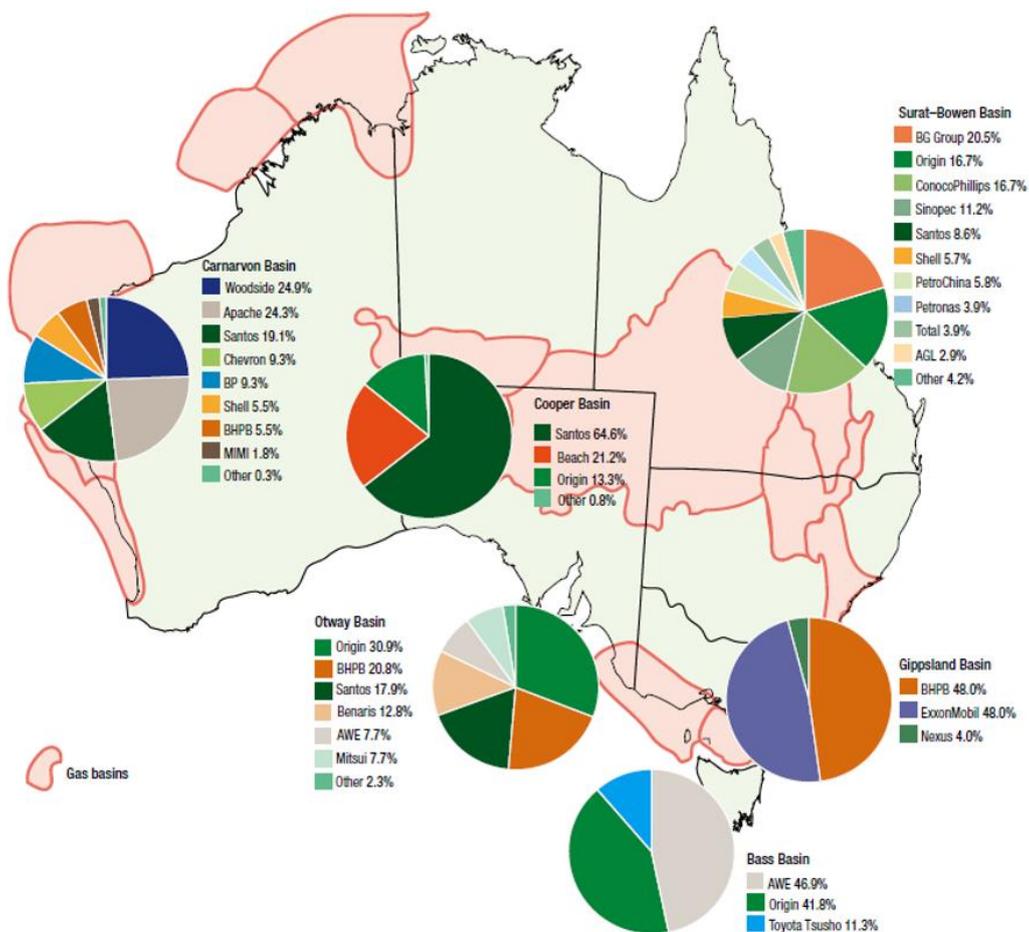
<sup>25</sup> ACCC (2016): ‘Inquiry into the east coast gas market’, pages 49-50.

<sup>26</sup> AEMO (2015): ‘Gas Statement of Opportunities – Attachment B’, page 8. Note: the figure includes both available and prospective supply.

**Firstly**, it is expected that Queensland and South Australia will increasingly seek gas supplies from Victoria, as production in these regions is directed to LNG exports. **Secondly**, fluctuations in LNG export operations may at times result in excess supply being made available for sale in Victoria.<sup>27</sup> The Commission anticipates that MPs will seek to manage their positions more actively in response to these developments.

As already highlighted above, gas production for the GBJV is highly concentrated, with 96 per cent of Gippsland production coming from the joint venture between ExxonMobil and BHP Billiton (see 2012-2013 market shares below).

Figure 3.3: Market shares in domestic gas production, by basin, 2012-13



Source: NSW Parliamentary Research Service<sup>28</sup>

### Flexibility services

Currently there are a number of potential sources of flexibility for shippers and AEMO in the Victoria system. The DTS has an LNG storage tank connected at Dandenong on the Longford to Melbourne pipeline. This is on the outskirts of the main Melbourne demand zone and is

<sup>27</sup> AEMC (2015b): 'Stage 1 Final Report: East Coast Wholesale Gas Market and Pipeline Frameworks Review'

<sup>28</sup> NSW Research Services (2014), 'A tightening gas market: supply, demand and price outlook for NSW', Briefing paper No 4/2014

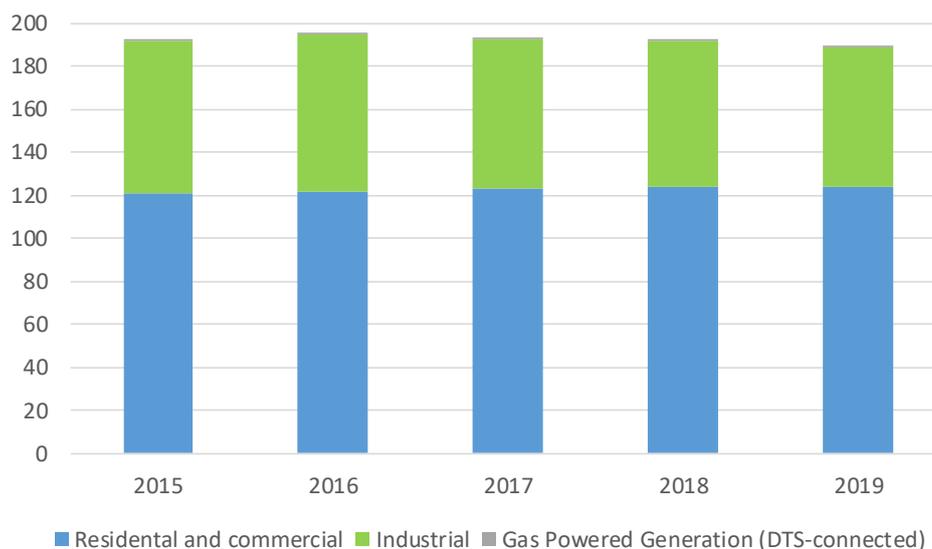
capable of starting injections of vaporised LNG in one hour. The Iona Gas Storage facility west of Melbourne is another source of flexibility for certain MPs. Our understanding is that certain supply contracts at Longford can also offer flexibility.<sup>29</sup>

## Demand

Victoria has the largest residential demand of all Australian states, resulting in significant seasonal variation in gas demand.<sup>30</sup> Annual system consumption is projected to decrease by around 1 per cent from 2015 to 2019, driven by changes in industrial consumption<sup>31</sup>. Winter maximum demand is also expected to decrease by around 1% to 2019<sup>32</sup>.

Victorian demand is predominantly from residential customers, and as such reflects variability associated with weather and seasons and results in a relatively peaky load on the system (see further discussion below). Demand projections from AEMO’s 2015 GSOO are illustrated in the figure below which shows the mix of residual & commercial, industrial and gas power generation demand in total DTS annual system consumption.

Figure 3.4: DTS annual system consumption (PJ/year)



Source: AEMO<sup>33</sup>

### 3.3. Implications

In summary, gas supply in Victoria is relatively concentrated (for example, compared to relatively heavily traded wholesale gas markets in Europe) and demand is also predominantly from retail customers. MPs with a predominantly retail customer base are unlikely to be able

<sup>29</sup> AEMO (2016): ‘Response to AEMC review of Victorian DWGM Discussion paper’, p. 9

<sup>30</sup> Gas Market Taskforce: Supplementary Report (2013)

<sup>31</sup> AEMO (2015), page 4 – including gas powered generation.

<sup>32</sup> Ibid, page 5.

<sup>33</sup> AEMO (2015d): ‘Gas Statement of Opportunities – Attachment B’, page 4.

to effect a demand-side response to an imbalance position and so will, in general, need to change their supply position through accessing flexibility.

Given the market for gas and, in particular, flexibility, is relatively concentrated and a change in supply position is, we understand, likely to only realistically be achieved through “*having access to LNG or perhaps to a flexible supply contract at Longford or a storage contract with flexibility at Iona (assuming hourly balancing gas is not required)*”<sup>34</sup> there is, by nature, a risk that liquidity under the proposed new Southern Hub’s market design could be slow in its development, particularly during the initial period of the new market, and there is likely to be limited competition in the supply of short-term gas flexibility.

The proper functioning of the target market and balancing model which the AEMC is considering for Victoria will rely on shippers (and the SO in its residual balancing role) having access to a liquid short-term gas trading market. The new target market model, the structure of Victoria’s market and the transition process itself, however, potentially raise a number of challenges if the overall vision for the Southern Hub is to be met.

First, part of Victoria’s market currently relies heavily or exclusively on the DWGM for sourcing gas and, in the absence of liquidity on the new exchange, or from other sources, may be unable to manage its gas needs at acceptable gas prices.

The current DWGM market design is considered to provide incentives for MPs to structure their bids and offers so that they are slightly long compared to their expectations, so that were they to actually use more gas than expected, their exposure to high prices would be limited. The effect of this bidding strategy is to:

- decrease typical prices in the DWGM; and
- dampen price volatility (see Figure 3.5).

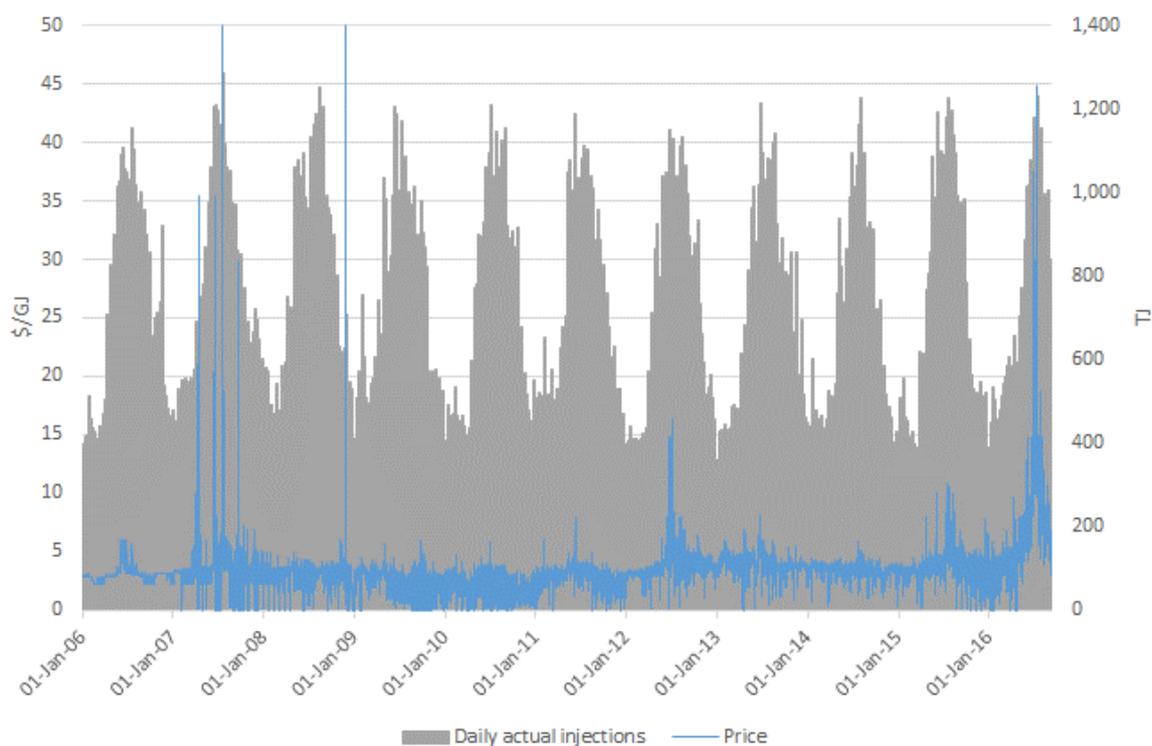
Because prices have rarely been high<sup>35</sup> in the DWGM, smaller gas retailers have come to increasingly rely primarily or solely on the DWGM for sourcing their short-term gas needs (rather than, for example, entering into GSAs with producers) and could be left exposed under the new market design in the absence of a relatively liquid shorter-term gas market.

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<sup>34</sup> AEMO (2016): ‘Response to AEMC review of Victorian DWGM Discussion paper’, page 9.

<sup>35</sup> Although, volatility has been increasing since 2015, with the continuing expansion of the Queensland LNG industry (see AER, *Winter Energy Prices 2016*, August 2016). Prices over Winter 2016, were consistently higher than seen in previous years.

Figure 3.5: DWGM daily injections and prices



Note 1: We have truncated the vertical axis at \$50 to better allow fluctuations to be seen. There are two prices which exceed \$50: 22 November 2008 (where the price reached \$800) and 17 July 2007 (where the price reached \$336).

Source: CEPA and TPA analysis of AEMO data.

Second, as highlighted in the introduction to this report, there is also a risk that if confidence and liquidity in the market are low in the first instance, the majority of MPs may largely ignore the trading exchange<sup>36</sup>, seeking to adjust injections and withdrawals within their own portfolios rather than trading gas to balance their positions. This could create a self-reinforcing cycle of low liquidity at the Southern Hub which could expose participants (in particular, small MPs) to significant financial risks during the initial transition to the disciplines of a continuous market based balancing regime.<sup>37</sup>

Finally, the characteristics of the DTS itself also place various physical constraints on the task of SO in performing its residual balancing role under Victoria's market redesign and are factors that need to be borne in mind, both in the design of the ultimate target market model for Victoria, and possible transitional measures. In particular, we understand that:

<sup>36</sup> However, as discussed above, sufficient trade to give confidence in prices may be all that is necessary from the outset provided that network users can access flexibility from other sources, e.g. OTC or GSAs. MPs may only make extensive use of the platform if it has meaningful products (in respect of design and prices) and that transaction costs are not too high.

<sup>37</sup> The system that AEMC has proposed will, in particular, require significant operational change for both pipeline operators and shippers in monitoring the balance in the system as well as shippers' individual positions.

- there is up to a six-hour lag between injections at the main supply source of the DTS (the Longford entry point) and the main demand source, Melbourne;
- the DTS generally has flat profiling of injections;
- Victoria can have weather-driven surprise demand events; and
- there is a lack of quick-response storage and limited linepack that can be used to rapidly respond to changes in demand.<sup>38</sup>

In terms of typical diurnal characteristics, the DTS has certain unique characteristics, for example, compared to transmission systems in NWE such as GB or the Netherlands.

In GB, much of the diurnal variation in demand is met closer to consumers within the local distribution systems, leaving the NTS to operate at fairly flat rates of flow within day.<sup>39</sup> Whereas in the Netherlands, significant diurnal flexibility has typically been delivered via the transmission system from supply source. In contrast, in Victoria we understand that input flows are typically flat, whilst offtake flows vary to meet within day demand variation given the relative absence of such capability within distribution systems.

Within the constraints of this report it has not been possible to independently assess the relative flexibility of the DTS. We would simply note without prejudice that prudent SOs are generally (and understandably) cautious about preservation of linepack when contemplating the move to a residual balancing role.

Under peak design conditions the linepack flexibility in the transmission system may be very limited. Generally, when the capability of the system is not being fully utilised for transmission then greater levels of linepack variation can be accommodated. By way of example, over time the role of Transco (and then National Grid) in GB as residual balancer has evolved. In particular, the acceptable range of linepack inventory has increased dramatically over the years, from 2 million cubic meters (mcm) to 10, 20 or even more than 30 mcm on occasions.

However, flexibility to absorb supply/demand mismatches via linepack is finite, and local considerations of gas pressure may well require remedial action even when in aggregate linepack levels should be adequate. Therefore, undertaking a residual balancing role may involve a complex and nuanced exercise in exploring (over time) the limitations of the physical system and the interactions with the behaviour of network users, and this is one further reason why transitional arrangements may be appropriate. The evolution of the role of the SO, and specifically its balancing action decision-making process, including the setting of acceptable community imbalance ranges within which it will not take mandated actions is a critical part of the SO journey from “guardian of the network” to “market facilitator” role.

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<sup>38</sup> AEMO suggest that the LNG storage facility is typically the only balancing tool available for quick response.

<sup>39</sup> It should be noted that in recent years shippers have increasingly exploited within day transmission linepack capability beyond traditional levels, and that local distribution zones (LDZs) are also looking to extract greater flexibility from the NTS.

#### 4. TRANSITIONAL MEASURES

The AEMC has set out that the balancing regime for the Southern Hub should meet the following principles and characteristics:

- support system security as the highest order priority;
- be competitive and market-based, so that balancing actions are achieved at least cost;
- be transparent and non-discriminatory, so that all shippers can compete on a level playing field;
- apply cost-to-cause incentives (where appropriate), so risks are allocated appropriately and each shipper bears responsibility for its actions; and
- prioritise a simple but effective approach that traders can understand and that could potentially be adapted to the Northern Hub in the future.<sup>40</sup>

More generally the introduction of the new Southern Hub market design and balancing regime needs to ensure from the outset that:

- the market can function effectively, with users of the DTS able to effectively balance their physical positions in the market without facing unwarranted balancing exposure and commercial risks<sup>41</sup>; and
- AEMO has the necessary tools to ensure that it can physically balance the DTS (without unwarranted recourse to emergency measures).

