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Mr John Pierce
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Dear Mr Pierce

Australian Energy Market Commission Victorian Declared Wholesale Gas Market (DWGM) Discussion Paper

AEMO welcomes the opportunity to comment on the Australian Energy Market Commission's (AEMC) Victorian Declared Wholesale Gas Market (DWGM) Discussion Paper.

In line with the terms of reference from the Victorian Government, AEMO supports a review of the pipeline capacity investment, planning and risk management mechanisms in the DWGM, with any changes reflecting the characteristics of the Declared Transmission System (DTS).

The east coast gas industry is currently undergoing a period of major change, manifested through large increases in gas production and demand, greater interconnection of pipeline transportation infrastructure and increases in inter-state gas flows. In this context, it is important that the DWGM can dynamically meet the needs of Victorian gas producers and consumers and support allocative efficiency whilst maintain system security.

When considering reform of the DWGM it is useful to consider the purpose of current market arrangements. As a virtual hub, the DWGM's market arrangements aim to balance the ideal of facilitating trading across the hub with the reality of managing congestion, constraints and system security in the DTS. It is important to recognise that many of the key constraints in the DTS occur within day and that a well-functioning-market should therefore incentivise efficient intra-day participant behaviour (such as accurate forecasting across the day). Models that aim to simplify the pricing mechanism through settling and scheduling the market around a single daily price could potentially distort such signals undermining the efficiency of market outcomes.

This submission is presented through two sections. The first section provides context to market design concepts and issues and how they relate to the physical and operational characteristics of the DTS. The second section provides initial feedback on the AEMC's proposed packages.

AEMO looks forward to engaging further with you during the course of this Review. If you would like to discuss the contents of this submission further, please do not hesitate to contact Andrew Mann on 03 9609 8833.

Yours sincerely,

Peter Geers

Executive General Manager, Markets

Attachments: AEMO submission on Victorian Declared Wholesale Gas Market Discussion Paper

Declared Wholesale Gas Market Submission

1 Introduction

This submission is in two sections. The first part of this submission provides additional context on market design issues and concepts that could be considered in the next stage of this review. It focuses particularly on the physical and operational characteristic of the Declared Transmission System (DTS) and how these manifest themselves in balancing arrangements, congestion and surprise, pricing and hedging (including AMDQ). The second part of this submission focuses on the packages for reform of the Declared Wholesale Gas Market (DWGM) proposed by the Australian Energy Market Commission (AEMC) and provides initial feedback on those proposals.

2 A view of the current DWGM and DTS

When considering reform of the DWGM it is useful to consider the current market arrangements. In essence, the DWGM operates as a virtual hub now. The (unconstrained) pricing schedule determines trades between participants across the virtual hub while the (constrained) operational schedule defines AEMO's "management", as system operator, of constraints, congestion and surprise through the market. In addition to providing bids and offers, market participants (and AEMO) forecast demand across the gas day at each schedule. This is a key component of the gas scheduling process and supports the efficient and safe operation of the system[1]. Fundamentally, the current scheduling arrangements are linked to maintaining the security of the system whilst facilitating trading.

Under any virtual hub model, there is a need to deal with the ideal of a virtual hub that allows gas to be traded between any location and the reality of managing physical constraints, congestion and system security. In the current market this is managed through the scheduling of out-of-merit-order gas and settled through the Ancillary and Uplift Payment mechanism. Much of the complexity of the current mechanism comes from the need to manage multiple intra-day schedules while also retaining appropriate incentives and at the same time maintaining a single "market-wide" price.

In reality, for any future model, there is a trade-off between both simplifying the current mechanism and diminishing cost to cause (say through some form of ex-post pricing) or moving to locational based pricing which would remove the need for an uplift-like pricing mechanism but potentially be a more complicated market design. Ultimately, the current arrangements aim to preserve incentives to encourage efficient behaviour without requiring locational pricing.

