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10 September 2015

Mr John Pierce
Chair
Australian Energy Market Commission
PO Box A2449
Sydney South NSW 1235

Dear Mr Pierce

APA Group (APA) welcomes the opportunity to comment on the Australian Energy Market Commission (AEMC) Wholesale Gas Markets Discussion Paper.

APA would be pleased to assist the AEMC in the development of its review report and recommendations for the future direction of the East Coast Wholesale Gas Market. Please call Alexandra Curran on 02 9275 0020, if you would like any further information.

Yours sincerely

Peter Bolding
General Manager Regulatory & Strategy

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# East Coast Wholesale Gas Market and Pipeline Frameworks Review:

# Wholesale Gas Markets Discussion Paper

## APA Group submission

## 1. Summary

APA Group (APA) welcomes the opportunity to provide comments on the AEMC Wholesale Gas Markets Discussion Paper, and supports the AEMC process of further articulating and giving substance to the way in which the COAG Energy Council's vision for a liquid wholesale gas market might be achieved.

APA considers that the AEMC's discussion paper outlines some of the conceptual economic characteristics of effective and liquid wholesale markets. The focus is on achieving a liquid market, in line with the COAG Energy Council's Vision. However market design is not the only element impacting a market - the number of participants, and their respective market shares, are key to achieving liquidity.

*Importance of long term perspective*

APA considers that the market reforms arising from this review are likely to be in place for a considerable time – it will be important to develop a market framework that will be sufficiently durable to cope with market structures of the future.

Key points that must be accommodated include:

- Significant gas flows associated with the full operation of three LNG plants; the market will need to be able to cope with infrequent but significant swings in demand – swings larger than the entire Australian market today.
- A pipeline link to the Northern Territory may feature in future markets, bringing additional gas to the existing system.
- A pipeline link from Narrabri to the MSP may feature in future markets, bringing additional gas to the existing system.
- Investment will be required to accommodate this volume of gas movement - it is possible that the SWQP and Wallumbilla compound will be further augmented, and it is possible that additional investment will occur in the Victorian Transmission System (VTS).

APA considers that the current market is still evolving – it is too early to implement a particular market design based on assumptions about uncertain future market development. This is a risky strategy that may not be prudent if the chosen design is unable to meet the needs of users as the market matures. Rather, APA advocates an

incremental, market-led development approach which retains the flexibility to modify the market framework as the market's needs develop over time.

APA has previously commented that contractual flow paths currently exist and create tradeable ownership rights that are critical for capacity and gas trading to occur. The AEMC's review should consider how a gas market might work with these contractual flow paths and tradeable capacity rights featuring prominently in the marketplace.

*Long term perspective must recognise changes occurring in the market*

We are currently seeing a major shift in the production and utilisation of gas, and the reality of a few large market players once the LNG facilities are all in production. As reported by the Productivity Commission, the top four market players make up about 70% of current production; in the next few years, the top four players will constitute up to 80% of a much larger market (importantly, the largest player in the future market will control as much gas as the entire current market).

*Market structure*

The AEMC sets out four key characteristics of a liquid market – market depth, market breadth, immediacy, resilience. It will be important to consider the market structure on the east coast, and consider whether these characteristics can be achieved in the context of that market structure. A good or theoretically optimal market design will not be successful if the market structure will not allow any of these elements to develop.

APA is particularly concerned with market depth. Regardless of the number of market participants and the volume of gas traded among them, there will remain three or four very large participants that control up to 80% of the market's gas. A single large participant moving from "buy" to "sell" (or vice-versa)[1] could significantly move the market. In this environment, APA believes it is unlikely that sufficient confidence will develop in a market price as a reference to support a liquid wholesale gas market.

This outcome is likely regardless of how much transmission capacity is available or how it is allocated – the temptation is to focus on transmission to address market design issues where in fact the majority trade of gas is undertaken by a very small number of very large players. In these circumstances, smaller players cannot have confidence to enter the market on the basis of a market price – they will always rely on the certainty associated with a contract price for significant gas demand.

The ACCC inquiry into Eastern and Southern Australian wholesale gas prices is expected to examine the scope of competition in upstream markets, and this will be a particularly critical input to determining whether sufficient market depth can be developed to support a truly liquid market.

APA would caution against the temptation to introduce significant changes to the structure of the market without considering the key fundamental issues of market depth and breadth. It would not serve the gas market to undermine existing mechanisms that have served the industry well, such as incentives to invest, through the perceived goal of

[1] We often consider the example of an LNG plant experiencing an unplanned outage, but the market impact could be equally significant when the plant resumes operation.

achieving a liquid market that may not eventuate due to the limited number of large market participants.