In light of these challenges, we have identified two sets of “transitional” measures which the AEMC could consider as part of its market reform process (see Figure 4.1):

- The first set are what we have termed **market design transition measures**. These would be associated with ensuring that sufficient volumes of gas will be traded at the new Southern Hub and that a robust set of reference prices will be available for balancing purposes, both for MPs and AEMO in conducting its residual balancing role. These measures could, for example, include market maker/must-offer supplier obligations, transitional choices on the balancing period or more structural interventions, to the basis on which trading could during an interim take place.
- The second set are what we have termed transitional **financial relief measures** for MPs. These would be protections against the full commercial disciplines of market based balancing. This could, for example, include the use of imbalance tolerances as an interim measure (note that the design of a “tolerance” regime in Victoria may differ depending on decisions that are made on other aspects of the new market design

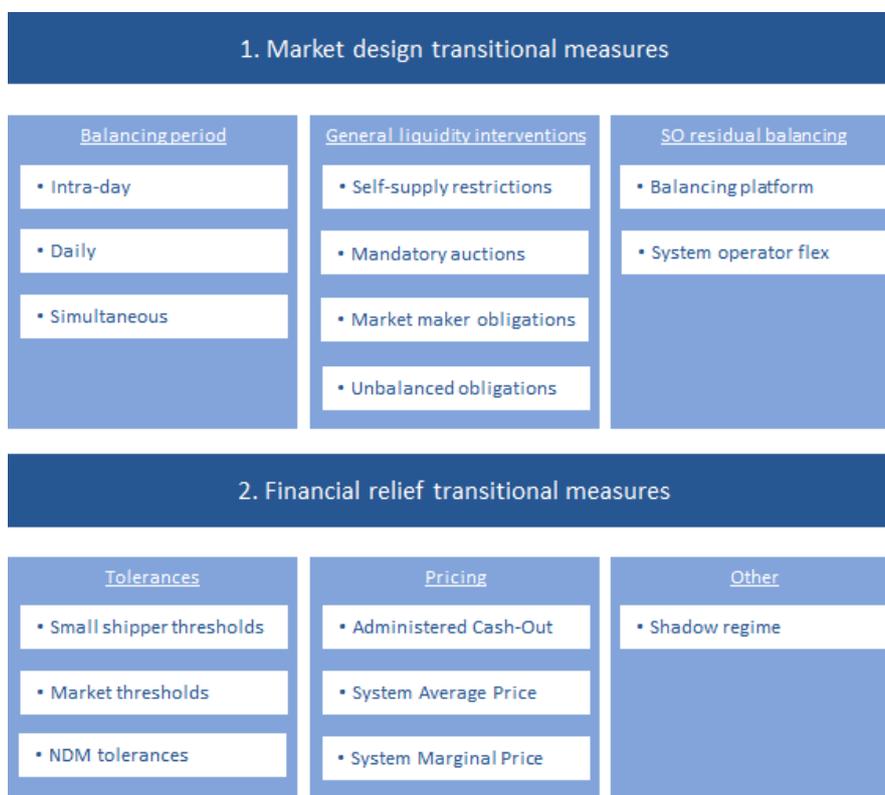
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<sup>40</sup> AEMC (2016): ‘Review of the Victorian Declared Wholesale Gas Market – Discussion Paper’

<sup>41</sup> The new Southern Hub will need sufficient trading liquidity that it provides the means for all MPs to manage both opportunities and risks in the market.

elements – see further discussion below<sup>42</sup>), or choices of the approach that are used for targeting balancing costs on individual MPs.

Figure 4.1: Dimensions for decision making on transitional measures



Source: CEPA and TPA

We discuss each of these measures below. Where applicable, we also discuss some of the findings and lessons that we have taken from the international case studies reviewed on transitional measures and processes followed in other markets that have transitioned to market based gas balancing and/or have had concerns of low liquidity in the market.

#### 4.1. Market design measures

##### 4.1.1. Choice of balancing period measures

As discussed in Section 2, the AEMC has stated that it sees merit in adopting a balancing approach in Victoria that does not prescribe a specific balancing period. Under such an approach, shippers’ individual balancing positions would only be relevant if the overall system was out of balance. A possible transitional measure would be to adopt a defined balancing period initially to help trading liquidity develop at the Southern Hub.

While the AEMC’s draft report and subsequent discussion paper for the Victoria gas market review set out the main advantages and disadvantages of different options for balancing

<sup>42</sup> For example, how “tolerance” is introduced into the balancing regime largely modelled on the Netherlands regime would be different than under the Belgian variation or GB style daily obligation balancing regime.

period selection, Table 4.1 below presents the advantages and disadvantages of different balancing periods specifically from a transitional perspective for the Southern Hub.

Table 4.1: Balancing period duration transition measures<sup>43</sup>

Measure	Advantages	Disadvantages
Intra-day – participants are cashed out at certain periods within the day	<ul style="list-style-type: none"> <li>• Should encourage short-term intra-day trading from the outset for focused periods provided that MPs have the incentive to participate in the market in the first place.</li> <li>• Strengthens price signals and targeting of costs on MPs.</li> </ul>	<ul style="list-style-type: none"> <li>• May fragment trading which may slice and reduce liquidity in any one intra-day period.</li> <li>• Poor liquidity may force shippers to hold flexibility for deployment within own portfolios.<sup>44</sup></li> <li>• It may lead to unnecessarily early and frequent balancing actions.</li> </ul>
Daily – participants are cashed out once for the whole day	<ul style="list-style-type: none"> <li>• Should encourage short-term liquidity from the outset of the new market with a focus on the introduction of simple daily products that favour market liquidity.</li> <li>• Still allows some targeting of costs whilst limiting the scope of market balancing requirements in the short term.</li> </ul>	<ul style="list-style-type: none"> <li>• The system in Victoria region may be less able to absorb significant mismatches in injections and withdrawals than other regions / countries adopting daily balancing in the past – so might require more residual balancing and cause more cost smearing.</li> </ul>
Continuous balancing period (i.e. no balancing period duration)	<ul style="list-style-type: none"> <li>• No artificial trading promoted by imbalance cash out exposures.</li> <li>• Balancing costs targeted on MPs creating cost-to-cause incentives, typically without smearing.</li> </ul>	<ul style="list-style-type: none"> <li>• May fragment trading which may slice and reduce liquidity in any one intra-day period.<sup>45</sup></li> <li>• Relatively complex system to adopt from the outset of the new trading arrangements.</li> </ul>

Source: CEPA and TPA

Where used, a fixed balancing period is chosen to provide direct and obvious commercial incentives for network users to match their inputs and offtakes over the relevant period.

In a sense, the time period is arbitrary although one consideration is to encourage trading. If the balancing period is short (say just a few hours) then few players will have flexibility to

<sup>43</sup> We note that similar advantages and disadvantages were raised in AEMC (2015), page 29.

<sup>44</sup> AEMC has already raised a concern that following the introduction of the new market arrangements for the Southern Hub, if confidence and liquidity in the market is low at the outset, the majority of MPs may largely ignore it, choosing to adjust injections and withdrawals within their portfolio than trading gas.

<sup>45</sup> It could be argued the effect on trading liquidity could be worse with continuous balancing compared to fixed intra-day cash out periods because MPs don't know when/whether they might have to trade intra-day.

offer whereas if a longer period (say a day) then greater competition is possible which might be expected to yield keener prices of balancing gas. The fixed balancing period is, therefore, a commercial construct although it needs to be defined in the context of wider issues including the physical operational requirements of the system and to keep system linepack levels, and its distribution within the system, within acceptable operational ranges.

The obvious international comparisons to inform the AEMC's decision about the preferred balancing period / discipline (which might act as a transitional measure, or permanent feature of the balancing arrangements at the Southern Hub) are the British and Dutch regimes. Whilst the AEMC has already investigated both regimes in some detail<sup>46</sup>, our review of both regimes from a transitional / market go-live perspective are presented in Annexes A and B.

We note that the Victorian market is relatively small compared to both the Netherlands and GB and so quantities of gas that would be used for balancing would be very small. Liquidity in the Dutch within day market is lower than in GB.

Therefore, there could be merit in using standardised products, including a balance of day product, together with a daily imbalance cashout as part of a transition to the target model to help facilitate better prospects for market liquidity from the outset of the new market arrangements given that daily products would help to focus liquidity better than hourly products as the new market arrangements "bed in". Whilst the continuous balancing regime might be the ultimate target model for Victoria, if financial relief / tolerance was offered to reduce MPs financial exposure to RBA cost targeting during a transitional period, an alternative (e.g. end of day) balancing discipline might also be used to maintain a degree of balancing discipline on MPs (see discussion in Section 4.2 below).

Whilst clearly a daily balancing discipline can be created through an end-of-day cash-out process, the current Dutch regime contains a linepack service charge which delivers a similar incentive to the daily cash-out in GB or Belgian regimes.<sup>47</sup> The linepack charge provides a similar incentive for MPs to limit their end-of-day portfolio imbalances and so encourages trading in within-day market on daily (or balance of day products). (Although it is important to note that while a linepack fee creates a similar discipline to an end-of-day cash-out, it does not transfer the title of the product and, therefore, leaves the MPs inventory position unchanged. This issue is discussed further in Section 5)

The key point is that different choices of balancing period / disciplines during the transition process at the start of the new market arrangements at the Southern Hub, could be used to help promote market liquidity at the outset of the new market design and ensure some form of balancing discipline is applied to MPs from the outset of the new market, if relief was offered to MPs from the within-day disciplines of a continuous balancing regime.

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<sup>46</sup> AEMC (2016): Review of the Victorian Declared Wholesale Gas Market – Discussion Paper

<sup>47</sup> See Annexes A and E.

#### 4.1.2. General liquidity interventions

Another set of market design measures that could be used to help to stimulate liquidity in the newly designed commodity market, would be obligation measures that would ensure that sufficient volumes of gas are being traded by the market.

For example, market maker/must-offer or restrictions on self-supply could be placed on the largest suppliers or even on AEMO – as the residual balancer – if it has contracted for gas under a long-term GSA.

Options include:

- **Mandatory auctions:** Certain suppliers could be required to offer specific products during defined ‘market making’ auction windows each business day. The mandatory auction would direct the mix of products that are made available to the market.
- **Market making obligations:** Market making could involve a commitment for certain MPs to continually (or during specific trading windows) show bid and offer prices for a minimum volume of gas for particular products (e.g. to meet the balancing needs of small gas retailers) and at a maximum bid-offer spread.
- **Physical self-supply restrictions:** A partial restriction on the amount of physical consumption that any company could supply from within its own portfolio. The objective would be to force the subject companies to trade and manage at least some of their balancing risks outside of their company portfolio.<sup>48</sup>
- **Unbalanced obligation:** Similar in principle to physical self-supply restriction measure, in order to help encourage trading at the outset of the new market arrangements, MPs could be required to have a net short or long position of injections, withdrawals and before the day trades during a transitional period for the Southern Hub. MPs would then be required to balance by trading on the day with other MPs who were also required to be long or short and would be prohibited from managing their gas requirements exclusively from their own portfolio.

Table 4.2 below presents the advantages and disadvantages of these transitional liquidity promotion measures (note the measures are not mutually exclusive).

Table 4.2: Liquidity promotion measures

Measure	Advantages	Disadvantages
Mandatory auction obligation – certain MPs would be required to sell	<ul style="list-style-type: none"><li>• Would help to stimulate liquidity in the newly</li></ul>	<ul style="list-style-type: none"><li>• Could limit liquidity for out-of-scope products or for trading</li></ul>

<sup>48</sup> Possible variants of this measure include where MPs are only allowed to change their positions via trades that occur in the market. In this way they might have to offer their flexibility into the market rather than directly use it to balance their own portfolio. This might apply at just some times in the day and the bids/offers might need to be available for acceptance by others for say half an hour before the network user could access its own flexibility. This indicates that rules might not be trivial.

Measure	Advantages	Disadvantages
certain volumes of gas through defined product and time windows	<p>redesigned commodity market.</p> <ul style="list-style-type: none"> <li>• Can be designed to stimulate products that meet the balancing needs of MPs.</li> <li>• Should help to facilitate transparent and robust reference prices.</li> </ul>	<p>periods outside the mandated windows.</p> <ul style="list-style-type: none"> <li>• Therefore, mandatory auctions may be less conducive as a measure for supporting the residual balancing role, although still helpful for some MPs.</li> </ul>
Market maker obligation – continually show bid and offer prices for a minimum volume of commodity within a defined bid-offer spread	<ul style="list-style-type: none"> <li>• Would help to stimulate liquidity in the newly redesigned commodity market.</li> </ul>	<ul style="list-style-type: none"> <li>• There may be monitoring costs involved in implementation.</li> <li>• Not clear from an initial review of Victoria market structure which MPs the obligation would be targeted on.</li> </ul>
Physical self-supply restrictions	<ul style="list-style-type: none"> <li>• Would help to stimulate liquidity in the newly redesigned commodity market.</li> </ul>	<ul style="list-style-type: none"> <li>• Likely to be difficult to monitor and enforce and the rules would be non-trivial.</li> <li>• As a result, could place material compliance and reporting obligations on companies and regulatory authorities.</li> <li>• Likely only to be possible if the market structure (competition concerns) can justify such a transitional measure.</li> </ul>
Unbalanced obligation	<ul style="list-style-type: none"> <li>• Will help to support within day trading amongst MPs.</li> </ul>	<ul style="list-style-type: none"> <li>• Highly artificial intervention rather than market based.</li> <li>• Practical complications of how to make this approach work – e.g. would you force some shippers to nominate long and others short and how would this be determined? Would the obligation vary day to day?</li> <li>• Therefore, in practice complex and potentially contentious to implement.</li> </ul>

Source: CEPA and TPA

Although not an example of a transitional measure as such, an international example of the types of measures set out in the table above, is the ‘secure and promote’ (S&P) licence conditions which Ofgem has introduced in the past few years for the GB electricity market.

The objective of the S&P conditions has been to improve independent electricity suppliers' access to the wholesale market and has comprised three elements:

1. **supplier market access rules** (setting minimum service standards for trading between smaller suppliers and the largest eight generators);
2. **market making obligations** (for the six largest vertically-integrated electricity companies); and
3. **reporting obligations** on the six largest ('Big Six') energy companies and two largest independent generators (see Annex C for further details).

Energinet.dk has also recently been considering the merits of a market maker obligation in Denmark specifically to help address concerns of low liquidity in their balancing market (as discussed briefly in Annex D). In this context, market making has been proposed as a solution to improve within day market liquidity and is not seen as required to operate during the entire trading day but only at certain times during the gas day.

#### **4.1.3. Transition measures to support SO residual balancing**

There are a range of transitional measures the AEMC could consider to specifically help support AEMO's residual balancing role during a transition period under the newly designed market and balancing regime. These include:

- **Balancing platform:** A balancing platform could be established by AEMO for the sole use of the SO for its residual balancing role. This platform would be used to establish a set of prices and products the SO could draw on for residual balancing purposes. An example of this is the mechanism previously used in the Netherlands, which was referred to as the 'bid-price ladder'.<sup>49</sup>

Given that it is envisaged that AEMO will establish and run the new exchange at the Southern Hub, a variant of this approach would be to simply use the new exchange, but to promote SO friendly physical / locational products (rather than establishing a separate balancing platform).

- **"SO flex":** AEMO could procure its own long-term GSAs with producers, and use this gas to balance the system, rather than gas procured on the exchange. This may serve to reduce balancing costs if the exchange is illiquid. Alternatively, the SO flexibility could be held under an option bid in to the market.

The table below sets out high-level advantages and disadvantages of these different (but not mutually exclusive) balancing market measures.

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<sup>49</sup> See Annex B for further detail.

Table 4.3: Balancing market measures

Measure	Advantages	Disadvantages
Establish balancing platform	<ul style="list-style-type: none"> <li>Creates clear price offers for AEMO to support residual balancing activities.</li> </ul>	<ul style="list-style-type: none"> <li>If a separate trading platform (for shipper use) and balancing platform (for residual system balancer use) are available from the go-live of the new commodity market, then this will split liquidity.</li> </ul>
SO flexible gas	<ul style="list-style-type: none"> <li>Could help to constrain the cost and risk of RBAs as an alternative to illiquid products.</li> <li>Provides operator confidence.</li> </ul>	<ul style="list-style-type: none"> <li>If provided under a GSA, could delay development of liquidity in the short term market although might be some mitigation if potentially unused flexibility is offered back into the market by AEMO.</li> </ul>

Source: CEPA and TPA

Relevant precedents include:

- The flexibility mechanism (“flex mex”) introduced in GB in 1996 which preceded the exchange based ‘On the day Commodity Market’ (OCM), from 1999 onwards, as an SO platform. Transco, the SO, could select from posted bids and offers from shippers in order to fulfil its residual balancing function. The “flex mex” was designed to provide Transco with the ability to accept location specific (or generic) flexibility from shippers using a simple bid stack approach operated by Transco as counterparty to all transactions.<sup>50</sup>
- The bid-price ladder discussed above in the Netherlands (note: our understanding is that there was a more widespread commitment than the flex mex in GB for shippers to offer flexibility into the bid-ladder).
- Balancing platforms have been established in other European countries (see Annex F). Under the European balancing network code, European member states are able to have these in place for five years after which their need is reviewed.

#### 4.1.4. Other liquidity promotion measures

##### Linepack banding

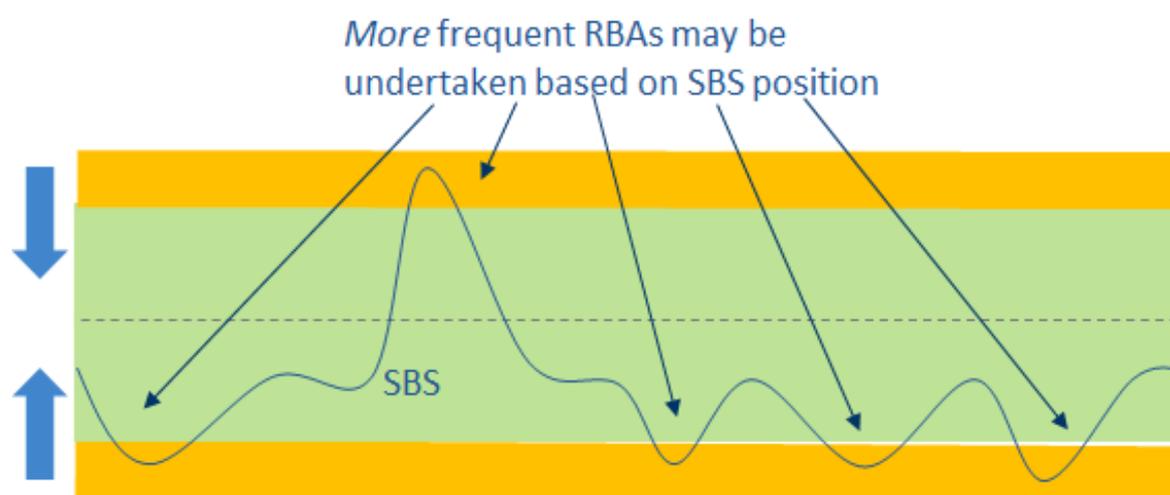
With regards to continuous balancing, as per the AEMC’s target balancing model (set out in Section 2.3), a critical choice is the width of the linepack bands that trigger SO RBAs.

<sup>50</sup> See further discussion in Annex A.

In principle, the width of linepack bands could be used to help promote market liquidity, as for example, the use of narrower bands would provide tighter balancing discipline for MPs (subject to intra-day application of cost causation being in force).

As a transition measure, this could be used to encourage MPs to trade to bring their individual positions close to balanced and, therefore, the overall system (SBS) within green bands to avoid bearing the cost of RBAs, as illustrated in Figure 4.2 below.

Figure 4.2: Impact of narrower linepack bands



Source: CEPA and TPA

Of course, a disadvantage of this approach is that the SO may need to undertake an unnecessary number of RBAs.

It may also not be useful transition measure (for the purposes of helping promote market liquidity) if the expectation is that the green zone will in any scenario need to be set relatively tightly due to linepack limitation concerns in the DTS.

#### 4.2. Financial relief measures

There are a range of financial relief measures that could be considered as part of a transition period at the Southern Hub, either as standalone measures or to operate alongside the market design measures set out above.