2.1 Balancing

An effective balancing mechanism is important in enabling the efficient management of short-term market and system requirements. It is important to differentiate between during the day measures to keep supply and demand balance, and ex post measures to allocate any over- or under-supply which was supplied through linepack to participants. The section below provides a generic description of balancing and implications for the operation of a gas system

Gas pressures need to be kept within a certain range to enable the efficient and safe operation of a transmission system and this requires injections into and withdrawals from the system to be balanced over a certain period. Going into a gas day a participant will typically have some base schedule position (a forecast for the gas day). This will be in the form of a pipeline nomination where injections and withdrawals are normally balanced. These schedules are based on a view of what will happen over the subsequent 24 hours. In practice, the situation often changes during the day due, for example, to forecast error or production outages. As a result, at any point in time during the day, a participant's injection or withdrawal quantity could differ or could be expected to differ from what has been scheduled. It is this difference from schedule (a deviation) that creates the need for balancing gas in order to keep the system in balance. Physical balancing gas is typically supplied from linepack, but balancing gas could also potentially be sourced from flexible storage, production or LNG storage.

[1] Typically market participant demand forecasts are used in scheduling. Under an agreed methodology, AEMO has the ability to apply Demand Overrides (using AEMO's forecast) in order to maintain system security

2.1.1 Implications for the DTS

A market needs to have adequate incentives to encourage participants to balance their position as well as mechanisms to price any balancing gas and allocate its costs. In the current market, participants have the ability to buy and sell gas in the market at the intra-day schedules or be cashed out in the linepack account at the following schedule. Participants who deviate from forecast are exposed to the subsequent schedule's price, and potentially surprise uplift. In Victoria, an effective balancing mechanism with appropriate market signals is particularly important due to the relatively small amount of available linepack (relative to demand), the meshed network and the potential for large weather-related swings in demand that are challenging to forecast. A poorly designed balancing mechanism with insufficient incentives on participants and the market operator could lead to inefficient market outcomes (e.g. frequent intervention), inefficient cost allocation, and ultimately undermine system security.

2.1.2 Balancing considerations for the proposed packages

The packages proposed in the paper do not detail how balancing gas would be managed (noting that this is a separate concept from imbalance trading). AEMO considers this to be an important next step in any future development for any of the packages, except for package A where it is assumed the current balancing mechanism is retained. In particular, consideration could be given to:

- *The Balancing Period*, this is the time period participants have to return to balance, for example at the end of a balancing period a participant who remains out of balance may be cashed out. The balancing period needs to take into consideration the limitations of the network to absorb swings in demand or supply. The longer the period the greater the flexibility participants have to manage their intraday position, however this is potentially traded off against lower levels of system security or more intervention from the system operator (with subsequent costs potentially smeared across the market).
- *Balancing tools*, these are the tools that are available to the party responsible for managing balancing gas (e.g. linepack, LNG etc). In particular, consideration needs to be given as to the tools used where a loss of economic scheduling reduces the options available.
- *Balancing market model*, how the balancing mechanism interacts with the commodity market e.g. is it integrated with the commodity market or is it a standalone mechanism that is separately priced. Gaming issues also need to be considered
- *Locational requirements,* any specific locational requirements (due to constraints or outages) that require certain balancing tools
- *Residual balancing,* how any residual balancing that is not managed by participants is managed by the system operator and the incentives required to ensure that this is coordinated.
- *Information requirements,* the information needed to support the balancing mechanism. For example, under a model where balancing is integrated with the wholesale market, and participants are expected to individually manage their imbalances through the market, there is likely to be a need for real-time information so that trading participants can calculate their position and decide how to act in a timely manner.

2.2 Surprise and Congestion in the DWGM

The paper primarily discusses congestion as being caused by the full utilisation of pipeline capacity. While the potential for this sort of congestion certainly exists an additional type of congestion occurs in the form of intertemporal congestion. Intertemporal congestion refers to constraints caused by the inability of distant supply sources to deliver gas in time to respond to sudden changes in demand[2]. For example, a sudden increase in demand at Melbourne during a cold day may not be able to be met by additional supply from Longford, given that gas supplied from Longford can take up to 8-10 hours to reach Melbourne. In such a scenario, if available linepack is inadequate to meet the additional demand, injections from LNG storage may be required to maintain system security. It is worth noting

[2] An unexpected change in demand is referred to as surprise in this submission

that the combination of limited linepack (when compared with demand), distant supply sources, a meshed network and large retail system demand that potentially varies materially intraday with changes in weather is bespoke to the DTS, and so requires tailored arrangements to safely and efficiently manage the system. Any future market design will need to account for this reality.