APA is concerned that there is insufficient market depth to support a truly liquid market, though liquidity could be improved through greater opportunities to trade marginal gas. Market structures that seek to support opportunistic gas trading (that is, trading in marginal gas) are likely to be more effective and efficient. This is a market that focuses on contractual supply, but provides effective, low cost outlets for the trade of gas when the opportunities arise.

APA believes that a modified version of market Concept 1 (that is, a physical market) is the best option for the market where there are clear constraints on the ability for market participants to fully trust a market reference price for their firm gas supply requirements.

*Design of a physical market*

APA does not believe there is a case for the multiple market hubs suggested in the AEMC's description of a physical market (Concept 1), and does not believe that any market participant has argued that there needs to be a particular number of hubs (or indeed as many hubs as Concept 1 suggests). APA believes that an efficient market structure in line with option 1 (a physical market) might feature:

- A northern voluntary supply hub at Wallumbilla, with a single trading point supported by hub services;
- A southern voluntary supply hub in Victoria (appropriate location to be determined);
- Market-based balancing markets at major demand centres;
- Contract carriage pipelines linking supply hubs;
- A well-developed and fully functioning secondary pipeline capacity market with appropriate incentives; and
- Effective, transparent information provision through the bulletin board that shows forecast daily gas flows into and out of zones, line pack status, and scope for real time reporting during incidents.

APA considers that the virtual market concepts (Concepts 2 and 3) do not address, and may even exacerbate, the failures identified in a number of reviews in relation to market carriage, where investment is delayed or stopped due to free rider issues, inefficient regulatory processes and the lack of firm transmission rights. As stated by the Productivity Commission: "In the Commission's view extending elements of the market carriage model could put at risk the investments needed to efficiently respond to current and future market developments."[2]

*Voluntary or compulsory markets?*

The AEMC Stage 1 Final Report also noted that compulsory markets such as the DWGM appear to be liquid, as measured by the quantity of gas traded. However, the Stage 1 Report acknowledges that as "the majority of trades that occur on the DWGM are within-

[2] Productivity Commission 2015, *Examining Barriers to More Efficient Gas Markets*, Commission Research Paper, Canberra, p105.

participant, the level of trading liquidity between different entities is also likely to be relatively low most of the time."[3] The false sense of liquidity is created by the mandatory nature of the market, not by the number of arm's length trades taking place.

In summary, APA supports:

- Physical markets over virtual markets; and
- Voluntary markets over compulsory markets.

APA strongly recommends that the existing Wallumbilla Gas Supply Hub be given the opportunity to develop and flourish in response to demonstrated industry needs before being replaced by a costly market design founded on assumed future needs.

APA looks forward to working with the AEMC throughout this process.

## 2. A long term perspective

Do the current market arrangements adequately support participants' needs?

In APA's experience, different participants have different needs.

Participants using gas as a fuel or feedstock are usually using gas in facilities which require long-lived, and process- or product-specific investments. These investments are much the same as pipeline operators must make: long-lived and specific in the sense that they have no alternative use. The risks of these investments – on both sides - are mitigated by long term contracts for gas and for gas transportation. They are critically important because they support the financing of long-term economic activity, gas exploration and production, and of pipeline investment.

These market participants will continue to require secure, stable, reliable gas supplies, and pipeline companies have delivered investment in capacity when required by shippers. That is, the current market arrangements have supported these participants' needs, and will continue to do so. APA understands that where market issues arise for these shippers in the current market, it is in securing long term gas supply arrangements on acceptable terms.

These users' needs remain unchanged regardless of how much transmission capacity is available or how it is allocated. These shippers seek firm long term arrangements for both

[3] AEMC, *East Coast Wholesale Gas Market and Pipeline Frameworks Review, Stage 1 Final Report*, 23 July 2015, Sydney, p120.

gas and capacity, and changes to the market design that undermine incentives for investment will adversely impact these customers.

But on any given day, variations in manufacturing or commercial activity, weather patterns or conditions in the electricity market may mean that there are fluctuations in requirements. Retailers, for example, use the STTM markets to balance their requirements daily. These quantities of gas that vary from day to day, either gas not required on the day, or gas sought when opportunities arise, is referred to as marginal gas. Voluntary gas trading hubs provide the opportunity to 'clear' this gas.

While contracted gas supply will play a key role in the normal day-to day requirements, there may well be a role for gas markets to accommodate this marginal gas. Whether there will be sufficient volumes of marginal gas traded to create a viable market is not known, however early indications from Wallumbilla, with steady growing gas volumes trading, are encouraging.