##### Tolerances / cost socialisation

The application of tolerance / balancing cost socialisation would be intended to reduce a network user's financial exposure to the imbalance cash out or targeting of RBA cost process during a transition period. The objective would be to:

- reduce individual network users' financial exposure as a means to allow other aspects of the regime to function effectively before imposing full balancing disciplines; and

- ideally observe regular bid/offering of flexibility with an expected greater RSB role before migrating responsibility for (and financial risk of) balancing to MPs.

How the financial relief might be applied in practice at the Southern Hub will, however, depend on the balancing regime in force in the market.

### **Financial relief under a fixed (e.g. daily) balancing period regime**

In GB, and other European countries that have more recently been required by European regulations to transition to market based balancing regimes, financial relief from daily balancing disciplines has been provided to MPs by imbalances within tolerance limits being cashed out at a lower financial exposure than outside the tolerance limits.<sup>51</sup>

For example, in GB, daily tolerances were provided that afforded System Average Price (SAP) rather than System Marginal Price (SMP) exposure to MPs for imbalances within tolerance limits (this included a minimum absolute level of tolerance to benefit smaller shippers). For non-daily metered (NDM) customers, there was also a forecast demand deviation protection, which was the last tolerance to be removed in 2002.<sup>52</sup>

Were a form of daily (or specified period) balancing regime / discipline applied at the Southern Hub in Victoria, applying an average rather than marginal price to MPs' imbalance (within specified tolerance limits) could be used in a similar way as in Europe to offer financial relief from balancing disciplines during the interim period of the new market. As was the case in GB, this tolerance could be applied on a market wide basis, or the level of imbalance tolerance offered designed specifically with smaller MPs in Victoria in mind.

### **Financial relief under continuous balancing period regimes**

In contrast, a continuous balancing regime like that of the Netherlands does not have full imbalance cash-out. It adopts an alternative approach as it is the full *cost* of the RBA that is targeted on causer MPs if and when the RBA occurs (the effect of the application of continuous balancing is to force trades of a certain size on the causers of the RBA).

In this case, a refined "tolerance" concept would be needed, whereby the cost of a within-day RBA would only partially be targeted on MP inventory positions at the Southern Hub. The value of the quantity within tolerance, at the unit price of the balancing action, would then be socialised.

The size of the protected element of causer inventory (whether an absolute value or a percentage of MP portfolio) could then be a very important determinant of how well the regime functions from the outset for certain MPs.

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<sup>51</sup> A critical component of the GB and European code specification is that there should be dual price cash out. These incentives can be collapsed to a single price which, although economically pure, has significant implications in terms of the regime operation.

<sup>52</sup> See further discussion in Annex B.

For example, if an absolute quantity (protected causer inventory) approach was used, this could be set at a level that is particularly valuable to smaller MPs given the absolute quantity will be of proportionally greater value in the context of their business. Criteria – including known size of MP portfolios, supporting competition and financial impact on end customers – could be used to size the relief provided in the interim.

Therefore, slightly different approaches would need be considered to mitigate the financial exposures of causers under a continuous balancing regime in a way somewhat analogous to how tolerances have typically been applied in other countries that operate under a full imbalance cashout system.

### Shadow continuous based balancing regime

Another possible ‘soft landing’ transitional relief would be to operate the proposed continuous balancing from the outset, but in “shadow mode” whereby within-day charges would be calculated but not applied (or only on a proportional basis).

Instead, all (or the rest) of the balancing costs would be recovered elsewhere. This could be by cash-out of end of day positions<sup>53</sup>, instead of (or alongside) a daily charge for use of linepack (as for example has been adopted in the Netherlands).

This would effectively be an extension of the various relief measures set out above and would allow the market to become accustomed to the new balancing regime before they are subject to any material intra-day cash out exposure.

### Summary of advantages and disadvantages

Table 4.4 below sets out the high-level advantages and disadvantages of providing financial relief to MPs either through a shadow regime or by a tolerance / cost socialisation scheme designed specifically for Victoria.

Table 4.4: Financial relief measures

Measure	Advantages	Disadvantages
Tolerance / cost socialisation	<ul style="list-style-type: none"> <li>• By design, the relief measures would shield MPs from the financial risks of balancing disciplines if it was deemed that MPs would not be able to manage these risks during the interim period of the new market.</li> <li>• Reducing MPs financial exposure to imbalance risks may help</li> </ul>	<ul style="list-style-type: none"> <li>• Would involve less targeting and more socialisation of the costs of RBAs – and therefore, weakened cost-to-cause incentives.</li> </ul>

<sup>53</sup> Which could be calculated to precisely meet the revenue requirement, or via the application of a dual price cash-out regime (as envisaged in the European balancing code) and possibly subject to “balancing neutrality” socialisation of any surplus costs or revenues.

Measure	Advantages	Disadvantages
	<p>encourage flexibility to be offered into the market.</p> <ul style="list-style-type: none"> <li>Relief measures can be used to help facilitate a phased transition process to the ultimate target market model at the Southern Hub, as the financial relief measures can be rolled back in stages.</li> </ul>	
Shadow continuous balancing regime	<ul style="list-style-type: none"> <li>Would offer full financial relief from within-day balancing disciplines and would as a consequence have similar advantages to tolerance / cost socialisation measures.</li> <li>Shadow operational phase can be used to test and refine the parameters – e.g. sizing of the Green-zone – of the balancing regime, whilst balancing discipline is potentially maintained by an end-of-day cash-out.</li> </ul>	<ul style="list-style-type: none"> <li>Would involve less targeting and more socialisation of the costs of RBAs – and therefore, weakened cost-to-cause incentives.</li> <li>Absence of MP continuous balancing disciplines at the Southern Hub during the initial (shadow) operational period of the transition process.</li> </ul>

Source: CEPA and TPA

### 4.3. Summary

In this section, we have discussed a range of different transitional measures that the AEMC could consider to help support the transition to the redesign of Victoria’s gas market and establish a liquid traded Southern Hub.

Given the features of Victoria’s market and the stated objectives for the overall balancing regime in Victoria, there is clearly a range of measures which the AEMC could consider to help support the transition to the new Southern Hub market design, including both the market design and financial relief measures set out in this section.

These individual measures should not, however, be seen as mutually exclusive and drawing from the menu of measures set out above, we have, therefore, sought to develop two transitional packages of measures for consideration by the AEMC.

Rather than specific standalone transition measures, each of these packages is what we would consider a coherent combination of potential options for regime transition that could achieve the AEMC’s relevant objectives and requirements for the Southern Hub’s transition process. The two packages are the focus of the next section of the report.

## 5. TRANSITIONAL PACKAGES

We have developed two options that are packages or “pathways” for the AEMC’s consideration that combine elements of the financial relief and market design transition measures which were set out in the previous section:

- **Package 1** would involve implementation of all the main features of the AEMC’s target market model for Victoria from day one, including continuous day-ahead and within-day trading market and continuous balancing<sup>54</sup>. However, the AEMC would look to administer a ‘soft-landing’ for MPs (designed specifically for the context and goals of Victoria’s market), supplemented (as needed) with additional measures (e.g. a market maker role) to facilitate liquidity if this was expected or deemed to be inadequate to achieve eventual cut-over to the target continuous balancing model.
- **Package 2** would allow an immediate move towards day (and further) ahead trading with a process where the SO would take over all balancing responsibilities after a ‘Gate Closure’ point to tackle within day flexibility needs during an initial interim transition phase. A form of balancing platform / flexibility mechanism would be used by AEMO to meet variations from the aggregate of MPs physical nominated flows at Gate Closure and to physically balance the system. Over time, this interim market design would be phased out to cut-over to the target continuous balancing model.

For each package, we discuss a range of individual transition measures that *could* fit coherently within the overall design, together with principles of the general approach and individual measures that might be used to support the objectives for the transition process.

In Section 6 we then set out our recommended package and specific individual transition measures we would propose that the AEMC adopt as part of a transition process.

### 5.1. Package 1: Soft landing of target model from day one

#### 5.1.1. Overview

In Package 1, continuous balancing would be implemented alongside a range of ‘companion transition measures’ designed to:

- i) offer shippers a ‘soft landing’ while the MPs build confidence in the market (*primary transition approach*); and
- ii) promote liquidity in the market to support the SO and smaller MPs in particular (*secondary transition approach*).

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<sup>54</sup> This means that network users will have commercial renomination flexibility both at day ahead and within day with the SO, therefore, taking a residual balancing role which could involve the possibility of actions being taken both at the day-ahead and within day.

These measures would be transitional, rather than representing an adjustment to the target model design. The provision of financial relief would have the objectives of both reducing risk aversion following the introduction of the new market design (to help free up flexibility) and helping MPs (and perhaps particularly smaller MPs) manage the transition process.

From the outset of the new market design, the SO could undertake mandated balancing actions according to the SBS rules and the MPs' within-day as well as end-of-day balance position would be monitored. However, the financial discipline of the continuous balancing regime applied at the within day level would not be targeted on MPs in full (or at all) from the outset, so as to allow MPs to acclimatise to the new regime, new NRT information flows to be assimilated and for confidence to be established in the adequacy of market liquidity to ensure the reasonable availability and price of any RBAs that may be required.

### 5.1.2. Transitional measures

#### Financial relief measures

There are a range of financial relief measures that could be considered to help engineer the soft landing under this approach.

The first could be used to reduce exposure of MPs to corrective intra-day trades by only directly attributing some of the cost of balancing actions<sup>55</sup> to causers in direct proportion to their individual cumulative imbalance position (as per the 'tolerances' measure set out in Section 4.2). The unrecovered costs (or surplus revenues) could be attributed to all participants (based on a measure such as throughput on the day), or could be recovered (partially) via end of day cash out positions.

A second approach could be to offer an absolute quantity of protected element of causer inventory that would not feed into the cost targeting attribution (see the "tolerances" measures discussion in Section 4.2).<sup>56</sup> In practice, the latter approach could be used to provide some small retailer protection during the early phases of regime operation. These approaches are summarised in Figure 5.1 below. ANNEX G sets out illustrations of the impacts of the different approaches on MPs.

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<sup>55</sup> This approach might mean that when a balancing action is taken for x GWh, that the corrective trades made in respect of the causers only correspond to y GWh (where  $y < x$ ). If the corrective trades are priced at the average price of the action then the unrecovered cost  $(x - y)$  times average price of the action will need to be recovered elsewhere.

<sup>56</sup> For example, each causer could be offered a protection on the first z TJs of its inventory that would not attract cost attribution. Rather than feed in each causing shippers inventory position  $SI_i$  TJs into the cost attribution calculation then, depending on the overall system imbalance,  $+/- \max ( (SI_i - z), 0 )$  would be used for each causing shipper.

Figure 5.1: Package 1 – financial relief options<sup>57</sup>

1 <b>Attributing only a portion of the RBA cost to 'causers'</b>	2 <b>Protected element of causer inventory</b>
<ul style="list-style-type: none"> <li>• When a RBA is undertaken, only a portion (i.e. X%) of the total balancing cost would be attributed to 'causers' according to the selected cost allocation methodology.</li> <li>• Any unrecovered RBA costs would then be socialised/ smeared across all MPs (e.g. based on a measure such as throughput on the day or all inputs and all offtakes).</li> <li>• The financial relief proportion (X%) could be adjusted over time to increase MPs financial exposure to imbalances.</li> </ul>	<ul style="list-style-type: none"> <li>• Each MP could be offered a protected element of causer inventory (an absolute value) that would not feed into the RBA cost targeting attribution.</li> <li>• Only the attributed imbalance above the protected inventory ('buffer') limit would attract imbalance cost targeting. Any unrecovered RBA costs would be socialised across MPs.</li> <li>• The protected element of causer inventory could be adjusted over time to increase MPs financial exposure to imbalances.</li> </ul>

Source: CEPA and TPA

Tolerances and other forms of financial relief are only transition measures and would need to be rolled back in stages (preferably to a well-signposted timetable) to mitigate the risk of unmanageable exposures for MPs. Again criteria – e.g. linked to market monitoring measures of the functioning of the Southern Hub<sup>58</sup> – could be used to identify when it might be feasible for MPs to be exposed to full balancing disciplines, or alternatively progressive steps taken to reduce the scope of financial relief offered.

The transition process that we envisage for this package is set out in Table 5.1 below. We might envisage that:

- As an initial phase, MPs would face very limited (perhaps even no) financial exposure to continuous balancing disciplines, with the market operating close to a shadow continuous mode, potentially supplemented with other measures to help promote liquidity and apply some form of balancing discipline on MPs from the outset.<sup>59</sup>
- The objective of the initial phase would be to establish that the new continuous balancing regime was operating effectively and develop confidence that with the supporting protection of the financial relief measures, flexibility could be offered into the new market by MPs.
- Finally, the second phase would involve progressive stepwise incentives to increase the balancing disciplines placed on MPs, before an eventual final cut-over to the target model (Phase 3).

<sup>57</sup> As discussed in Section 4.2, the size of the protected element of causer inventory (whether an absolute value or % of MP portfolio) could be a very important determinant of how well the regime functions from the outset for certain MPs.

<sup>58</sup> In particular that flexibility is being offered into the market and will remain available once cost targeting levels increase.

<sup>59</sup> See below for further discussion of what those measures might be.

Table 5.1: Transition process – Package 1 financial relief

	Regime	Transition measure	Objective outcome
Phase 1 – Go-live	<ul style="list-style-type: none"> <li>• Continuous traded market and balancing regime from the outset.</li> <li>• Traded reference Southern Hub price(s) and degree of balancing discipline from outset.</li> </ul>	<ul style="list-style-type: none"> <li>• Transitional limits applied to RBA cost targeting at go-live to shield MPs from the full (or any) exposure to intra-day market based balancing disciplines.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Get flex provision working:</b> Establish access to flexibility but initially limit MPs financial exposure to encourage them to offer flexibility into the market from the outset.</li> </ul>
Phase 2 – Transition	<ul style="list-style-type: none"> <li>• As per Go-Live phase. MPs and SO will operate under the ultimate target regime model from the outset.</li> </ul>	<ul style="list-style-type: none"> <li>• Gradually weaken financial relief measures introduced in Phase 1. Either by the choice of end-of-day discipline (see further discussion below) and/or extent of RBA cost dilution applied.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Progressively migrate responsibility for balancing to MPs after short trials:</b><sup>60</sup> By reducing financial relief encourage more MP-MP trading and less SO RBAs.<sup>61</sup></li> </ul>
Phase 3 – Cut-over	<ul style="list-style-type: none"> <li>• As per earlier phases.</li> </ul>	<ul style="list-style-type: none"> <li>• Further reduce and/or adjust financial relief and end of day provisions to encourage MPs to take increasing responsibility for balancing aligned with ultimate target regime.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Final cut-over to target model:</b> When evidence of active trading between MPs (before &amp; within day) &amp; SO operating in a ‘light-handed’ RBA role, cut-over to the final target model.</li> </ul>

Source: CEPA and TPA

### Measures for liquidity promotion and other interim measures

Whilst financial relief measures would reduce MPs’ financial exposure to RBA cost targeting during a transition period, with the objective to encourage flexibility being offered into the market from the outset, a number of additional measures might be considered to further promote liquidity, ensure that the SO has access to the tools it needs to perform its residual balancing role and where financial relief from continuous based balancing is adopted, that some form of market-based balancing discipline applies to MPs from the outset.

We suggest there are four transition measures that might be considered as part of Package 1 to help facilitate these objectives.

<sup>60</sup> We would envisage more than one but less than four steps during Phase 2 transition to keep focus.

<sup>61</sup> Greater MP incentive to balance acts as a further inducement to trading.

The first measure is a form of **end-of-day balancing incentive**. This would partly allow a balancing discipline for MPs to be introduced from the outset (whilst continuous balancing disciplines are suppressed because of the financial relief measures discussed above) but also to help encourage trading at the daily level from the outset of the Southern Hub.

The second measure would be to adopt a form of **mandatory liquidity promotion measure**, such as a market maker function or must-offer obligation. The third measure would be provision of the **SO with access to its own flexibility sources** ('SO flex') during the initial interim period of the new market design. The fourth measure would be application of **narrower line pack bands** during an interim period to encourage liquidity.

Each of these measures is discussed in the subsections below.

### End of day balancing incentives

Given that continuous balancing disciplines would by design be suppressed during the transition process under Package 1 (because of the financial relief measures offered), some form of end-of-day balancing discipline should be applied to help create a minimum level of regular balancing discipline for MPs.

As discussed in Section 4, this regular end-of-day discipline could be achieved at the Southern Hub either through an end-of-day linepack flexibility charge (applied to each shipper's imbalance portfolios, similar to the fee applied in the Netherlands regime), or a daily imbalance cash-out (as in the Belgian or GB regimes).

Text Box 1 below explores the relative merits of linepack fees and imbalance cash-out. In view of the Victorian context, and the role of smaller MPs, we tend to prefer the latter (i.e. imbalance cash-out approach), potentially combined with an (interim) absolute tolerance for the daily cash-out during the market's transition process.

Either way, the intended effect would be to provide incentives to MPs to reduce their individual end-of-day portfolio imbalances (subject to interim tolerance levels) thereby encouraging trading in the within-day market focused on a standardised daily title product which is far more likely to offer liquidity than intra-day and/or more physical products.

This is also likely to be consistent with AEMO's requirement to have linepack at optimal levels at the end of each gas and consistent with meeting early morning peaks in the characteristic demand profile in Victoria.

#### Text Box 1: End of day inventory linepack fee versus daily imbalance cash out

If an end-of-day balancing discipline is needed – both as a transition measure and/or permanent feature of the market design – there are different ways this could be achieved at the Southern Hub. An end of day inventory linepack fee could be designed to provide appropriate daily disciplines on individual MPs, depending on the choice of fee adopted.

For example, the fee could be based dynamically on average or marginal prices (or some hybrid) emerging from SO balancing actions or the traded market more generally, rather than simply being set at a fixed administered level. All (or at least the majority) of revenues arising would be socialised

between MPs in some form rather than retained by the SO or pipeline owner, who are already being paid for their services and the use of the pipeline respectively.

However, a linepack fee does not transfer title to inventory, and leaves the MP's inventory position unaffected. This creates a potential transitional problem, especially for those (smaller) MPs who might choose<sup>62</sup> to continue to obtain some or all of their gas requirements without trading with other MPs, either before or within day.

Under continuous balancing with a daily linepack fee, for example, a small MP generating an increasingly negative (short) cumulative inventory position will eventually start to generate persistent SBS signals for the SO to buy gas via an RBA (of which a proportion of the cost is socialised). In order to alleviate the number of RBAs (and cost socialisation), one option might be to consider some form of forced purchase transaction that resets the MP's position "back to zero", but this would require other parties to make a forced sale too, and at what price?