While pipeline congestion is primarily an issue of capacity and pipelines being fully utilised, intertemporal congestion is an issue of time *and* capacity chiefly caused by inaccurate forecasting[3]. More importantly, events that cause intertemporal congestion occur intra-day and by definition were not forecast at the start of the day by both market participants and the system operator.

Under the current market, the intraday rescheduling of the market enables demand to be reforecast across the day (when more information is available) and allows the costs of any intertemporal congestion (the cost of gas required to balance the system) to be priced at the time it occurs. Intraday prices and the uplift allocation methodology encourage accurate forecasting (reducing the probability of intertemporal congestion), as those who forecast poorly and deviate can be exposed to surprise uplift payments and the next schedule's price. A participant who forecasts accurately over the gas day, and supplies gas in accordance with its forecast is not exposed to surprise uplift payments.

Any future market model needs to take into account the fact that many of the 'events' in the Victorian market occur within the gas day, and as such the market needs to provide appropriate intra-day incentives and signals to encourage efficient behaviour within the gas day. While there are some limitations to the current market design, the market has encouraged more accurate participant demand forecasts and attempts to attribute the costs of intertemporal congestion to those who cause it within the confines of a single price (locational pricing could provide more accurate cost-to-cause allocation) . Indeed, one of the primary reasons from moving away from the pre-2007 ex post market was that a single end of day price did not encourage accurate forecasting as it socialised the costs of intertemporal congestion across all withdrawals – this particularly disadvantaged participants who had a flat load (primarily large users). The ancillary payments and uplift methodology attempt to address this within the confines of maintaining a single price for all locations. An alternative approach would be to have zonal or nodal pricing but such a market design may be as (or even more) complex as the current market.

2.3 Hedging and AMDQ

AEMO agrees that effective risk management is important to a well-functioning wholesale market. The report primarily talks to hedging price and congestion risk in a financial context. However it is important to consider the hedge instruments that exist today.

For example, the report talks to an inability of participants to hedge against surprise uplift. In practice, participants can hedge against this through accurate forecasting of consumption; a participant who forecasts accurately at the start of the day, and procures gas at the 6 AM schedule to meet this forecast, is not exposed to surprise uplift. Accurate forecasting is a desirable behaviour to encourage, weakening such incentives would result in increased balancing requirements, and hence cost, for the market to manage. Participants can also secure physical hedges against the market prices through their supply contracts and structure their bids into the market accordingly.

If a participant is physically hedged, it is likely to only seek a financial hedge to the extent that physical hedging has limitations. Equally parties would only be prepared to offer a financial hedge to the extent that it would not outweigh their own advantages in retaining a physical hedge. These factors should be considered in understanding the likely liquidity (and usefulness) of any future financial hedge products.

AMDQ is the current means of providing a capacity hedge against congestion and exposure to the associated congestion uplift. The DWGM does not determine a locational price for congestion. Consequently *any* method to recover congestion costs will be an approximation and will produce imperfect signals. The current uplift allocation methodology attempts to provide an approximate cost-to-cause allocation through charging network users that are deemed by some measures to contribute

[3] The report talks to congestion related to surprise due to there being limited pipeline capacity and access to linepack. While physically this is the case, it may not be economic to build in enough capacity (or linepack) to manage surprise given that it is a temporal issue related to the limitations of forecasting. One of the roles of the LNG facility at Dandenong is to cater for surprise (forecast error).

to congestion while providing those who hold AMDQ with a hedge against the cost of congestion uplift. While it has its limitations, the aim of this arrangement is to both recover the cost of working around congestion and to provide a disincentive for participants to cause increased congestion.

Low current levels of congestion costs, due to current adequate levels of system capacity, may encourage adoption of simpler approaches, but consideration has to be given to how simpler approaches might work in the future if congestion becomes a major issue again.

A further potential issue with the current framework is that it would currently be possible for a participant to fund a network expansion in one part of the network and for its usage of that investment to cause congestion. The participant who funded the investment would be hedged against congestion by its AMDQ - pushing the cost of congestion on to other participants. These "other participants" are more likely to be new entrant participants who do not have AMDQ (or a matching injection bid)[4]. However, arguably these other participants (if they do not have AMDQ) are injecting without capacity. There is a trade-off between encouraging investment and encouraging new entrants.

2.4 Meaningful Reference Price and the Intraday Market

The report talks to the current ex ante market prices not being "a meaningful reference price" and the need to develop such a price to support risk management. As a spot market, the ex-ante price in the DWGM should represent the value of gas on the day (or in the context of the DWGM's intraday prices, for the remaining scheduling horizon) to participants. Spot prices should provide a signal to support the efficient allocation of gas over the short-term.

As many of the key events that participants need to manage occur intra-day, there is a need to have intraday signals (pricing) to encourage efficient behaviour and outcomes. Indeed, any market change will still need to incentivise efficient behaviour.

AEMO considers it important that the pricing structure in the spot market can support the development of a forward market and reference price for gas and this merits further consideration by the AEMC. In addition, AEMO notes that there are further considerations in developing a meaningful reference price, including:

- *Number of prices on the day.* As discussed, many of the key events in the DWGM are unplanned (for example the scheduling of LNG) which makes it challenging to price the market around a single price (as the pre-2007 market was). A single ex post price would imply a smearing for intra-day actions, as participants would not have the intra-day signal to respond to changing market conditions during the gas day and would simply pay the price at the end of the gas day. If there is a single ex ante price, then this price is a forecast for the gas day and would not take into account changes to conditions after the price is set, undermining the usefulness of this price as a reference price as it does not reflect the best information available. This implies the need for the market to retain intra-day signals and therefore a number of prices to encourage efficient behaviour and market outcomes. However, the greater the number of prices the potentially more challenging it is to derive a reference price.
- *A reference price will likely be a derived price.* As it is unlikely to be desirable to have a single market price, any reference price will likely have to be derived from multiple prices. For example, if the market was to move to a model with continuous trading (when prices can change continuously throughout the day), then a formula would need to be determined to calculate a reference price (similar to the Wallumbilla Hub Benchmark Price). While this is not an insurmountable issue, it means that there will likely still be some basis risk for any reference price and that the determination of the pricing index is a key consideration.
- *Participation in the spot and forward market.* An important determinant to the success of a reference price and the development of an effective forward market is the need for there to be a variety of active buyers and sellers in the market (market depth and breadth). Indeed, an

[4] The ability to procure a corresponding supply contract may prove challenging for smaller participants or new entrants, limiting the usefulness of any AMDQ acquired through their customers.

important issue that warrants further consideration is how a greater number of players with diverse positions (including gas producers) can be encouraged to participate in the market.

3 Comments on the proposed packages

The following section provides AEMO's initial view of the five packages outlined in the paper. The submission attempts to highlight items that would need further consideration as part of any future development of any of the packages as well as challenges and issues with some of the concepts presented.

In addition AEMO considers that it would be worthwhile articulating what is given up and what is gained for any of the proposed packages. Some of the proposed packages improve one aspect of the market design and diminish others; ultimately any substantial change is going to involve trade-offs. Any analysis should recognise that the cost of existing design are sunk, and that a new design should be assessed on its incremental gains in benefits relative to the total cost of change.

3.1 Package A – Targeted Measures

Package A seeks to improve investment signals through providing additional benefits to holders of AMDQ while retaining the current market framework. Out of the five packages proposed, this package would seem to have the least impact from market operation perspective, however the changes to transmission rights are likely to have significant impacts on market participants.

3.1.1 Targeted Transmission rights

The intent of this reform is to prevent new network users from free riding on the investments made by foundation shippers. This is achieved through a differential tariff framework that requires participants who do not fund an investment but use that investment's capacity to pay an expanded asset charge, with the foundation participant(s) receiving the revenue from that charge.

The AEMC highlights that the usage and allocation rules for this mechanism are key to its success, and while AEMO agrees with this point, the calculation of the charge itself is an equally important and challenging aspect of the mechanism. If the price is set too low, then it could disincentivise participants from investing (as they may seek to free ride off of another participant's investment) if they believe they are unable to gain a competitive advantage from funding additional capacity. If the price is set too high, then this would effectively amount to an exclusive right and could present a considerable barrier to new entrants. Further, issues of economic withholding of capacity may need to be considered if this additional capacity goes unused. In addition, a high charge could penalise users who inadvertently use additional capacity due for example to a forecast error. Tolerances may be required to mitigate such a risk. Pricing the capacity charge efficiently is likely to be challenging and a clear methodology would need to be outlined.