A cleaner and more elegant solution might, therefore, be to simply avoid the difficulty at source by applying a Belgian or GB-style daily imbalance cash-out, rather than a linepack fee. Such an approach returns a shipper's inventory position to zero every day and avoids the cumulative build-up of negative inventory. Where combined with a reasonable transitional absolute imbalance tolerance band, the (smaller) MP will be able to obtain gas within that tolerance at say the "neutral" SAP, and will thereby avoid the automatic triggering of the continuous balancing imbalance charge. Any imbalances outside of the tolerance might be expected to attract an appropriate system marginal price cash-out that would provide the incentive for MPs to manage their individual daily position by trading, more so as the tolerance is reduced in stages during transition.

*Source: CEPA and TPA*

### **Market maker function**

Under this package, AEMO would be expected to primarily source balancing requirements through the exchange, with the liquidity measures discussed above potentially providing some interim assurance that product availability would largely be adequate.

One way to further ensure this, would be to impose mandatory liquidity measures in the form of an interim '**must-offer**' condition, requiring certain MPs to place bids and offers on the exchange or a **market maker** type intervention.<sup>63</sup> However, careful thought would need to be given as to which MPs could be subject to this obligation (if mandated), given the costs and impacts this could impose, and how to develop a viable solution. The text box below sets out some of the considerations that would need to be borne in mind.

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<sup>62</sup> Potentially because of the financial relief offered against continuous RBA cost targeting.

<sup>63</sup> Must-offer obligations could be imposed on certain MPs possibly as a measure to mitigate perceived market power. A market maker role could be attributed to one or more MPs possibly in exchange for a fee with costs socialised across all network users.

### Text Box 2: Market maker function

A market maker could continually (or during specific trading windows) show bid and offer prices for a minimum volume of gas for particular products and at a maximum bid-offer spread. The presence of a market maker would help to encourage liquidity as the presence of a buy or sell price in the market should encourage other parties to participate and compete to be the best buyer or seller in the market. The posted prices by the market maker may also help to improve the transparency and quality of prices at the Southern Hub.

There is a range of options for the form the market maker role could take, including: which products would be covered; whether bids/offers would be shown continuously or during specific trading windows; and the interim use of mandated bid-offer spreads. These types of measures could be applied on a temporary basis and be easily tapered over time as liquidity develops in the market. A commercial and legal framework for the market maker function would need to be established (between the market maker and AEMO (the expected Southern Hub exchange operator)). There would also be costs associated with payment of fees for the service.

Source: CEPA and TPA

The market maker function could be:

- Established from the *start* of the new market design. This would have the benefit that the market-based balancing regime might also be able to immediately start with some incentive level.
- Alternatively, the intervention could be retained as an additional transition measure that would only be introduced if following an initial period of operation in Phase 1, if it was deemed that liquidity was not developing sufficiently at the Southern Hub to facilitate the next stage of the transition process.
- Imposed upon, or voluntarily offered by, certain MPs. For example, the incentive to provide market making functions could be offered by the payment of a fee for this service (e.g. by AEMO) during the transitional period.<sup>64</sup>

Why might the AEMC be cautious of seeking to introduce a market maker function (via AEMO) from the start of the transition process?

- First, the measure obviously would involve a regulatory intervention in the market that may in principle not be necessary if other individual transition measures delivered their objectives.
- Second, there is likely to be a cost involved to financially incentivise the offering of the service. Again, this would be unnecessary if the market was able to function adequately in the absence of the intervention.

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<sup>64</sup> Compared to other transitional measures, this would simply be an alternative representation of the interim 'costs of illiquidity'.

## SO Flexibility

An alternative, or additional measure to a market maker, would be to offer the SO limited use of GSAs to provide back-up in the event that the exchange could not meet the SO's requirements to physically balance the system.

However, to encourage use of the market, it may be desirable to constrain the circumstances in which GSAs could be used by the SO, for example, through time limits, restricting use to periods when the products available on the exchange would be "excessively" expensive, or restrictions to specific products not available or not covered by market-maker obligations on the exchange. Additionally, where GSAs are held by the SO there may be merit in ensuring that any optionality in the contract is posted onto the exchange at a predetermined price and only taken on a strict price based merit order. This would help stimulate competitive pricing of alternative flexibility, thereby encouraging the market, but would likely require a cost-recovery mechanism for any SO stranded costs associated with the GSA.

## Narrow linepack bands

As discussed in Section 4, market liquidity could also be promoted quite differently by a narrower green zone that drives the need for more forced and "voluntary" transactions.

Whilst this is clearly an option under a Package 1 approach (given that the continuous balancing regime in some form would apply from the outset) we are mindful that there is already an expectation within AEMO that the green zone will need to be set rather tightly in Victoria any case, due to linepack limitation concerns.

We believe it would be better, therefore, to gain operational experience of applying green zone and SBS balancing triggers in some form of transitional "shadow mode" before exposing MPs to commercial intra-day disciplines. This learning experience might then assist with the precise formulation of the green zone design for the enduring target model.

As a consequence, rather than seeking to intentionally set "narrow" linepack bands from the outset as a liquidity promotion measure, Phase 1 (see Table 5.1) of the transition process, might instead be used as a shadow period to test the operation of within day balancing disciplines and the design of key components (including the linepack bands) of the regime.

### **5.1.3. How could the transition measures in this package meet the objectives for the transition process?**

In the introduction to the report, we set out a set of objectives which transition measures would be intended to support during the initial introduction of the proposed new market arrangements in Victoria. These include:

- helping to stimulate some initial liquidity in the newly redesigned commodity market and the development of a robust and transparent traded reference price at the Southern Hub;

- during an interim period, reducing the negative impact of low liquidity on MPs (particularly small MPs), the SO and ultimately end consumers of gas; and
- supporting the eventual cut-over to the target market model and balancing regime for the new Southern Hub.

In the subsections below, we set out how the range of transition measures we have grouped under package 1 could meet these objectives and also offer a brief discussion of the possible risks / disadvantages of package 1 as a transitional regime.

### **Stimulate liquidity in the newly redesigned commodity market**

By adopting the target market model from day one, the transitional regime most closely resembles the AEMC’s proposed target model design where forward and derivative trading would be supported by the emergence of market-driven reference price.

On the basis that the target market model should help to facilitate achievement of the Victorian government objectives for the DWGM reform process, the transition regime might also be considered to support: the ability of MPs to effectively hedge risk; market-driven capacity investment signals (to the extent they are achievable within the DTS); and facilitate trading between the DTS and interconnected pipelines.

The success of the regime, however, would depend on there being adequate liquidity at the Southern Hub, and the transition package could help stimulate by:

- initially limiting MPs financial exposure to encourage them to offer flexibility into the market from the outset;
- offering variable incentives for within-day balance discipline on MPs, from “shadowing mode” to 100% cost targeting, whilst giving MPs the opportunity to trade on the exchange from day-one; and
- potentially offering a spectrum of secondary market transitional measures (see above) that could be used to progress the transition process in stages and help facilitate SO and MP access to flexibility in the event financial relief was not considered sufficient to stimulate liquidity from the outset.

### **Reduce the negative impact of low liquidity on MPs**

This package of transitional measures by design shields MPs from full exposure under the balancing regime, and the financial relief can then be tapered once players are more confident that they can manage their exposures.

### **Support the cut-over to the target model**

The roll-back of the financial relief measures can be used progressively to migrate balancing responsibilities to MPs through steps / trials before final cut-over to the target end model.

The parameters of the financial relief regime, can be used to manage the transition process, phased out over time to agreed milestones and/or targets and criteria for the Southern Hub's development.

### **What are the possible risks / disadvantages of transitional regime?**

Financial relief measures would generally involve less targeting and more socialisation of the costs of RBAs and, therefore, weakened balancing disciplines. The recovery of socialised costs could also raise risks for MPs if there was no transparency and predictability of the level of these “unhedgable” costs recovered from the market<sup>65</sup>.

## **5.2. Package 2: Day-ahead trading plus balancing platform/gate closure on the day**

### **5.2.1. Overview**

The concept for this transitional scheme is to allow an immediate move towards day (and further) ahead trading to replace the DWGM, but with a reliable interim process to tackle within-day flexibility needs, in order to address potential concerns about initial market liquidity and limited competitive access to flexibility.

Under this package, MPs would be free to trade bilaterally (via OTC or the exchange) up to a 'Gate Closure' point before the day, at which time MPs' physical nominated entry and offtake flows would be set and would become the deemed target (for physical flows) for the forthcoming gas day (subject to any flexibility subsequently provided to the SO).

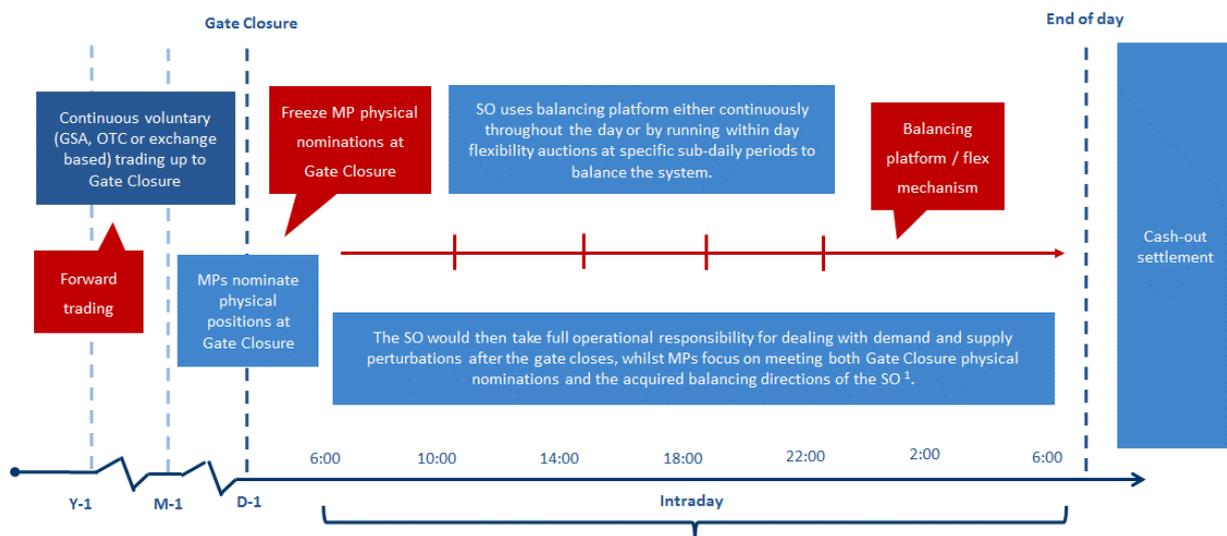
After Gate Closure, AEMO (as SO) would take over all balancing responsibilities and would meet any within-day variations from the aggregate of MPs' physical nominated flows at Gate Closure to physically balance the system. A form of balancing platform / flexibility mechanism would be used by AEMO to meet any within-day variations. Over time, this interim design would be phased out to deliver the target continuous balancing model.

The role of the SO under this interim package can be thought of as providing “directed balancing” rather than the indirect “residual balancing” role of a GB or Netherlands type regime. The SO would be taking full responsibility for dealing with demand and supply perturbations after gate closure whilst the MPs would focus on delivering the outcomes nominated before gate closure, as well as responding to any SO balancing action commitments.

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<sup>65</sup> This risk could be mitigated, for example, through a surcharge set ex-ante to cover expected neutrality costs that need to be smeared across the market. When actual costs are different from anticipated, they could be recovered through a true-up / K-factor applied to future surcharges. Alternatively, cost socialisation could simply be tipped into the future.

Figure 5.2: Illustration – Gate closure set at day-ahead stage



Note: Any flow rate changes made in respect of transactions for system balancing made with AEMO  
 Source: CEPA and TPA

### 5.2.2. Transitional measures

We envisage this package could build upon some aspects of the current DWGM. For example, the interim regime could possibly borrow from DWGM a range of practical features such as “flexibility auctions” held at regular scheduling intervals<sup>66</sup> which help establish price discovery for acquiring flexibility during the within-day period, complemented by some reasonable cost allocation method for distributing SO costs/revenues between MPs.

However, the transitional regime would not retain the existing DWGM deep-pool arrangements as the directed balancing approach would apply to marginal supply/demand matching rather than the full rescheduling process within current DWGM auctions. Although the transitional market design in itself would be a transitional measure, the ultimate objective would be to phase out the interim scheduled balancing regime over time.

We envisage at least four possible ways of phasing out the SO directed balancing approach before adopting a final cut-over to the ultimate target balancing regime for the Southern Hub with full SO residual balancing:

- rolling the gate closure point back through the gas day in stages to extend the period for which MPs have primary scheduling and balancing responsibility;
- allowing MP-to-MP trading within-day, after gate closure, alongside SO directed balancing (parallel trading);
- allowing MPs to plan on a deficit or surplus in advance, and so nominate unmatched positions at gate closure; and

<sup>66</sup> Potentially covering the same balance of day periods as DWGM.

- allowing matched renominations after gate closure, whereby MP inputs can be adjusted to track within day variation in larger (controllable) offtake flows.

### **Rolling gate closure**

A move towards the full trading and target gas balancing regime in stages could be adopted, building confidence in market operations and liquidity before taking the next step, whereby the Gate Closure point could be progressively moved to extend the period for which MPs have primary scheduling and balancing responsibility. The roll-back of the gate closure might for example, take place in one or two steps, shrinking the period for which the SO has the directed balancing role and expanding the period for which the SO would have a purely residual balancing role (monitoring and intervening more sparingly as required subject to the precise rules of the ultimate target balancing model).

Careful consideration would need to be given to any detailed complications arising from a rolling gate closure approach including potential “boundary issues” between the pre and post gate regimes within the same day.

### **Trading between MPs after gate closure**

The simpler version of the gate closure regime would require MPs to stop trading at gate closure. There may be merit, however, in considering allowing trading to continue through the day. In this case, MP physical nominations would still remain frozen at Gate Closure positions, but the right to trade would persist, offering an alternative means for MPs to achieve target positions. For example, if within-day demand increases after gate closure it would be the SO’s responsibility under directed balancing to use the flexibility mechanism to redress the situation by purchasing gas. However, an MP who is long against its nominated supply position could also trade within-day with another MP who is short, in order to reduce their respective financial exposure to scheduling/imbalance charges.<sup>67</sup> Clearly the rationale and encouragement for such MP to MP trade within day will be influenced by the financial disciplines imposed by the SO directed balancing regime.

### **Unmatched positions at gate closure (and matched renominations afterwards)**

A typical requirement for MPs to present matched nominations (i.e. injection nominations equal to withdrawals nominations for each MP) at gate closure could also be relaxed somewhat as a transitional measure at the start of the regime, for example, to provide an easier commercial glide path in particular for smaller MPs who have become accustomed to securing some or all gas via the DWGM.

With unmatched nominations, rather than effectively projecting a zero imbalance, MPs would be allowed to plan on a deficit or surplus in advance.

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<sup>67</sup> With reference to GB terminology, this would represent facilitation of trades at the virtual trading point perhaps via a form of OCM from the outset, rather than being introduced after the initial “flex mex” period.

By this means a small MP, for example, can be allowed to deliberately secure some of its gas via the SO's directed balancing mechanism, rather than trading for all its gas needs in the forward and day-ahead (or within-day) market. Assuming unmatched nominations are allowed, there is then the question of how to price the SO sourced matching. This might not be as sharply priced as the situation where an MP fails to meet its planned physical positions, but might be priced at the same level (or somewhat more sharply<sup>68</sup>) than the neutral price applicable to unpredictable within-day variation. The intention of this measure would be to allow (smaller) MPs both the ability to trade in advance whilst still having the comfort that "fall back" gas can be secured (effectively via the SO imbalance/scheduling charges) at a reasonable price. Although, there would be a tension between such transitional relief and the promotion of active trading between MPs, which is why the financial discipline applied might be sharpened over time (as an alternative to simply restricting allowed volumes).

If unmatched nominations are allowed there is also a second question of whether there should be any restriction on the use of this facility.

For example, the facility might be limited to only requests to source extra gas, rather than to dispose of a surplus (which could be made available via traded market or as a source of RBA flexibility to the SO). Furthermore, it might be reasonable, after a while, to revisit the role of the SO in responding to all increases in within-day demand after gate closure – for example, it could be considered that MPs should assume responsibility for deviation in larger controllable offtakes. This could be achieved by allowing MPs to make a "matched re-nomination" of entry flows in response to a within-day change in offtake flows at larger (controllable) offtakes. This option could be accompanied (or followed later) by a price incentive on any MP who does not use the facility to take direct responsibility but instead continues to rely on the SO to manage such deviations. In this way, MPs can be gradually allowed (and/or encouraged) to take on more of the balancing responsibility that is a feature of the ultimate target balancing model (whatever its precise design).

### Expected transition process

The transition process we envisage for this package is set out in Table 5.2 below.

Table 5.2: Transition process – Package 2

	Regime	Transition measure	Objective outcome
Phase 1 – Go-live	<ul style="list-style-type: none"> <li>Continuous voluntary trading up to Gate Closure point. Interim balancing regime / process to fulfil flexibility needs within day.</li> </ul>	<ul style="list-style-type: none"> <li>The transition measure at the go-live point is the interim process / regime for balancing before the target balancing model is implemented.</li> </ul>	<ul style="list-style-type: none"> <li><b>Establish confidence in the new traded market design:</b> use the interim SO "directed balancing" process to tackle within-day flexibility needs and system balancing.</li> </ul>

<sup>68</sup> For example, at a level somewhere between an average "neutral price" and an extreme system marginal price.

	Regime	Transition measure	Objective outcome
Phase 2 – Transition	<ul style="list-style-type: none"> <li>As per Go-Live Phase. Depending on the policy for gate closure a within day continuous balancing regime may partly apply.</li> </ul>	<ul style="list-style-type: none"> <li>Roll-back from directed SO balancing: either by strengthening disciplines on MPs<sup>69</sup> or by moving the timing of gate closure.</li> </ul>	<ul style="list-style-type: none"> <li><b>Get flex provision working:</b> offering network users certainty that they don't need to reserve flexibility for their own portfolios whilst the SO performs its interim directed balancing role.</li> </ul>
Phase 3 – Cut-over	<ul style="list-style-type: none"> <li>Cut over to continuous traded market and balancing regime.</li> <li>Traded reference price(s) and MP balancing discipline.</li> </ul>	<ul style="list-style-type: none"> <li>Complete roll-back from SO directed balancing role to residual balancing role. MP responsibility for balancing under target continuous regime.</li> </ul>	<ul style="list-style-type: none"> <li><b>Evaluate progress after short trials:</b> When evidence of active trading between MPs (before &amp; within-day), cut-over to final target model.</li> </ul>

Source: CEPA and TPA

### Balancing incentives for MPs during the transition process

The gate closure concept suggests that an MP should not be “punished” if its demand unpredictably rises (or falls) after closure, for example due to a change in temperature. Instead the SO should look to address this requirement, via some form of competitively sourced flexibility provision. The cost of this flexibility could be subject to a level of targeting or socialisation commensurate with a “no undue punishment” principle, whilst recognising the general desirability of cost reflectivity. So, for example, the cost of addressing within-day demand change ought to be based on some “neutral” averaged unit cost, rather than say an extreme marginal price.