In addition, further consideration could be given to:

- How revenue would be allocated across multiple foundation shippers
- The implications of intra-day rescheduling on the calculation and allocation of the charge
- How out-of-merit order gas is treated under such a regime

3.1.2 DTS Planning Standard

As part of this package, the AEMC suggests a review is undertaken "on the appropriateness of the continued use of a 1 in 20 planning standard for the DTS". An appropriate planning standard is in part a policy question as it speaks to what is an acceptable level of system security and curtailment priorities - an ideal figure cannot simply be derived. As such, consultation with government and industry is likely required.

If designing and planning for a 1-in-20 basis is considered too conservative then alternatives could be a 1-in-10 or a 1-in-2 standard. Examining the recent frequency of such occurrences, 1st of August 2014 experienced a 1-in-10 with system demand exceeding 1,200 TJ. For 2015 there have been three 1-in-2 system demand days. The planning standard needs to be considered against an acceptable frequency of interruption of gas supply to customers and the associated safety issues of such events.

3.1.3 Summary

In redesigning the current tariff framework and reviewing AMDQ consideration needs to be given to the impacts on both short and long term incentives.

3.2 Package B - Simplified DWGM pricing mechanism and transmission rights

AEMO considers that the pricing structure under this model needs further consideration. The benefit of this model is that it has a relatively simple pricing structure, however this is traded off against a market that provides intra-day incentives and cost-to-cause allocation of congestion.

3.2.1 Simplified Pricing Mechanism

Under this package it is proposed that a simplified pricing mechanism is adopted by scheduling and pricing the market off a constrained schedule. There are some major issues in allocating costs and settling the market around single constrained schedule that should be further considered.

For example say, 1000 TJ of gas is scheduled on a day at price of $3/GJ. However, due to an under forecast of peak demand, an additional 10 TJ of LNG is required, and this gas is offered into the market at $50/GJ (or even at VOLL). Under this model, the entire market would be scheduled at $50/GJ to meet the constraint. Under the existing market, only the additional 10 TJ of LNG would be priced at $50/GJ (and funded through ancillary payments and uplift charges), as this is all that is required to relieve the constraint. This is a key distinction as it implies a potential wealth transfer to producers and holders of LNG and creates large risks for users, potentially discouraging participants from buying off the spot market. Further, there is an argument as to whether such a pricing structure could be gamed, with holders of LNG withholding cheaper injections to create constraints in order to drive up the price for the entire market. The paper states that hedging products could be developed to mitigate such risks. However, under this pricing structure it is hard to imagine anyone but LNG holders offering a hedge and the price of such a hedge is likely to reflect the magnitude of the price risk. It is therefore a question as to whether the manageability of risk under this model is improved at all.

As there is a single non-locational specific constrained price, a further major issue with this model is that it smears costs of congestion and surprise not only across all users but across all locations which seems very inefficient when compared to existing incentives.

A consideration (that is not clear from the paper) is how many schedules are run and when are prices set. As outlined in this submission, most events in the DWGM occur intraday necessitating multiple prices to encourage efficient outcomes. It is hard to see how a single ex ante price would work under this model as it would not be able to reflect any intra-day constraints. An ex post price is more plausible but it would imply a cross-subsidy of the cost of surprise congestion between those with a flat load profile and those with a volatile load profile, and would not encourage efficient intra-day behaviour to reduce the probability of constraints. If there are multiple prices, intraday price movements under constrained schedules could be large, creating considerable risk for participants with volatile loads that could be challenging to manage.

3.2.2 Transmission rights on the DTS

The package aims to introduce firm and non-firm transmission rights to the DTS. With firm transmission rights "[providing] limited protection from congestion uplift and curtailment of withdrawals"[5]. The fact that there is congestion uplift implies that there are constrained-on payments made under this model. Constrained-on payments would appear to be unnecessary under this package as constrained-on injectors should already be adequately compensated through the constrained market price. If the intent is to provide protection against the market then it is not clear as to how this could be achieved.