However, a more forceful discipline may presumably need to be applied to any failure by the MP to deliver on the position nominated before gate closure, such as due to undersupply of gas at entry. It is for consideration whether this discipline should take the form of two “scheduling charges” (for entry and off take) rather than one “imbalance charge” (for the net difference)<sup>70</sup>, or some other means. For example, a scheduling fee could be applied against deviation from nominated quantities<sup>71</sup> without any associated transfer of gas title.

The underlying rationale is that MPs make their best view of supply and demand before gate closure and are incentivised to “stick with the program” after the gate shuts, whilst the SO

<sup>69</sup> Such as by the cash-out pricing applied to unmatched positions at gate-closure or by the introduction and encouragement of matched renominations in respect of controllable offtake variation.

<sup>70</sup> Either way, dual marginal price cash-out is probably an appropriate discipline for such non-performance.

<sup>71</sup> Based on inputs in aggregate or locationally, and (separately) on offtakes in aggregate or locationally.

takes over responsibility for dealing with variation afterwards, and then spreads or targets the costs incurred as appropriate.

Annex H contains examples of different facets of Package 2 using (for illustration purposes) a two-part scheduling imbalance cash-out approach (on entry and exit flows separately), using a mix of SMP and SAP prices, that avoids the need for separate scheduling fees<sup>72</sup>. Alternatively, a single combined imbalance cash-out approach could have been adopted accompanied by scheduling fees on entry and offtake flows.

### **5.2.3. How could the transition measures in this package meet the objectives for the transition process?**

As with Package 1, we have considered how the range of transition measures grouped under package 2 could meet the objectives for the transition process following the introduction of the new market arrangements in Victoria.

#### **Stimulate liquidity in the newly redesigned commodity market**

Package 2 would, during the interim period, provide a process to tackle within day flexibility needs in order to address potential concerns about initial market liquidity and limited competitive access to flexibility. Liquidity concerns in the balancing timeframe would be addressed and the within-day platform ensures the SO has access to gas for balancing purposes. However, overall the package as a whole can be considered an alternative market design approach and so would be less aligned with the reform objectives for the DWGM.

#### **Reduce the negative impact of low liquidity on MPs**

Although not directly providing financial relief, the interim transition process to “roll-back” from a directed SO balancing mechanism to the eventually the target continuous market based balancing model, seeks to address the initial liquidity concern – for MPs and SO – by offering network users certainty after the Gate Closure point that they don’t need to reserve flexibility for their own portfolios.

#### **Support the cut-over to the target model**

As set out above, there are a range of measures that could be used over the transition period, to phase out the interim ‘scheduled’ balancing regime. For example, if rolling gate closures or some other identified options were adopted, MPS and the SO could be allowed time to learn the working of the new market, in bite-sized steps, before being fully exposed to the end target model as set out for the new Southern Hub. There are a number of options for gradually accustoming MPs to the greater responsibilities of market based balancing disciplines.

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<sup>72</sup> In this context a scheduling fee would impose a cost discipline without involving any transfer of gas title (unlike a scheduling *imbalance charge*).

### **What are the potential risks / disadvantages of transitional regime?**

Package 2 would not require MPs to take primary balancing obligations from the start of the new Southern Hub and essentially requires the design of a whole new regime for the interim period. The risks and drawbacks of this overall approach are likely to be found in the detailed development and implementation of the specific market design, developed solely for the transition process. For example, based on only brief discussions with AEMO, we understand that the implementation of rolling gate closure may be challenging (and costly) from an operational and IT perspective.

## 6. CONCLUSIONS AND RECOMMENDATIONS

### 6.1. Conclusions

#### Preference between Transition Packages

In Section 5 we considered two packages for transition against the Victoria Government's objectives for the DWGM reform process and the various objectives and criteria for the Southern Hub's balancing regime.

Overall our conclusion is that if the wider policy goal and commitment is and remains to adopt the continuous balancing and target market model for Victoria, then there is merit in adopting a version of the Package 1 approach. Package 1 has the distinct advantage that it would allow the AEMC's target market model to be implemented from day one, albeit with supporting measures to ensure the market functions from the outset.

In contrast, Package 2 would require significant additional work to develop a new market design for Victoria's wholesale gas market, simply as a transition measure, meaning that during the interim period there would be a market design in place that would be less aligned with the reform objectives for the DWGM. This additional effort could perhaps be justified if the transition process was seen as a potentially quite lengthy journey towards an evolving and currently somewhat uncertain destination.

#### Staged Transition Process

However, we believe that the transition process, once initiated, should be measured in months not years, because:

- the AEMC has clarified that there is a commitment to delivering the target model rather than a need to "feel the way" towards some emergent solution;
- the Victorian gas market already starts from a strong base that includes years of:
  - reliable DWGM operation and sourcing of flexibility;
  - active retail market competition;
  - experienced MPs and SO;
- unnecessary delay in moving to the target model prolongs the period during which there is a "trade-off" between financial relief measures and adapting to new market disciplines; and
- this will limit the extent of cost socialisation arising from transitional financial relief measures.

Furthermore, we would expect this focussed transition process to comprise planned steps with defined criteria for progression, rather than a more open ended "voyage of discovery". The latter approach might have some attraction in a different environment where there was

less commitment to a particular target model, but obviously implies greater unpredictability for network users as well as delay and cost.

### Proposed Package 1 version design

In determining which version of Package 1 to adopt, there is a choice to be made between starting with market maker type obligations or holding them in reserve. We lean towards the latter given that there are potential costs and complications (and potentially controversy) associated with such an approach, and, most importantly, that it simply might not prove necessary. However, we recognise expressed concerns about initial market liquidity and adequate SO access to flexibility, and therefore conclude that the regime should begin with an emphasis on limiting the balancing risks facing MPs as a means to encourage them to make most if not all of their flexibility available to the SO in its residual balancing role.

Given that continuous balancing disciplines would by design be suppressed during the transition process because of the financial relief offered, there will need to be a form of end-of-day balancing discipline applied so as to apply a minimum level of regular balancing discipline and encourage trading at the daily level from the outset. Furthermore, given such discipline exists as a permanent measure in other markets that have adopted continuous balancing, this would suggest that the form of discipline be adopted from the go-live of the new market and be incorporated within the ultimate end-market design.

What form should the end-of-day discipline take?

Given the Victorian context includes a number of smaller MPs who have traditionally obtained gas from the DWGM, we would favour a form of end-of-day discipline like the Belgian regime that involves transfer of gas title rather than simply applying a fee for an end-of day linepack “service”, as is the case in the Netherlands. But given the concerns of initial low liquidity at the Southern Hub, at least during the initial phase of the new market, it is likely this end-of-day balancing discipline would also need to accommodate a degree of tolerance for MPs from the outset – i.e. a reasonable volume of daily cash-out at a reasonably attractive “neutral” price – as an additional transitional measure.

There would be a need for a regulatory policy to determine the initial end-of-day volume level that benefits from this tolerance and whether that should be reduced over time and/or subject to somewhat sharper pricing disciplines. There might also be a case to be made for restricting MPs’ access to this facility, but we currently assume that in the interests of non-discrimination the chosen level of tolerance would apply to all MPs.<sup>73</sup>

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<sup>73</sup> If nothing else, there may be need for some regulatory monitoring to avoid MPs creating spurious multiple subsidiary entities simply to exploit the absolute level of the tolerance.

## 6.2. Recommendations

In the light of these conclusions, and on the working assumption of a clear intent to adopt a voluntary trading and continuous balancing target model for Victoria, our recommendations to the AEMC are as follows:

1. Financial relief should be offered to MPs from the risks / disciplines of the proposed intra-day balancing model during an interim period for the Southern Hub. Specifically, we would recommend an initial “shadow operation” of within-day balancing disciplines with the facility to introduce and increase cost targeting via simply varying the proportion (i.e. percentage) of targeted RBA costs on the “causer” MPs during within day period in question.<sup>74</sup>
2. During the first phase of transition, AEMO would operate to the defined balancing action zones and SBS method to determine the need for, timing, size and nature of residual balancing actions, but none of the costs and revenues arising would be targeted at individual “causer” MPs within day.
3. Instead, from the outset of transition, MPs should face an end-of-day imbalance cash-out discipline, with an initial absolute tolerance providing System Average Price (SAP) based relief<sup>75</sup> from what would otherwise be a stronger end-of-day imbalance cash-out price (for example, some form of marginal price).
4. The net difference between the costs and revenues arising from balancing actions, and the costs and revenues from imbalance cash out, should be accommodated by a suitable designed balancing neutrality mechanism that addresses MP concerns about unpredictable application of any socialised costs arising.
5. End-of-day imbalance cash-out should also be a feature of the ultimate target model to encourage ongoing trading in a daily title product as the most credible focus for future market liquidity and to help establish a clear daily reference price.
6. The further steps and precise parameter values of transition should ideally be pre-defined with clear criteria for progression, developed with industry workgroup involvement. These will focus on: the introduction and strengthening of intra-day balancing cost targeting (getting the proportion of RBA targeted costs from 0 to 100%); the phased reduction in the daily cash-out SAP based tolerance (if appropriate)

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<sup>74</sup> Applying cost targeting relief on a proportional basis has the advantage that it can be varied on a sliding scale basis to apply to all MPs and could, therefore, be used as a transparent basis to phase out the financial relief from within-day balancing disciplines in stages. However, other approaches of providing this financial relief, such as offering an absolute quantity of protected element of causer inventory, might also be investigated during the detailed transition regime design process as a way to provide further support to smaller MPs.

<sup>75</sup> The daily cash-out could offer a reasonably substantial tolerance to MPs during the interim where say shippers would be cashed-out at SAP +/- a very small adjustment – just enough to encourage MPs to trade out an anticipated imbalance in the market rather than allowing it to be cashed out.

or adjustment(s) to its precise pricing; and measures of progress in terms of general market liquidity and SO access to adequate flexibility.

7. Consideration should be given to providing the SO with a form of flexibility capacity agreement during the transition period. Further analysis would be needed to finalise any such arrangements as to form, timing and financing, and to ensure that as far as possible any potentially adverse impact on general market liquidity is mitigated.
8. In the event that market liquidity was deemed (preferably judged against pre-agreed criteria) to not be developing sufficiently at the Southern Hub following Go-live, a market maker role could then be introduced to help mitigate this situation. Criteria for subsequently suspending this role should be established prior to appointment, and a decision taken on whether costs arising should be allocated via the balancing neutrality or some other mechanism.

## **ANNEX A    EVOLUTION OF BRITISH GAS BALANCING**

### **A.1.            Introduction**

This appendix is intended to provide examples of transitional arrangements in the context of the evolving gas balancing regime in GB. Transitional arrangements can take various forms, and for different purposes, and in the GB context these include:

- Provisions to (temporarily) soften shipper imbalance exposure, such as “soft landing”, dry running and the adoption of (reducing) imbalance tolerances.
- Interim mechanisms to assure the SO’s access to tangible residual balancing tools, such as the “flex mex”, prior to relying on an anonymous traded market, such as the OCM.
- Measures to boost “market liquidity”, such as shipper undertakings to support the introduction of flex mex and then OCM.
- Use of licence schemes to encourage desirable SO behaviour, such as system balancing incentives to encourage “smarter” interventions, reinforcing the evolution of a new operator culture designed to facilitate the operation of the market rather than dictating how shippers will be allowed to access the system.
- Expanding the use of linepack inventory as a means of accommodating shipper friendly gas trading, rather than as a prescriptive determinant of balancing decisions and shipper discipline.

### **A.2.            Background 1990-96**

Between 1990 and 1996 British Gas Transportation Services Department offered bi-lateral transportation agreements to “third party” shippers with limited balancing discipline. Engineering concerns led British Gas to initially propose “continuous simultaneous balancing” for such shippers, but the regulator Ofgas rejected such an approach as inherently unreasonable and indicated that monthly balancing by third party shippers should suffice<sup>76</sup>. Bilateral negotiations resulted in a compromise whereby there would be stronger shipper disciplines on “difficult days” of higher demand, otherwise monthly balancing would apply. Not surprisingly, but to Ofgem’s disappointment, no prompt daily market developed given this lax shipper balancing regime<sup>77</sup>. In practice, physical system balancing was achieved by continued use of the flexibility of the incumbent gas supply contracts, given the relatively modest volume of third party transportation.

However, recognition of the growing importance of third party flows, the desire to extend competition to the full retail market, and the (widespread but erroneous) assumption that British Gas enjoyed preferential treatment from its embryonic sister transportation division (Transco), led

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<sup>76</sup> Ofgas wished to promote new entrancy and argued that the volumes involved were insignificant.

<sup>77</sup> The intended “difficult day” discipline was diluted by the absence of reliable daily metering, and in practice even monthly imbalance charges were rarely applied due to logistical problems with the whole invoicing process.

to the development of a “level playing field” transportation regime for all shippers (including British Gas), based on an entry/exit virtual hub transmission system and daily balancing for all shippers.

### **A.3. Network Code “Soft Landing” Mar – Sep 1996**

Given the considerable strengthening of balancing disciplines implied by the envisaged Network Code regime, and in recognition of the history of transportation data and invoicing problems previously experienced by shippers, there was some nervousness about applying full daily imbalance cash out from day one of the Network Code introduction on 1<sup>st</sup> March 1996.

Hence a soft landing approach was adopted whereby daily balancing operations would effectively be shadowed rather than actually applied, so that MPs (and Transco) could become accustomed to the new rules and supporting IT systems and business processes. In the interim a diluted monthly discipline was applicable.

### **A.4. Network Code “Hard Landing” October 1996 onwards**

The introduction of proper shipper daily balancing from October 1996 was accompanied by a flexibility mechanism by which Transco could select from posted bids and offers from shippers in order to fulfil its residual balancing function. This “flex mex” was designed to provide Transco with the ability to accept location specific (or generic) flexibility from shippers using a simple bid stack approach operated by Transco as counterparty to all transactions. The introduction of the flex mex was supported by British Gas, as a dominant incumbent supplier, initially undertaking to the regulator to post minimum volumes of flexibility bids and offers within a fairly tight price spread.

The hard landing was somewhat softened for Shippers by the initial adoption of daily tolerances that afforded System Average Price (SAP) rather than System Marginal Price (SMP) exposure, including a minimum absolute level of tolerance to benefit smaller shippers in particular. Most tolerances were negotiated pragmatically as percentages of flow, reduced over time, with smaller allowances for larger sites where gas flows could be metered more accurately in near real time. For non-daily metered (NDM) customers there was also a forecast demand deviation protection, the last tolerance to be removed in 2002.<sup>78</sup>

### **A.5. On the Day Commodity Market October 1999 onwards**

Although the flex mex worked well from Transco’s residual balancing perspective, the regulator was concerned that the mechanism was too limited in scope, placing Transco as a counter party to all transactions, and denying shippers the ability to trade directly with one another. It was felt that as well as being helpful to shippers, an anonymous traded within day market would also offer deeper and less expensive access to flexibility than the rather thinly supported flex mex. The regulator thus pushed hard for the introduction of an externally operated (and financially cleared) OCM to address these concerns.

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<sup>78</sup> By protecting shippers from SMP cash out, tolerances diluted balancing discipline (and risked gaming by “phantom flexibility” provision), and increased the potential for residual balancing costs to be smeared.

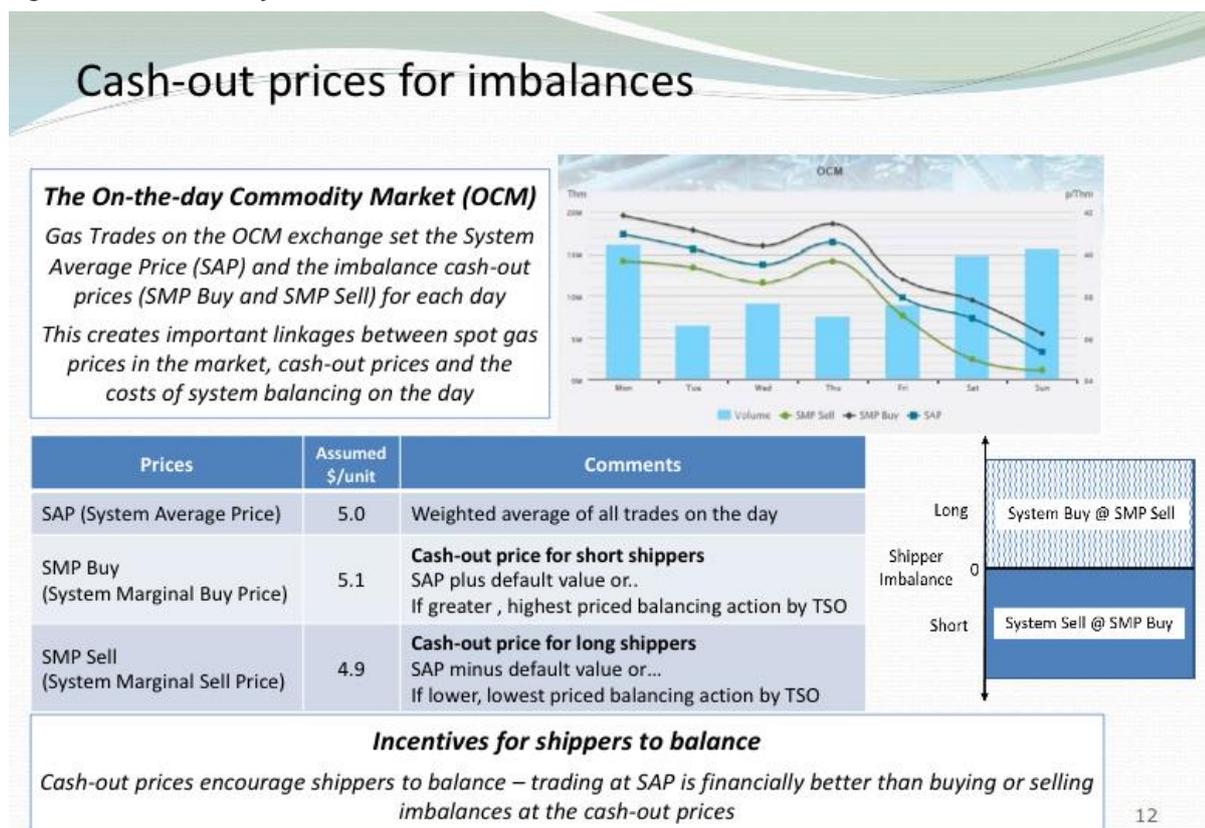
At the insistence of Transco, the OCM included physical and locational products alongside the main title market that Shippers would be expected to use with one another. This was to assuage operational concerns that title trading alone might not generate the timely physical response that Transco was seeking.<sup>79</sup> A number of larger shippers, and not just British Gas, were lobbied to provide letters of assurance to Transco that they would support the introduction of the OCM by making reasonable amounts of their flexibility available to the market.