The package also proposes that the users with non-firm rights are charged an overrun charge for using the network beyond their capacity rights. It is not clear who the revenue from this charge would be distributed to. Assuming that it is to firm rights holders, then the same issues that apply to the

[5] AEMC, Victorian DWGM Discussion Paper, pp 64

expanded capacity charge in Package A would apply here. Hence AEMO agrees that the calculation of this overrun charge is likely to be a significant challenge.

3.2.3 Summary

Ultimately efficient pricing is about providing incentives and enabling an efficient allocation of costs – under this model both aspects are potentially weakened to gain a simpler pricing structure.

3.3 Package C – Zone-based pricing and capacity rights

This package proposes the introduction of four pricing zones across the DTS, to improve the locational pricing signals (In particular on constraints) whilst not going to a full nodal model.

3.3.1 Definition of zones

The zones presented in the paper appear to be derived from the DTS's current linepack zones, the boundaries of which are not necessarily where congestion is. While these zones in the paper may be presented for illustrative purposes, AEMO believes a useful first step in further progressing this model would be to define what a zone should actually constitute and what would cause them to change. Once such a definition is determined the zones could be specified.

3.3.2 Zone-based Pricing

The package proposes to use the same pricing mechanism as outlined in package B, AEMO would consider that the same concerns raised to that pricing mechanism would also apply here. Further, as the model is not fully nodal, the prices provided will still be an approximation, resulting in imperfect signals though potentially more granular than the single price under today's market, this is acknowledging that a fully nodal market has complexities and limitations of its own.

The paper states that price differentials between zones will occur when constraints occur between zones - somewhat analogous to the NEM. However, unlike the NEM, there are intertemporal factors such as surprise which could cause prices to diverge even when there are no constraints in the capacity between zones (or a need to signal for investment in inter-zonal capacity). Indeed, this may also necessitate the need for there to be multiple prices throughout the day.

3.3.3 Capacity rights and network investment

The package proposes to introduce financial transmission rights that allow zonal prices to be hedged against by providing the holder with a payment based on the price differential between zones multiplied by the volume of the right.

This description of a right may be too simplistic for a gas network given the inter-temporal nature of flows. It is possible that gas flowing into a zone may not equal gas flowing out of a zone over the same period, with difference being made up through a decrease or increase in linepack. The capacity right would need to reflect this flow dynamic, and may therefore need to be intertemporal, and this, in addition to how it is priced, could be quite complex.

3.4 Package D – Entry-exit model

The package proposes moving the DWGM to an entry-exit type model for managing capacity, the potential trading arrangements are not outlined.

3.4.1 Trading Model

The commodity trading model is not specified in the paper, this section outlines some high level details on how an entry-exit model could work with continuous trading (and bilateral trades) of commodity. It is worth noting that the current market scheduling arrangements (with trades undertaken through schedules) could also be compatible with an entry-exit capacity regime. There are trade-offs associated with either approach.

3.4.1.1 Continuous trading with entry exit and a virtual trading point

Continuous trading refers to a trading model where participants can enter into transactions at any point during a specified trade window. Under such a model, bids and offers are continuously matched with prices set (based off bid or offer prices) according to pre-determined rules (an exchange based continuous trading model is used by the Gas Supply Hub). Continuous trading could involve the trading of on-the-day gas products as well as future dated products.

Under a continuous trading model, consideration needs to be given to how balancing requirements are managed in the absence of intra-day market schedules. An ideal model should give participants the responsibility for balancing their position and the flexibility to monitor and manage their imbalance position as they choose. For example, for a participant who has under delivered gas they should have the optionality to either deliver additional gas, purchase additional gas from the market or being reconciled by the system operator (for example through a cash out mechanism). If balancing obligations are shifted to participants there needs to be sufficient timely information provided to enable participants to effectively manage their on-the-day position. The calculation of any cash out price for residual balancing is also an important consideration for minimising system operator intervention required to maintain system security.

How a conceptual entry-exit model could work in Victoria with continuous trading and a virtual trading point

Trading and Operation

Trades could be facilitated via a DTS virtual trading point comprised of all physical entry and exit points included in the market. On the gas day, participants would provide a beginning of day nomination to AEMO made up of bilateral trades, transiting flows and previously transacted exchange flows, AEMO would then manage gas requirements accordingly. To manage any on-the-day requirements, participants could then voluntarily trade for gas via an on-the-day gas product listed on the exchange. Trades in this product could be continuously made through the day. AEMO would use any on-the-day trades entered into to recalculate requirements from the initial nomination, participants may also need to provide nominations to facility operators. The exact on-the-day renomination and gas delivery process would need to be determined.