OCM implementation was accompanied by the introduction of an SO incentive scheme that encouraged Transco to undertake any RBAs at close to the emergent market daily average prices of all OCM title transactions.

### A.6. Imbalance cash out

Over time the original shipper daily tolerances have all been reduced to zero. Furthermore, a minimum spread has been introduced between SMP buy and sell prices, effectively eliminating SAP cash-out, by applying a small differential either side of the SAP price as illustrated below. This was designed to further encourage shippers to trade with one another via the OCM rather than simply accepting imbalance cash-out on days where the SO has not needed to take any balancing actions on the OCM.

Figure A.1: Cash-out for imbalances



Source: TPA

<sup>79</sup> Although performance against these product purchases was also deemed, and could not actually be measured, there were matching (re)nomination obligations on shippers that could at least be monitored.

## **A.7. Residual Balancing evolution**

At the time of the original negotiation of the Network Code, Transco was keen to adopt a commercially (and financially) neutral role as SO. Its primary operational concern was to be able to continue to operate a safe and reliable gas transportation network, despite the loss of “command and control” over the day to day (re)nominations of gas inputs and offtakes that now became the province of the shippers.

As such, Transco saw its new residual balancing role as primarily about maintaining a very conservative linepack inventory range, often taking flex mex actions to address any material projected deviations by buying or selling the full quantity of gas required. Transco and Shippers typically sought a fairly mechanistic and transparent approach to residual balancing in these early stages.

However, the regulator and others increasingly became concerned about the mechanistic approach<sup>80</sup>, resulting in the introduction of various SO incentives, coinciding with OCM implementation and thereafter, designed to encourage smarter decision making. In particular, the SO was now rewarded for taking balancing actions at close to market average prices, and for achieving closing system linepack close to the opening inventory position.

Over time the role of Transco (and then National Grid) as residual balancer has clearly evolved. In particular, the acceptable range of linepack inventory has increased dramatically over the years, from 2mcm to 10, 20 or even more than 30 mcm on occasions. When RBAs are taken on the OCM now, they are almost always conducted on the main (and more liquid) title market, and typically involve smaller volumes that are designed to influence wider shipper behaviour indirectly via the impact on cash out prices, rather than simply filling an order for the full projected inventory deviation.

This is “light touch” residual balancing, designed to work with the market as unobtrusively as possible in order to achieve the desired outcome – namely facilitating market operation whilst maintaining a safe network with minimal intervention. This can be seen as part of a wider philosophy whereby the gas transportation system becomes increasingly concerned with the facilitation of wholesale (and retail) markets rather than prescriptively dictating conditions of shipper access to the network<sup>81</sup>.

## **A.8. Potential concerns with daily balancing**

Almost from the outset there have been concerns about whether daily balancing provides adequate incentives on shipper behaviour:

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<sup>80</sup> Heightened by one or two small but very expensively priced end of day balancing interventions in December 1997 that were following guidelines but made little contribution to linepack, and even less sense to shippers suddenly exposed to a dramatic increase in SMP cash out.

<sup>81</sup> This might be at the expense of traditional goals such as minimising operating costs like use of compressor fuel, but the wider benefits of competition are presumed to outweigh such considerations.

- Surely (some) shippers can manipulate the system by varying flow rates within-day in order to encourage RBAs and favourably increase prices?
- Could the system physically cope with increasing demands for diurnal flexibility?
- Where is the cost reflectivity if the costs of such balancing actions are smeared across all shippers, given that those causing the costs might avoid daily imbalance charges by simply adjusting flow rates later in the same day?

These are potentially substantive and reasonable concerns, and prompted significant regulator reviews circa 2001/02, but overall GB experience suggests that they are generally unfounded, at least to date, for a variety of possible reasons:

- Linepack inventory has proved to be a far more flexible and plentiful resource than previously assumed.
- The OCM and SO incentives have worked very well in combination to fundamentally change the residual balancing paradigm.
- RBAs now tend to be modest directional “nudges” within the more liquid title market, with shippers and traders normally responding quickly and efficiently to slight changes in the price signal.
- The removal of tolerances, the minimum SMP buy sell spread in cash-out prices, and the relatively modest costs of SO intervention, means that daily imbalance charges generally recover such costs, rather than them being smeared across shippers via neutrality.
- Sharing of near real time network flow information and updated projected linepack levels offers reassurance through greater regime transparency.
- Shippers with the ability to influence flow patterns always have to be mindful of wider licence obligations and not just the rules of the Network Code.

Furthermore, the case for moving to shorter balancing periods such as hourly balancing, or some form of continuous within-day balancing, has foundered on two fundamental objections, one pragmatic, the other economic:

- the GB (upstream) regime cannot provide within-day allocations of gas inputs to individual shippers at commingled entry points without fundamental (and fiercely resisted) contractual and operational overhaul<sup>82</sup>; and
- the pursuit of cost reflectivity via shorter balancing periods is potentially illusory if it neglects to consider the implications for the size of the balancing zone, given the typical transit times of gas around the network – sub-daily balancing might suggest the need for smaller (multiple) balancing zones and seriously threaten the liquidity of gas trading both geographically as well as temporally.

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<sup>82</sup> This being a key reason why flexibility transactions are simply deemed to be performed, and daily allocations adjusted accordingly, as actual compliance within day cannot be measured.

## **A.9. Why daily balancing works for GB**

A single balancing zone based on a virtual hub with daily shipper balancing may well be a crude approximation for the physical reality of the transmission system – but it seems to be good enough. Linepack is the invisible “flexible filler” that bridges the geographical and temporal gap between network outputs and inputs over the gas day. And residual balancing accommodates the gap between the commercial model and the physical constraints of the network, monitoring (and occasionally taking action) to ensure that the use of linepack is neither overextended nor unnecessarily restricted<sup>83</sup>.

Balancing can be achieved by the SO making relatively few and modest interventions on the OCM title market, because shippers and traders generally respond quickly to small movements in price – the SO does not need to buy or sell a fixed volume of gas, but instead just moves the price in the right direction, repeating (or reversing) as and when needed.

The OCM response is typically so effective because the title market is liquid and actively traded; and this is reinforced because the commercial balancing regime preserves liquidity by maintaining a national, daily product and aligning cash-out prices in a simple and transparent “cause and effect” feed-back loop. The clear focus on a single daily imbalance for each shipper, cashed out at SMP prices with a minimum buy sell spread, encourages shippers to trade with one another during the day, often anticipating changing system needs without waiting for the SO to intervene. The GB regime does not attempt to target costs too precisely – interventions are not costed or apportioned by their size, location or time of day but simply exert their influence (if any) on the SMP buy or sell price for the day.

The simple model is shipper and trading friendly, and transaction costs are relatively modest. In practice, shippers do not appear to be generating excessive levels of residual balancing costs, and the level of smeared costs is generally very low.

This is in part because there are no shipper tolerances, so all daily imbalances are cashed out, and there is always a minimum (even if modest) SMP buy-sell spread. Shippers accept this exposure because they have confidence in their ability to trade imbalance positions efficiently through the OCM, and know that their exposure will normally be limited because the SO is typically operating in the title market in modest quantities at reasonable prices close to SAP.

In effect there is a virtuous circle in action, with various contributory and complementary features:

- Sufficient shippers with direct access to flexibility.
- An active liquid market that can trade that flexibility.
- A relatively simple commercial balancing regime that facilitates shipper trading.
- A residual balancing role that works with, not against, the market.
- Access to adequate linepack.

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<sup>83</sup> Within a normal target of returning the close of day inventory to the opening level.

- A regulator that has placed the goal of a well-functioning gas market above the pursuit of (spurious) cost reflectivity.<sup>84</sup>

Key elements of the GB balancing regime have admittedly been constrained by practical considerations, most notably the unavailability of within-day allocations, but these constraints have served to simplify rather than complicate the commercial model.

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<sup>84</sup> At least in the context of system balancing costs.

## **ANNEX B    EVOLUTION OF NETHERLANDS GAS BALANCING**

The Dutch gas market is characterised by one of the most liquid gas trading hubs in Europe. The Title Transfer Facility (TTF) was set-up in 2003 but, for several years, trading was illiquid. Liquidity took off slowly in around 2007 with more firm progress from 2009. A step change in liquidity on the TTF came in 2011 (the year when the bid-ladder balancing mechanism was introduced).<sup>85</sup>

### **B.1.            Key features of Dutch balancing regime**

The Dutch balancing regime is a continuous balancing regime with no specific balancing period. It is also being referred to as a cumulative hourly balancing system as shippers build imbalances on an hourly basis. A shipper's cumulative hourly imbalance portfolio is called the POS - portfolio imbalance signal (from the Dutch acronym). The aggregated imbalances across all shippers create the SBS.

MPs have primary responsibility for balancing their own portfolios. Imbalances do not attract penalties as long as the overall system is in balance (or more specifically, within a pre-set tolerance level).

If the SBS is projected to go outside tolerance levels, the TSO will buy or sell gas with the cost of the balancing action recovered (pro-rata) from the MPs with imbalances in the same direction as the SBS imbalance ("the causers" of the imbalance). Shippers with positions opposite to the system imbalance are not affected by the TSO action.

As the actual cost of the balancing action is recovered directly from shippers with imbalances, the Dutch system does not require a neutrality mechanism (employed in other regimes in Europe) to adjust for any surplus/deficit in the revenue recovered by the TSO through imbalance charges.

### **B.2.            Introduction of market-based balancing regime**

A market-based balancing regime was first introduced in the Netherlands in 2011. It involved the TSO undertaking balancing actions through a dedicated Bid Price Ladder mechanism.

Under this regime, MPs submitted offers to the TSO to supply gas (when network is short) or buy gas (when network is long). The demand curve was fixed and represents the physical balancing need of the network. The imbalance price was set by the marginal offer used to balance the system.

In order to incentivise MPs to submit offers for the Bid Price Ladder mechanism, the TSO would pay a **reservation fee** to MPs to reflect the fact that gas offered under the bid price ladder could not be offered on the open market. The reservation fee was determined based on a competitive tender and the TSO's estimate of the hourly gas flexibility need.

The TSO, GTS, called the bid-price ladder if the system imbalance exceeded the tolerance band. If the quantity offered via the bid ladder was not sufficient to balance the system in one period, the bid ladder was used for several hours, if the imbalance was not critical. Emergency measures were

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<sup>85</sup> <https://www.acm.nl/en/download/attachment/?id=10444>

available for the TSO to undertake when the imbalance was too high by instructing MPs to inject or withdraw gas from the network.

Actual information on (among others) the gas balance of the whole network as well as the bid curves were made publicly available to MPs.

### B.3. Current balancing regime

Changes to the market based balancing regime were implemented in the Netherlands from June 2014 in order to comply with the provisions of the Balancing Network Code.

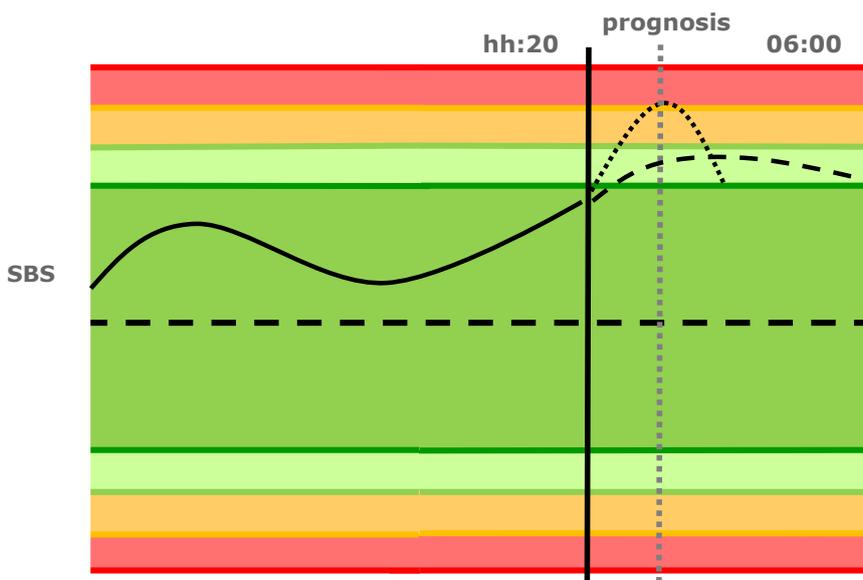
Under the new balancing regime, the TSO primarily uses title products traded on the within-day gas exchange market (operated by ICE-Endex) to balance the system. Two title products are used for balancing purposes, depending on the variation in linepack relative to pre-set tolerance bands:

- TTF Within-day – with gas delivered/withdrawn by the end of the day starting from 4 hours after the hour of the balancing trade; and
- TTF Next hour - with gas delivered/withdrawn before the end of the next hour after the balancing trade.

The pre-set tolerance levels are illustrated in the figure below (the absolute ranges of the four zones are set and published by the TSO at least two hours before the start of each gas day):

- No balancing action undertaken when system linepack is within dark green zone.
- When system linepack is forecast to reach light green zone, a TTF within-day product is used.
- When system linepack is forecast to reach orange or red zones, a TTF Next hour product is used.

Figure B.1: Tolerance levels



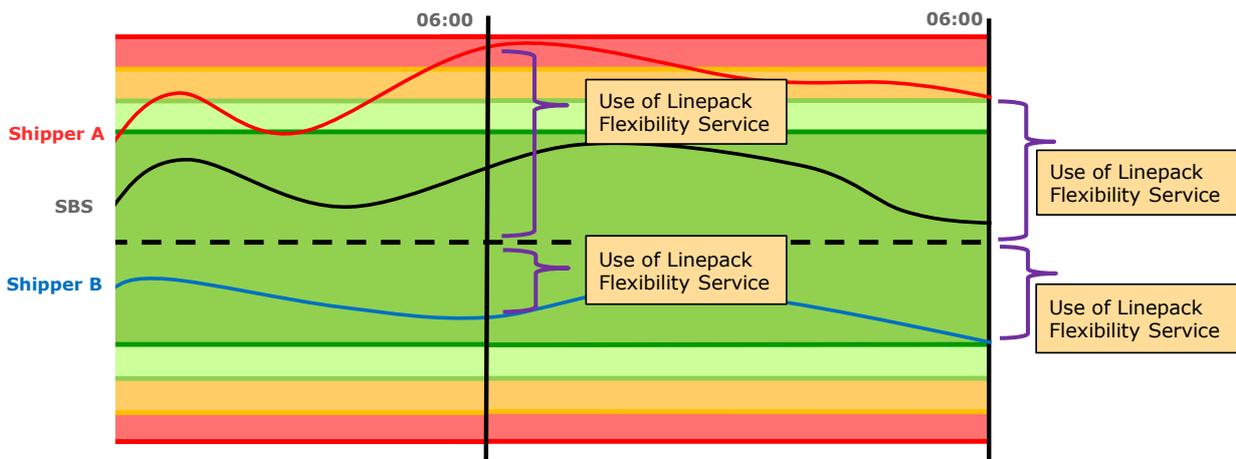
Source: Gasunie

## Imbalance charges

The Dutch balancing regime does not apply an end-of-day imbalance cash-out settlement instead providing a Linepack Flexibility Service.

The Linepack Flexibility Service means that any shipper imbalance at the end of the day is transferred to the next day (for a fee) if the system as a whole is within the set tolerance band. In the figure below illustrating the LFS, both shippers A and B have an imbalance position (in opposite directions). The overall SBS is within the dark green zone allowing the both shippers to make use of the network linepack buffer.

Figure B.2: Tolerance bands with linepack buffer illustration



Source: Gasunie

## Information provision

The balancing regime is also supported by near real-time information provided to shippers by the TSO. Imbalances for each hour are calculated near real-time (with about a five-minute lag) using near real-time allocations. A forecast of the position of individual shipper portfolio imbalances and the overall system imbalance at the end of the current hour is also provided.

The forecast of the overall SBS position is used to determine whether a balancing action should be undertaken and can be used by MPs to anticipate TSO actions and its impact based on their imbalance positions during that hour.

## ANNEX C BRITISH SECURE AND PROMOTE LICENCE CONDITION

### C.1. Introduction

Ofgem's 2008 Energy Supply Probe<sup>86</sup> found that intervention was required to address liquidity levels in the GB wholesale electricity market. In particular, concerns had been raised that low liquidity presented a barrier to new entry in supply markets and a source of competitive disadvantage for independent suppliers. In a 2009 discussion paper<sup>87</sup>, Ofgem further concluded that liquidity in the GB market was lower compared to other energy and commodity markets.

As part of this assessment, Ofgem developed three liquidity objectives:

- improved availability of products to **support hedging**;
- **robust reference prices** along the curve; and
- an **effective near-term market**, so that imbalances can be avoided.

### C.2. Options considered

In addition to the final package of Secure and Promote (S&P) conditions outlined below, Ofgem considered a range of other interventions to meet these objectives, including:

- **Mandatory Auctions** that would require parties to auction 25 per cent of their generation in a specified range of products each month. While it was thought that auctions could create regular opportunities to trade and reference prices along the curve, stakeholders expressed concern regarding the lack of continuous trading and potential costs.
- **Self-supply restrictions**, ranging from 'light' (restrictions on intra-group transfers within vertically integrated firms) to 'heavy' (complete operational separation of generation and supply businesses). Ofgem concluded that such measures would not improve liquidity along the curve, nor improve access for small participants.
- **Obligations to trade** a minimum volume in the market. This was rejected due to the perceived risk that firms would be forced to trade at uneconomic prices, introducing pricing distortions.<sup>88</sup>

### C.3. Secure and Promote conditions

Following a period of analysis and consultations, the Secure and Protect (S&P) licence conditions<sup>89</sup> came into effect in March 2014. The objective of the S&P conditions was to improve access of independent suppliers to the wholesale market. The S&P conditions comprised three elements to address the liquidity objectives outlined above:

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<sup>86</sup> Reference

<sup>87</sup> Reference

<sup>88</sup> Ofgem (2013): 'Wholesale power market liquidity: final proposals for a 'Secure and Promote' licence condition', June 2013, pages 10-11.

<sup>89</sup> Generation Special Licence Conditions AA

- **Supplier Market Access (SMA)** rules, setting minimum service standards for trading between smaller suppliers and the largest eight generators. This was intended to improve the availability of products to support hedging;
- **Market-making obligations** for the six largest vertically-integrated firms, with the aim of promoting robust reference prices for forward products; and
- **Reporting obligations** on the six largest companies and two largest independent generators to facilitate monitoring. No further interventions were considered necessary by Ofgem with regard to near-term liquidity, as this was judged to be sufficient for firms to balance their positions<sup>90</sup>.