In addition to on-the-day trading, physical products could also be traded for future gas days. Trades in such products would inform the nominations for subsequent gas days and the prices from such trades could inform the forward market for gas.

Balancing

Participants could be individually responsible for monitoring and managing their balancing position on the day. Participants could manage their imbalances through the market, from their own portfolio or bilaterally.

A mechanism would still need to be in place for the system operator to undertake balancing actions in order to manage surprise or congestion that compromises system security for situations where participants are unable or choose not to respond in sufficient time. One option would be to have a balancing stack where participants provide the system operator with bids and offers for gas that can be called on by the system operator to return the system (in a sense an ancillary market for balancing). The triggers for the system operator intervening in the market would need to be determined, and it should be transparent to the market when the system operator is undertaking balancing actions. How the cost of balancing actions are determined and recovered under such a model is not a trivial consideration. Consideration also needs to be given as to whether such a regime could be gamed.

Pros

- Trading is voluntary (but balancing mandatory)
- Standard products for off-market (including bilateral and OTC trades) can be registered
- Provides participants with the flexibility to manage their requirements throughout the day (and hence manage surprise)
- Future dated products could be traded and incorporated into market positions
- A transparent balancing price could be created

Cons

- No single market price – a reference price would need to be derived
- System change and impact likely to be greater than a trading model that retains schedules
- Potentially different bids and offers used for managing commodity and congestion
- Potential loss of coordination in managing congestion with the system operator and participants independently managing congestion and balancing. This could make congestion management more complicated and potentially more costly.

3.4.1.2 Potential issues with converting the DWGM to an entry-exit model

The proposal states that the DWGM needs to be redesigned to solely involve the trading of gas that is to remove the implicit allocation of DTS capacity. AEMO is not clear on what this means. Under the current market design the only role capacity rights (AMDQ) play in scheduling is for tie-breaking of equally priced bids when capacity is constrained. Indeed, it may be possible to translate existing AMDQ rights into entry-exit rights. The translation of existing rights are an important further consideration if this model is to be progressed. Another consideration is that while an entry-exit model may provide investment signals at the borders points of the network, it may not provide adequate signals for "within-network" investment.

In addition, by moving to an entry-exit model with continuous trading there are several trade-offs to consider against the current central market model:

- *Liquidity, competition and spot trading*. The current market encourages liquidity by requiring all participants to provide bids and offers through the market. Participants can trade imbalances or make spot market transactions by either bidding long or short into the market. The market automatically balances demand and supply ensuring that (subject to constraints and pricing) the participant will be scheduled to receive or deliver its gas at the market price. An entry-exit model with continuous trading depends on competitive provision of bids and offers into the voluntary market in order to support liquidity. There is no obligation on participant to provide bids or offers. If there are insufficient offers available through the market, then participants may need to source gas bilaterally or rely on balancing. A lack of liquidity could potentially be challenging for new-entrants or smaller players. While the central market model provides greater certainty of trades a continuous trading model provides greater flexibility in portfolio management.
- *Constraint management*. Under the current market model, the system operator is more readily able to predict future gas flows through the centralised provision of demand forecasts, bids and offers as part of the scheduling process. The system operator also undertakes its own demand forecast and compares this against participant forecasts, bids and offers, and can apply demand overrides in order to maintain system security. Under a continuous trading model, where bids to increase or decrease flows can happen at any time constraint management may be more difficult. Furthermore, participants would be individually responsible for managing their imbalance position (rather than central management) which could likely imply less coordination in balancing actions across the market. Thus management of constraints and balancing could be a lot more challenging (and potentially more costly). This is traded off against greater flexibility for participants in managing their gas requirements throughout the day.
- *Congestion management, economic dispatch and investment signals.* Under the current market, there is an economic schedule and when pipeline congestion occurs, flows are constrained based on their bids/offers (subject to AMDQ tie-breaking), ensuring that the lowest cost source of gas typically flows. An entry-exit model without schedules on-the-other hand implies the need to have some form of interruptible capacity (or prorata arrangements) to manage congestion. When congestion occurs, interruptible capacity would be curtailed first regardless of the economic value of the gas that capacity is being utilised for. This may provide a better investment signal but at the cost of an economic dispatch.
- *Pricing.* The current market provides intra-day prices which value gas at a particular time for a specific scheduling horizon. A voluntary continuous trading model would not have a single "market" price. Rather, a reference price would be derived from trades entered into and potentially if there are no trades then a formula to calculate a price would be required. A reference price may be more useful for developing a forward market and encouraging derivatives but less useful (than intra-day schedule prices) for providing on-the-day signals to enable efficient management of congestion and surprise.