Further details on the operation of the three elements are provided below.

### Supplier market access

The SMA element was introduced to address reported difficulties for smaller MPs in establishing trading agreements. The rules set out minimum service standards for eligible suppliers in negotiating with the largest generators. Under the Supplier Market Access rules, the eight largest generating companies are required to:

- consider applications for trading agreements within defined timeframes;
- offer proportionate credit and collateral terms;
- provide transparency on the information required to open trading agreement negotiations and the rationale for credit terms offered; and
- once a trading agreement is in place, offer to buy and sell a specified list of products. These products must be available in small clip sizes, quotes for products must reflect market prices and there are restrictions on what additional fees generators may add to the market price.

### Market-making obligations

These measures aimed to improve the availability of products that suppliers and generators require to hedge their positions, at a price reflecting market value. Under these obligations, the six largest vertically-integrated firms are required to offer to trade specific products during two hour-long 'market making' windows each business day. The obligations also set a maximum ceiling on the bid-offer spread (set by product type), which is intended to ensure that prices are robust and reflect market conditions.

The mandated products, along with the maximum bid-offer spreads, are shown in the table below. Allowed spreads were 2% higher than the range shown above for the first three months following the introduction of S&P.

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<sup>90</sup> The reasons for this are considered to include commitments from the six largest vertically-integrated firms to trade on a day-ahead auction and day-ahead market coupling with north-west Europe (introduced in February 2014). See CMA (2016): 'Energy Market Investigation – Final Report - Appendix 7.1: Liquidity', June 2016.

Table C.1: Market-making obligation - covered products and maximum bid-offer spreads

Baseload products and maximum bid-offer spread		Peak products and maximum bid-offer spread	
Month+1	0.5%	Month+1	0.7%
Month+1		Month+2	
Quarter+1		Quarter+1	
Season+1		Season+1	
Season+2		Season+2	
Season+3	0.6%	Season+3	1%
Season+4			

Source: Ofgem (2016): 'Wholesale power market liquidity: Annual report 2016', page 36.

## Reporting requirements

The six largest vertically-integrated firms and two largest independent generators are obliged to follow reporting requirements to enable the regulator to more effectively monitor the near-term market.

### C.4. Impact to date

In August 2016, Ofgem published its second annual report into wholesale power market liquidity since the introduction of the S&P conditions. Monitoring includes stakeholder feedback and a range of metrics including: trading volumes; churn; timing of trades throughout the day; type of products traded; and bid-offer spreads.

Overall, liquidity was found to have improved in the two years since S&P, albeit with a decline over middle two quarters of 2015, thought to reflect a period of low prices and volatility. Although Ofgem noted difficulties in isolating the impact of the licence conditions from other factors, the report was "cautiously optimistic" that the reforms had improved liquidity<sup>91</sup>. The main observations in relation to the three S&P measures were:

- **Access for independent suppliers:** Trading volumes with smaller suppliers in SMA products had followed a clear upwards trend. Feedback to Ofgem from suppliers also indicated that they had found it easier to access products covered by the S&P obligations.
- **Product availability and robust prices:** Positive trends were observed on trading volumes within the mandated market making windows. Feedback from MPs indicated that access was improved for the covered products, and that they considered prices to be more robust than before the introduction of S&P. Some participants did raise concerns that liquidity was being concentrated in the market making windows – in other words, shifting from other times of the day rather than increasing overall. Ofgem's analysis did not support this, although they will continue to monitor.

<sup>91</sup> Ofgem (2016): 'Wholesale power market liquidity: Annual report 2016', August 2015, page 5.

- **Near-term liquidity:** Ofgem found that near-term liquidity had remained at adequate levels since the introduction of S&P.

The recently concluded energy market investigation by the Competition Markets Authority (CMA) also considered the effects of liquidity on competition, as well as the impact of the S&P conditions. While noting that it was still “*too early to draw robust conclusions on the implications for liquidity as a whole*”<sup>92</sup> as a result of the S&P reforms, the CMA considered that:

- liquidity was generally good in the near-term;
- while availability and spreads had improved for the products covered under the S&P conditions, this had not been the case for out-of-scope products or for trading periods outside the mandated windows; and
- there was no evidence to suggest that liquidity was causing distortions in competition between vertically-integrated incumbents and other MPs.<sup>93</sup>

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<sup>92</sup> CMA (2016), page 9.

<sup>93</sup> Ibid, page 46.

## **ANNEX D    EVOLUTION OF DENMARK GAS BALANCING**

### **D.1.1.        Introduction**

Denmark introduced a new balancing regime in October 2014 in compliance with the Balancing Network Code, involving market-based trading and end-of-day settlement with imbalances cashed out based on end of day shipper positions. The imbalance price is determined by the neutral gas price<sup>94</sup> plus/minus an adjustment fee. This adjustment fee depends on whether the overall system was in balance and the balancing actions undertaken by the TSO.

Each day the TSO publishes the commercial system balance and the boundaries of the green flexibility zone within which no balancing actions will be undertaken. If the commercial system balance reaches the boundary of the green zone, the TSO trades on the within-day market at five predefined times during the gas day.

Besides the commercial system balance determined by market trades on the day, the TSO also monitors the physical balance of the network using separate tolerance bands. To correct physical imbalances, the TSO undertakes trades mainly using day-ahead products at Gaspoint Nordic.

The Danish balancing regime and market are still at an evolving stage with many changes having been introduced or currently considered in order to improve short-term market liquidity and incentives for shipper balancing. We discuss some of these measures and the issues they are trying to address in the rest of this section.

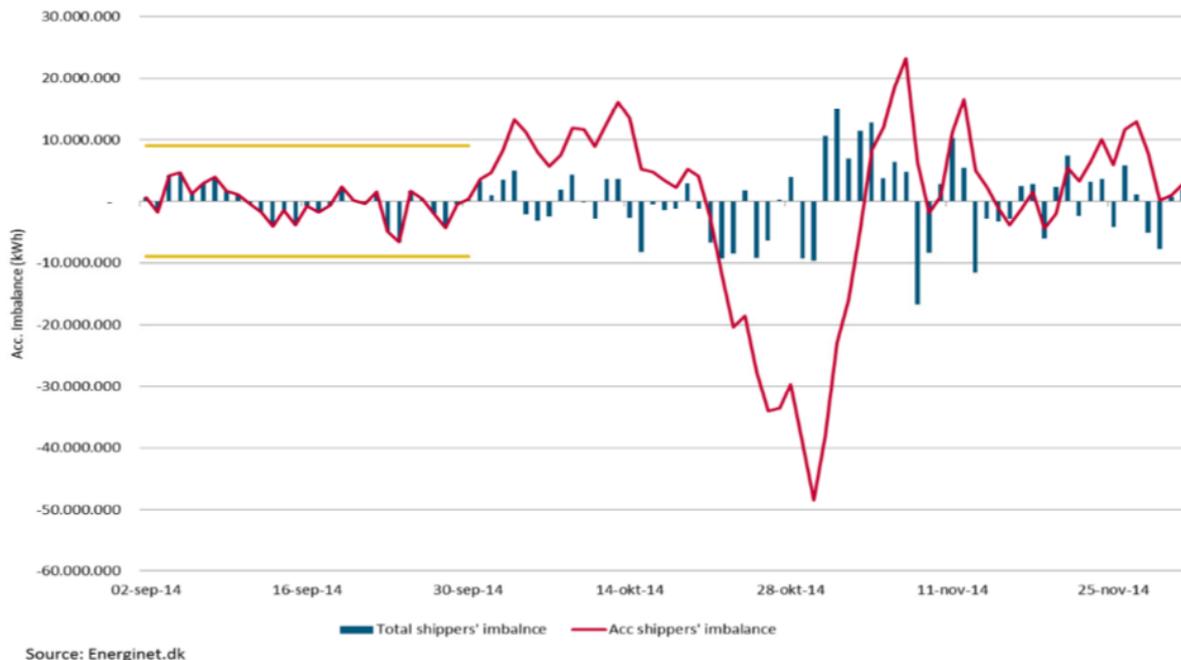
### **D.1.2.        Use of system flexibility**

The new balancing regime introduced a greater degree of balancing flexibility for MPs. This is largely because commercial system flexibility was calculated each day based on expected flows on that day without taking into account imbalances from previous days. This permitted MPs to run larger imbalances on consecutive days within the commercial flexibility limits resulting in gradually increasing physical imbalances on the network. As shown in the figure below from the Danish TSO report, accumulated shipper imbalances (shown by the red line) increase significantly after a period of daily total shipper imbalances in the same direction (represented by the dark blue columns). As a result, the TSO had to intervene more often to trade physical gas in the day-ahead market.

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<sup>94</sup> In Denmark, the neutral gas price is calculated as an average of transactions undertaken on both the day ahead and within-day markets.

Figure D.1: Commercial imbalances in the Danish system (Sep-Nov 2014)

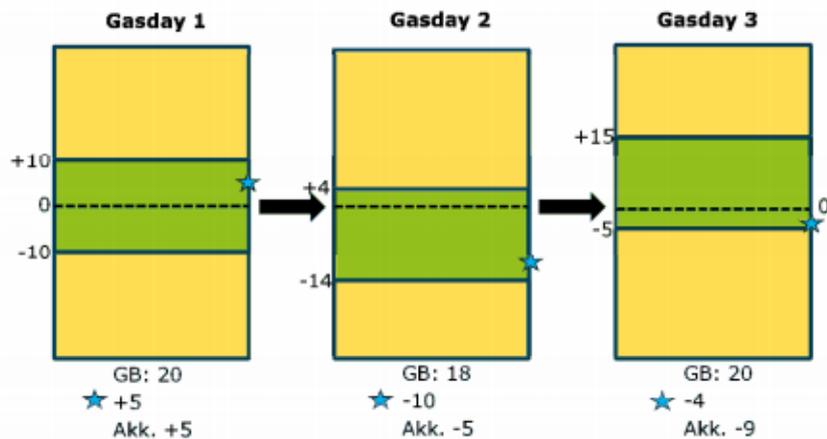


Source: Energinet

A series of transitional measures were introduced starting with a gradual reduction of the green zone flexibility to around 1/3 of the original level in November 2014 (less than two months after the new model was implemented). This narrowed the band within which MPs could run imbalances and thus provided stronger incentives on users to balance their portfolios.

Although this measure had a noticeable impact, it was also observed that a tendency existed in the market for MPs to be short of gas. Even if imbalances on a given day were smaller, the fact that the commercial system balance over a number of days was consistently short meant the physical imbalances were still being accumulated. This prompted the introduction of asymmetric flexibility zones where the green flexibility zones on a given day were determined by the end-of-day market imbalances of the previous day. Thus if the end-of-day market position on day 1 was long, there would be less flexibility on the next day for running long imbalances but larger flexibility for running short imbalances, as illustrated in the figure below.

Figure D.1: Intra-day imbalances



Source: Energinet

### D.1.3. Corrective and transitional measures

The main reasons behind the issues presented above have been identified as a lack of liquidity in the within-day market and a lack of proper incentives for MPs to resolve their own portfolio imbalances. A series of measures or tools have been considered by the Danish TSO to address these issues, including:

- introduction of a market maker in the within-day market;
- reform of the method for calculating imbalance prices to provide better cost-reflectivity and stronger incentives to MPs; and
- revising trading windows used by the TSO to trade in the within-day market.

#### Market liquidity and introduction of market maker

The within-day market at Gaspool Nordic has suffered from low liquidity even after the introduction of the new regime despite an increasing number of participants using the exchange and an increase in trading volumes on the day-ahead market. The volatility of the within-day market has also increased due to increased TSO trades when the commercial system balance goes outside the green zone.

The introduction of a market maker has been proposed as a solution to improve within day market liquidity. The TSO's evaluation report indicates that MPs would prefer the market maker to provide narrow spreads rather than providing large trading volumes. The market maker is also not seen as required to operate during the entire trading day but only at certain times during the gas day. The main objective of the market maker intervention would be to improve price formation and provide a credible market price which can also serve as a daily reference price for the within-day market used to calculate imbalance prices.

## Imbalance prices

The method used for calculating imbalance prices has also been identified as not providing strong enough incentives for MPs to balance their own portfolios.

Firstly, imbalance prices are calculated based on a neutral gas price reflecting, in equal weights, the Gaspoint Nordic day-ahead market price and the average price of all within-day trades on the gas day. The use of the day-ahead market price for the gas trading day means that the imbalance price is not fully reflective of the price of trading imbalances on the day. Given that the day-ahead market price is less volatile than the within-day price means that MPs are more likely to prefer relying on the imbalance price (which partly reflects the day-ahead market price) than try to trade imbalances in the more volatile and higher risk within-day market.

Secondly, the imbalance price includes an adjustment applied on the days when the TSO undertakes actions due to the system reaching the boundary of the green zone. The original adjustment could be either:

- 0.5 per cent;
- 2 per cent; or
- the marginal price of the TSO trades on the within-day market.

It was suggested that these adjustments are not penalising enough compared to the cost of sourcing flexibility through other means in the market resulting to a lack of responsiveness of shippers to signals sent by the TSO balancing actions. The TSO recommended that the second price step is increased from 2% to 3%.

## Trading windows

The Danish TSO can currently undertake balancing actions in the within-day market during five trading windows lasting ten minutes. The TSO publishes in advance information on when and how much it will trade in the market. This is meant to encourage traders to participate during those trading windows most needed by the TSO.

Activity in the market, measured by number of bids and offers and the spread between them, increases during the trading windows but this disappears soon after its closure. One suggested change to this process is to increase the duration of the trading window (together with the introduction of a market maker). A four-hour trading window operates in Germany, where the TSO also publishes information on the volume of trade it intends to undertake.

The TSO recommended a move towards continuous trading inside normal business hours combined with specific trading windows outside business hours.

## ANNEX E BELGIAN BALANCING REGIME

### E.1. Introduction

In Belgium, a hybrid balancing model is used that includes a continuous within-day balancing regime together with a full daily imbalance cash-out.

This appendix provides insights into the approach that might be relevant to the implementation of Victoria's target model. Specifically, this appendix provides:

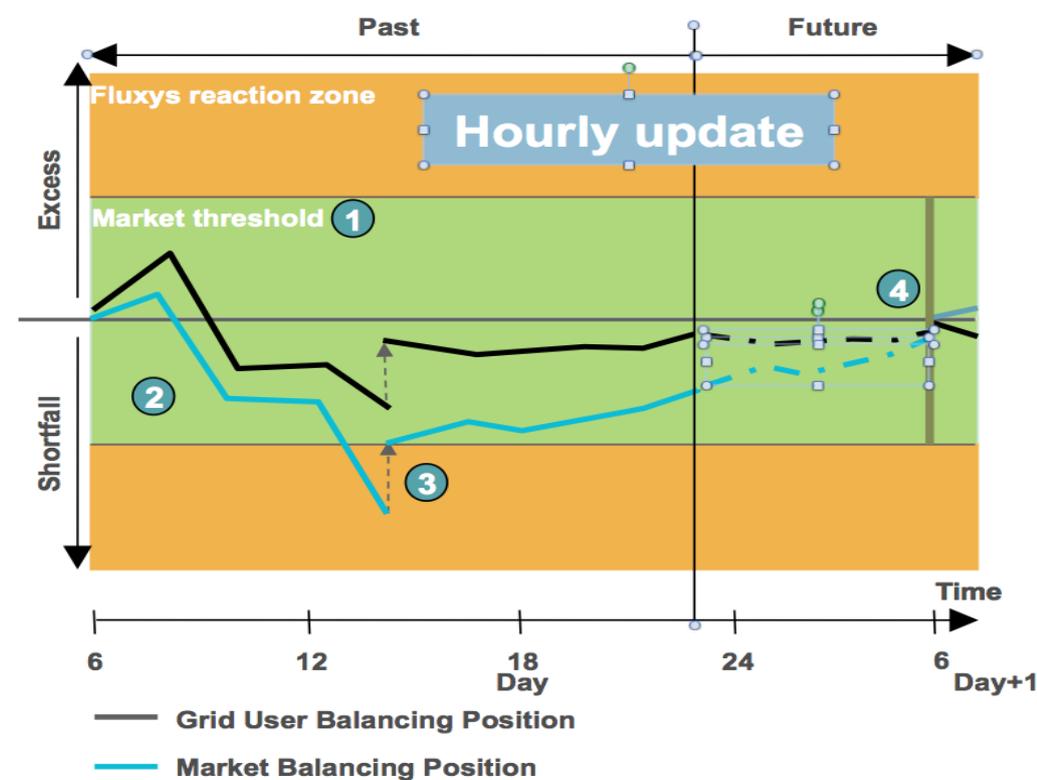
- an overview of the Belgian approach to continuous balancing;
- how a full daily cash-out is implemented; and
- how “good behaviour” obligations on network users are reflected in the contractual framework.

### E.2. Operation of the regime

The Belgian system involves substantial transit flows as well as domestic supply. The Belgian regime was introduced in 2012 and has recently been refined to deliver full compliance with the European Gas Balancing Code<sup>95</sup>.

The regime builds upon the Netherlands approach to continuous balancing and is illustrated in the following graphic and further explained below.

Figure E.1: Illustration of the Belgian balancing regime



<sup>95</sup> Regulation (EU) 312/2014

<http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32014R0312&from=EN>

## Continuous balancing

The green zone defines thresholds that limit the aggregated market imbalance. These thresholds are a commercial construct aimed at preventing excessive within day cumulative imbalances arising from the aggregate effect of all physical flows entering and leaving the system. Individual Grid User Balancing Positions<sup>96</sup> are calculated for each network user which indicate their cumulative imbalance position.

The Individual Grid User Balancing Positions are summed for all network users to define the Market Balancing Position<sup>97</sup>.

If the Market Balancing Position is outside the green zone, i.e. exceeds the market threshold (upper or lower level), then the market excess or market shortfall respectively is sold or purchased in the market via a balancing action. An instant settlement is made in respect of the grid users causing the said market excess or market shortfall who pay at least the price associated with the corrective balancing action. This brings the Market Balancing Position to the relevant market threshold, the boundary of the green zone.

The incentive mechanism is designed to encourage grid users to remain within the restrictions defined by the green zone<sup>98</sup>. The effect is to provide strong disciplines on the grid users to keep their cumulative imbalance positions close to zero throughout the day. This ensures that the system operator, in its residual system balancer role, has a very limited and infrequent requirement to take actions to manage within day positions.

## Daily cash-out

The regime also incorporates an end of day imbalance cash-out regime. The cumulative imbalance of each network user at the end of day is extinguished. Network users with long positions effectively sell gas to the system. Network users with short positions effectively purchase gas from the system. Each network user therefore starts the next gas day with a zero imbalance opening position.