3.5 Package E – Hub and Spoke

This section outlines some specific comments on the proposed hub and spoke model.

3.5.1 Balancing Hub at Melbourne

The package describes the establishment of a balancing hub at Melbourne that is used to manage residual balancing. The package talks to balancing being managed in a similar manner to the Market

Operator Service (MOS) in the existing STTM design. It is important to note that MOS is used as an ex post allocation method for unscheduled flows that are required to balance the system, and from an operational perspective balancing is managed independently from the market by the pipeline operator. Further, in the STTM there is limited coordination between pipeline operators (and distributors) in the management of balancing at the hub. Assuming under the hub and spoke model that the pipelines are independently managed and independently provide balancing (as in the STTM), then this could imply a loss of coordination and in turn diminished operational efficiency.

One of the key features under the current market is that operation between DTS pipelines is coordinated and centrally managed[6]. This is an important benefit as the system can be operated in a way that maximises the useable system linepack available to manage peak demand and surprise events. This is particularly important during cold weather events as by having linepack available to meet swings in demand, the probability that expensive peak-shaving gas or curtailment is required is reduced. AEMO has several operational strategies in place that leverage the ability to coordinate system operation.

AEMO, in consultation with ESSO, has the ability to profile injections at Longford (by having Longford inject more over the first half of the day) to build up useable linepack prior to the system peak. This improves system security and reduces the probability of requiring peak shaving gas (or curtailment). In addition, during winter, useable linepack on the Southwest pipeline is used before peak-shaving gas is required. This requires adequate linepack to be built up on the Southwest pipeline ahead of the system peak, and in the event that this linepack is depleted to meet peak requirements the system needs to be configured in a way to enable Southwest pipeline linepack to be replenished overnight.

Such operational strategies would not be possible if the pipelines are independently operated in accordance with contract carriage arrangements and a MOS-type balancing arrangement. A possible consequence of such a regime is that the probability of pressure breaches at the balancing hub could increase and that peak-shaving gas is required increases.

3.5.2 Contract Carriage in the DTS

The contract carriage arrangements outlined in the package would represent a fundamental change to current framework. In particular the initial allocation of rights would need consideration and consultation. The primary benefit the AEMC outline for contract carriage is that it encourages investment. It is true that contract carriage promotes bilateral investment, but history of investment does not necessarily mean that that investment was efficient or achieved at least cost and this is something that should be considered.

Further consideration needs to be given to the complexity in defining contract carriage-type rights in the DTS. Given that the system is meshed, a point-to-point rights model would be difficult to define. Indeed, the paper states that point-to-point rights would be simple to do for the Longford to Melbourne Pipeline. However even this could be relatively complicated given that the Longford to Melbourne not only delivers into the ring main but splits off from Pakenham to Wollert. The pipeline also has multiple off-take and intake points. Other “spokes” would have similar issues related to the underlying infrastructure (which is arguably more complex), and this presents a real challenge to this model.

In addition, consideration should be given to capacity release and trading mechanisms to encourage the efficient allocation of capacity under such a model. Without capacity trading, gas could be locked up in certain parts of the network undermining allocative efficiency. This would be a step backwards from today’s arrangements where gas can freely flow (subject to physical constraints) within the market to where it is mostly highly valued.

[6] A coordinated approach in pipeline operations can be thought of in terms of gas demand being supplied from a pool, where once gas is injected into the DTS from different sources, it can equally supply demand. Gas is moved around the transmission system by compressor operation and pressure regulation stations to supply demand.