The imbalance charge rate applicable to the settlement is based upon the weighted average price of all gas trades on the trading platform that is used for both network user to network user trades and by the residual system balancer. This price will be used for cash-out where network users' imbalances are in the opposite direction to the system position. A three per cent adjustment is applied to those network users with imbalances in the same direction as the system.

The imbalance cashout pricing is illustrated in Table E1 where WAP represents the weighted average price of all gas trades on the trading platform for the day.

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<sup>96</sup> Analogous to POS in Netherlands regime

<sup>97</sup> Analogous to SBS in Netherlands regime

<sup>98</sup> The size of the green zone is less than the full flexibility that might be available within the system.

Table E.1: End of day daily imbalance cashout price determination in the Belgian system

Individual network user position	System position	
	Short	Long
Short	WAP+3%	WAP
Long	WAP	WAP-3%

### E.3. Good behaviour provisions

The Belgium network code<sup>99</sup> includes a good behaviour clause that forbids network users from deliberately creating an imbalance for reasons of commercial opportunities. In the event such act is committed then the SO has the right to refuse the network user’s renominations and to charge the network user with any balancing costs incurred related to its specific behaviour.

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<sup>99</sup> Fluxys’ Access Code for Transmission – Attachment A

## ANNEX F INTERIM MEASURES IN OTHER COUNTRIES

The implementation of the European Balancing Network Code is at different stages and progressing at different speeds in other European countries. Many countries have availed themselves of the provisions of the Network Code on the introduction of interim measures.

The Balancing Network Code provides four types of interim measures that can be adopted by countries making the transition to the balancing “target” model as well as optionality on a range of provisions including, for example, the type of products that can be procured by the TSO on a trading platform, the use of linepack flexibility services and the use of within-day balancing obligations.

In the table below, based on an ACER monitoring and implementation report, we have summarised the measures that a range of European Member States have stated they have adopted or plan to adopt.

*Table F.1: Interim measures for the balancing regime planned to be introduced in various European countries<sup>100</sup>*

Country	Balancing platform	Balancing services	Tolerances	Interim imbalance charges
Germany	✓			
Ireland		✓	✓	✓
Greece	✓		✓	✓
Poland	✓		✓	✓
Romania	✓	✓	✓	
Slovakia	✓			✓
Bulgaria		✓	✓	✓
Northern Ireland		✓	✓	
Sweden		✓	✓	
Estonia			✓	
Lithuania			✓	

Source: ACER, CEPA

Most of the interim measures adopted have been justified by the absence of sufficient liquidity in the short term wholesale gas market. In the case of Germany, the continued use of the existing balancing platform has been justified due to the need for locational products which are not provided on the trading platform. The use of balancing services (the measure which, in many ways, departs the most from the objective of the Balancing Network Code) has generally been warranted by the absence of a trading or balancing platform. Several countries seem to have adopted the route of

<sup>100</sup> The measures presented in the table have been reported by each country’s regulatory authority to ACER for the purpose of the Second ACER-ENTSOG Report on the status of the implementation of the Balancing Network Code, published in November 2015.

continuing using balancing services until a balancing platform is set up with the (stated) aim of moving to a trading platform once liquidity in the market develops sufficiently.

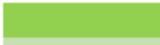
The use of tolerances seems to be the most widespread measure employed by the reporting countries. The tolerance levels used range from a proposed 2-3% in Romania, to 5% in Poland and Bulgaria, and 10% in Greece. In Ireland, existing tolerance levels are being gradually reduced to provide stronger incentives to shippers to trade imbalance positions.

Table F.2: Interim measures adopted and their rationale in selected European countries

Country	Measures	Rationale
Poland	<ul style="list-style-type: none"> <li>Establish a balancing platform where the TSO acts as a trading party in relation to balancing actions</li> <li>Adopt tolerances with regard the daily imbalance quantities (5% imbalance limit)</li> </ul>	<ul style="list-style-type: none"> <li>Low liquidity and lack of short-term products required for balancing on the wholesale market exchange. A balancing platform is a more market-driven process for undertaking balancing actions than fixed contracts for balancing services.</li> <li>Limited access for shippers to supply sources to meet short-term fluctuations in supply/demand (due to lack of available flexible supplies and limited trading period within the gas day).</li> </ul>
Germany	<ul style="list-style-type: none"> <li>Use of balancing platform</li> </ul>	<ul style="list-style-type: none"> <li>Locational products required for balancing are not adequately available on the short-term gas market (although the standardised exchange products are available and used where possible).</li> </ul>
Ireland	<ul style="list-style-type: none"> <li>Use of balancing services contracts</li> <li>Apply interim imbalance charges – proxy method based on GB SAP but with added differential to provide increased incentives</li> <li>Apply tolerances for imbalance quantities (looking to gradually reduce tolerance levels)</li> </ul>	<ul style="list-style-type: none"> <li>A trading/balancing platform is not currently available (TSO to conduct feasibility study).</li> <li>Lack of short-term liquidity in the market would expose shippers to risk they are not able to manage. The existing “neutral” imbalance cash out price approach is enhanced with a differential added to provide incentives to shippers to reduce imbalance positions.</li> <li>Protect shippers from exposure to imbalance risk given lack of liquidity in the short-term market. Reduce tolerances to gradually increase incentives for shippers to trade their imbalance positions.</li> </ul>
Romania	<ul style="list-style-type: none"> <li>Balancing platform (under development)</li> <li>Tolerances (set at 2-3%)</li> </ul>	<ul style="list-style-type: none"> <li>Until a balancing platform is available, the alternative balancing mechanism used involves a Gas Trading Facility allowing shippers to trade imbalances during the course of a month.</li> </ul>
Slovakia	<ul style="list-style-type: none"> <li>Balancing platform</li> <li>Interim imbalance charges</li> </ul>	<ul style="list-style-type: none"> <li>Low liquidity levels in Slovak short-term wholesale gas market.</li> <li>No trading platform available to provide daily gas prices.</li> </ul>

Source: National TSO reports and Second ACER-ENTSOG Report on the status of the implementation of the Balancing Network Code

## ANNEX G FINANCIAL RELIEF MECHANISMS – EXAMPLES

No Financial Relief				
System position - illustrative example				
			Quantity	
Green zone	(+/-)		0 - 50	
Light green zone	(+/-)		51 - 75	
Amber zone	(+/-)		76 - 100	
SBS			-80	
Use of green zone			-50	
Use of light green zone			-25	
Use of amber zone			-5	
MP position - illustrative example				
	MP 1	MP 2	MP 3	MP 4
Cumulative inventory	-100	-50	30	40
Contribution to cost	100	50	0	0
% contribution to cost	67%	33%	0	0
Targeted inventory purchase	20	10	0	0
Residual Balancing Actions				
		Price	Quantity	
Next hour product to cover shortfall to light green boundary		11	5	
End of day product to get SBS back to green band boundary		5	25	
<b>Total cost (P x Q)</b>			<b>180</b>	
Cost targetting - allocated pro rata (no reliefs applied)				
		MP contribution to cost %	Cost	
MP 1		67%	120	
MP 2		33%	60	
MP 3		0%	0	
MP 4		0%	0	
<b>Total targeted cost</b>			<b>180</b>	
<b>Socialised / smeared cost</b>			<b>0</b>	

Proportional Financial Relief				
System position - illustrative example				
			Quantity	
Green zone	(+/-)		0 - 50	
Light green zone	(+/-)		51 - 75	
Amber zone	(+/-)		76 - 100	
SBS			-80	
Use of green zone			-50	
Use of light green zone			-25	
Use of amber zone			-5	
MP position - illustrative example				
	MP 1	MP 2	MP 3	MP 4
Cumulative inventory	-100	-50	30	40
Contribution to cost	100	50	0	0
% contribution to cost	67%	33%	0%	0%
Targeted inventory purchase	10	5	0	0
Residual Balancing Actions				
		Price	Quantity	
Next hour product to cover shortfall to light green boundary		11	5	
End of day product to get SBS back to green band boundary		5	25	
<b>Total cost (P x Q)</b>			<b>180</b>	
Cost targetting - allocated pro rata and then relief proportion applied <sup>1+2</sup>				
	MP contribution to cost %	Financial Relief Proportion	Revised contribution	Cost
MP 1	67%	50%	33.3%	60
MP 2	33%	50%	16.7%	30
MP 3	0%	50%	0.0%	0
MP 4	0%	50%	0.0%	0
<b>Total targeted cost</b>				<b>90</b>
<b>Socialised / smeared cost</b>				<b>90</b>

Note 1: Smeared cost will be recovered from say all flows on the day.

Note 2: Untargeted quantity of 15 will be sold to all MPs in same proportion as cost smearing.

Protected inventory				
System position - illustrative example				
			Quantity	
Green zone	(+/-)		0 - 50	
Light green zone	(+/-)		51 - 75	
Amber zone	(+/-)		76 - 100	
SBS			-80	
Use of green zone			-50	
Use of light green zone			-25	
Use of amber zone			-5	
MP position - illustrative example				
	MP 1	MP 2	MP 3	MP 4
Cumulative inventory	-100	-50	30	40
Contribution to cost	100	50	0	0
% contribution to cost	67%	33%	0	0
Potential inventory purchase	20	10	0	0
Residual Balancing Actions				
		Price	Quantity	
Next hour product to cover shortfall to light green boundary		11	5	
End of day product to get SBS back to green band boundary		5	25	
<b>Total cost (P x Q)</b>			<b>180</b>	
Cost targetting - allocated pro rata first but then with absolute adjustment <sup>3+4</sup>				
	Potential purchase (quantity)	Financial Relief Quantity	Revised purchase	Cost
MP 1	20	10	10	60
MP 2	10	10	0	0
MP 3	0	10	0	0
MP 4	0	10	0	0
<b>Total targeted cost</b>				<b>60</b>
<b>Socialised / smeared cost</b>				<b>120</b>

Note 3: Assumes that cost is based on weighted average unit price of balancing cost.

Note 4: Smeared costs of 120 will be recovered from say all flows on the day.

## ANNEX H GATE CLOSURE BALANCING – EXAMPLES

### H.1. Example 1 – Matched Nominations

#### Narrative

- Within day demand increases for weather sensitive load, eventually averaging 10% on day.
- The SO responds by making a 15-unit purchase from MP1 initially.
- SO then purchases 15 units from MP2 due to other demand increases.
- And then purchases 2 units offtake turndown from MP1 and MP4, setting SMP (buy) at \$8
- Later in the day, the SO sells via small input reductions to choke off some oversupply
- And takes small offtake increase from MP1 at the SMP (sell) of \$5 to hit linepack target.

"Matched" nominations, deviation in uncontrolled demand equals .....						10%
<b>MP opening positions</b>						
	MP 1	MP 2	MP 3	MP 4	TOTAL	
Nominated total entry @ gate	215	170	10	5	400	
Nominated total offtake @ gate	190	150	40	20	400	
(inc. uncontrollable offtake noms)	110	50	30	10	200	
Net trade positions at gate (-ve = sale)	-25	-20	30	15	0	
"Unmatched" nomination	0	0	0	0	0	
<b>Residual Balancing Actions - assume physical response</b>						
	Qty.	MP 1	MP 2	MP 3	MP 4	TOTAL
Purchase by SO of input increase	15	\$5.80	\$6.20			30
Purchase by SO via offtake reduction	2	\$6.50			\$8.00	4
Sale by SO via input reduction	1		\$6.00	\$5.00		2
Sale by SO via offtake increase	4	\$5.00				4
Weighted system average price SAP		\$6.00				40
System marginal buy price SMP (buy)		\$8.00				
System marginal sell price SMP (sell)		\$5.00				
<b>Input and offtake outcomes after Balancing Actions</b>						
	MP 1	MP 2	MP 3	MP 4	TOTAL	
Actual entry	233	188	10	4	435	
Revised entry target after flex	230	184	9	5	428	
Scheduled entry imbalance (surplus)	3	4	1	-1	7	
Linepack inventory change .....	0					
Uncontrollable offtake "actual"	121	55	33	11	220	
Controllable offtake actual	90	107	12	6	215	
Actual offtake	211	162	45	17	435	
Revised offtake target after flex	192	150	40	18	400	
Deviation uncontrollable offtake (increase)	11	5	3	1	20	
Within day title trading	0	0	0	0	0	
Residual offtake imbalance (increase)	8	7	2	-2	15	
<b>Cost targetting - two scheduled cash-outs @SMP, other cash-outs @ SAP - no tolerances</b>						
	MP 1	MP 2	MP 3	MP 4	TOTAL	
Flexibility payments to MPs	\$80	\$87	-\$5	\$16	\$178	
Costs of purchase charged to MPs:						
Entry cash out @ SMP	-\$15	-\$20	-\$5	\$8	-\$32	
Uncontrollable deviation @ SAP	\$66	\$30	\$18	\$6	\$120	
Unmatched nomination @ SAP	\$0	\$0	\$0	\$0	\$0	
Residual offtake cash out @ SMP	\$64	\$56	\$16	-\$10	\$126	
Contribution to socialised/smeared cost	-\$35	\$21	-\$34	\$12	-\$36	

## H.2. Example 2 – Unmatched Nominations

### Narrative

- Less before day trade than Example 1 result in unmatched nominations for MP3 and MP4
- Consequently, MP1 and MP2 reduce initial input nominations compared with Example 1.
- Within day demand increases for weather sensitive load by 10%, as in Example 1.
- SO purchases 20 extra units compared with Example 1, not the full 25 unmatched "need".
- All other balancing actions the same as for Example 1.
- MP1 and MP2 supply extra flexibility gas, whilst MP3 and MP4 buy unmatched needs at SAP.

"Unmatched" nominations, deviation in uncontrolled demand equals ..... 10%						
MP opening positions						
	MP 1	MP 2	MP 3	MP 4	TOTAL	
Nominated total entry @ gate	200	160	10	5	375	
Nominated total offtake @ gate	190	150	40	20	400	
(inc. uncontrollable offtake noms)	110	50	30	10	200	
Net trade positions at gate (-ve = sale)	-10	-10	10	10	0	
"Unmatched" nomination	0	0	20	5	25	
Residual Balancing Actions - assume physical response						
	Qty.	MP 1	MP 2	MP 3	MP 4	TOTAL
Purchase by SO of input increase	25	\$5.80	\$6.20			50
Purchase by SO via offtake reduction	2	\$6.50			\$8.00	4
Sale by SO via input reduction	1		\$6.00	\$5.00		2
Sale by SO via offtake increase	4	\$5.00				4
Weighted system average price SAP		\$6.00				60
System marginal buy price SMP(buy)		\$8.00				
System marginal sell price SMP(sell)		\$5.00				
Input and offtake outcomes after Balancing Actions						
	MP 1	MP 2	MP 3	MP 4	TOTAL	
Actual entry	230	191	10	4	435	
Revised entry target after flex	225	184	9	5	423	
Scheduled entry imbalance (surplus)	5	7	1	-1	12	
Linepack inventory change .....	0					
Uncontrollable offtake "actual"	121	55	33	11	220	
Controllable offtake actual	92	108	9	6	215	
Actual offtake	213	163	42	17	435	
Revised offtake target after flex	192	150	40	18	400	
Deviation uncontrollable offtake (increase)	11	5	3	1	20	
Within day title trading	0	0	0	0	0	
Residual offtake imbalance (increase)	10	8	-1	-2	15	
Cost targetting - two scheduled cash-outs @SMP, other cash-outs @ SAP - no tolerances						
	MP 1	MP 2	MP 3	MP 4	TOTAL	
Flexibility payments to MPs	\$138	\$149	-\$5	\$16	\$298	
Costs of purchase charged to MPs:						
Entry cash out @ SMP	-\$25	-\$35	-\$5	\$8	-\$57	
Uncontrollable deviation @ SAP	\$66	\$30	\$18	\$6	\$120	
Unmatched nomination @ SAP	\$0	\$0	\$120	\$30	\$150	
Residual offtake cash out @ SMP	\$80	\$64	-\$5	-\$10	\$129	
Contribution to socialised/smear cost	\$17	\$90	-\$133	-\$18	-\$44	

### H.3. Example 3 – Unmatched Nominations and within-day trading allowed

#### Narrative

- Same scenario as example 2.
- But now within day trading is exploited by all MPs.
- MP3 and MP4 trade surplus gas to avoid being cashed out for only \$5.
- MP1 and MP2 are exposed to buying offtake imbalances at \$8.
- Hence they all trade at mutual advantage, and the smeared cost figure falls slightly too.
- (MP4 surplus caused by an over-response to flexibility offtake turn down).

"Unmatched" nominations, deviation in uncontrolled demand equals .... 10%						
MP opening positions						
	MP 1	MP 2	MP 3	MP 4	TOTAL	
Nominated total entry @ gate	200	160	10	5	375	
Nominated total offtake @ gate	190	150	40	20	400	
(inc. uncontrollable offtake noms)	110	50	30	10	200	
Net trade positions at gate (-ve = sale)	-10	-10	10	10	0	
"Unmatched" nomination	0	0	20	5	25	
Residual Balancing Actions - assume physical response						
	Qty.	MP 1	MP 2	MP 3	MP 4	TOTAL
Purchase by SO of input increase	25	\$5.80	\$6.20			50
Purchase by SO via offtake reduction	2	\$6.50			\$8.00	4
Sale by SO via input reduction	1		\$6.00	\$5.00		2
Sale by SO via offtake increase	4	\$5.00				4
Weighted system average price SAP		\$6.00				60
System marginal buy price SMP(buy)		\$8.00				
System marginal sell price SMP(sell)		\$5.00				
Input and offtake outcomes after Balancing Actions and within day trades						
	MP 1	MP 2	MP 3	MP 4	TOTAL	
Actual entry	230	191	10	4	435	
Revised entry target after flex	225	184	9	5	423	
Scheduled entry imbalance (surplus)	5	7	1	-1	12	
Linepack inventory change .....	0					
Uncontrollable offtake "actual"	121	55	33	11	220	
Controllable offtake actual	92	108	9	6	215	
Actual offtake	213	163	42	17	435	
Revised offtake target after flex	192	150	40	18	400	
Deviation uncontrollable offtake (increase)	11	5	3	1	20	
Within day title trading	-2	-1	1	2	0	
Residual offtake imbalance (increase)	8	7	0	0	15	
Cost targeting - two scheduled cash-outs @SMP, other cash-outs @ SAP - no tolerances						
	MP 1	MP 2	MP 3	MP 4	TOTAL	
Flexibility payments to MPs	\$138	\$149	-\$5	\$16	\$298	
Costs of purchase charged to MPs:						
Entry cash out @ SMP	-\$25	-\$35	-\$5	\$8	-\$57	
Uncontrollable deviation @ SAP	\$66	\$30	\$18	\$6	\$120	
Unmatched nomination @ SAP	\$0	\$0	\$120	\$30	\$150	
Residual offtake cash out @ SMP	\$64	\$56	\$0	\$0	\$120	
Contribution to socialised/smeared cost	\$33	\$98	-\$138	-\$28	-\$35	