There are some other market participants, and potentially some new entrants hypothecated in the AEMC Discussion Paper, that may have an interest in gas trading and accessing opportunities for arbitrage between markets. This is likely to also involve the trade of marginal gas.

While the current market can cope with swings at least up to the size experienced in the 2015 startup period for the first LNG train, APA questions whether the market has the physical capacity to accommodate very large and infrequent events, such as a plant trip for one of the LNG producers, that would have a significant impact on the market price. Events such as these are likely to undermine the scope for gas trading hubs to become a significant source of firm gas supply for most market participants. Therefore, while there may be a market desire for more significant 'base load' trading of gas through gas markets (such as would form the basis of a trusted gas price), the east coast market structure may mean that this will not eventuate as it would involve too much risk for trading participants.

| Are gas trading markets expected to become more important in ensuring the efficient allocation of gas? |
|---|

APA's experience suggests that most users require firm supply arrangements in order to meet their needs for gas as a fuel or feedstock, or to meet their commitments to their customers. In this regard, APA considers that contracts for supply and transportation will continue to form an integral part of the market.

But as discussed below, the market is likely to feature a small number of large LNG participants whose demands can overwhelm the markets for gas and move the market prices significantly. In this context, small users are unlikely to view this market as a reliable and suitably low risk market to source all their gas supply.

APA considers that, as existing trading markets continue to mature, they will become more important in ensuring the efficient allocation of marginal gas.

Over the next 10 years, how do industry participants see their gas sales and procurement activities changing?

APA's response to this question is based on observations of the behaviour of our shippers. As discussed above, our observations indicate that users have a strong preference for certainty of supply, suggesting that longer term contracting will feature for some years to come.

APA agrees with the AEMC that the reforms resulting from this review need to be sufficiently durable and robust to be able to cope with the major changes likely to happen in upcoming years.

One clear change is that three LNG plants will be coming on line. Together, these plants will increase the volume of gas moving through Australia four-fold – any one of these plants will be responsible for moving as much gas as is currently moved through the entire Eastern Australian market.

Should any one of these plants cease operation suddenly (for example, a shutdown caused by a cyclone), the market will need to be sufficiently robust to cope with a sudden redirection of gas the size of the entire current market. This would likely cause a sharp (but temporary) decrease in market prices.

In principle, for a user to take advantage of sudden opportunities in the market arising from short term low gas prices, it must have a sufficient degree of spare plant capacity to be able to utilise more gas. Moreover, gas costs must form a sufficient proportion of input costs for the user to be able to profitably take advantage of any short term price decreases.

However, this is currently a major source of uncertainty. As a market, we have insufficient knowledge of how the LNG plants and CSG fields will operate in practice. At this stage, we know the physical capabilities of the pipeline network, [4] but not the extent to which those capabilities will be called upon. We also do not know the capabilities of users to absorb any sudden surplus supply.

The market design must also acknowledge the scope for any constraints in the current pipeline network to be addressed over time (for example, augmentation of the capacity on the SWQP). This is already evident in the capital investment being undertaken at the Wallumbilla hub, and in allowing for flow reversal on existing pipelines.

The market design should also consider the ongoing development of capacity in the Victorian Transmission System. In particular, it is possible that additional capacity could be developed that could create further links between Port Campbell (Iona, SEAGas Pipeline), Culcairn (MSP and northern markets), and Longford (Victorian markets, EGP and Tasmanian Pipeline).

[4] By way of orders of magnitude, if all three LNG plants were to go offline simultaneously (for example due to a cyclone in Gladstone), and not be able to turn down production, the SWQP would only be able to move about one-tenth of the gas redirected from the coal seam gas fields to southern markets.

# 3. Market characteristics

What are the main barriers to achieving a liquid wholesale gas market on the east coast and are regulatory solutions required?

The ACCC inquiry into Eastern and Southern Australian wholesale gas prices is expected to examine the scope of competition in the upstream market, and this will be a particularly critical input to determining whether sufficient market depth can be developed to support a truly liquid market.

APA encourages the AEMC to consider the ACCC's findings on market structure before developing a regulatory solution regarding market design.

The AEMC Discussion paper draws on economic theory to set out the characteristics that contribute to a liquid market. These are listed as:

- **Market depth**: where no single buy or sell order is likely to move the market price excessively
- **Market breadth**: where a large number of bids to purchase gas and offers to sell gas are present in the market
- **Immediacy**: the ability to trade large volumes in a short period of time
- **Resilience**: the ability of the market to recover towards its natural equilibrium after being exposed to a shock

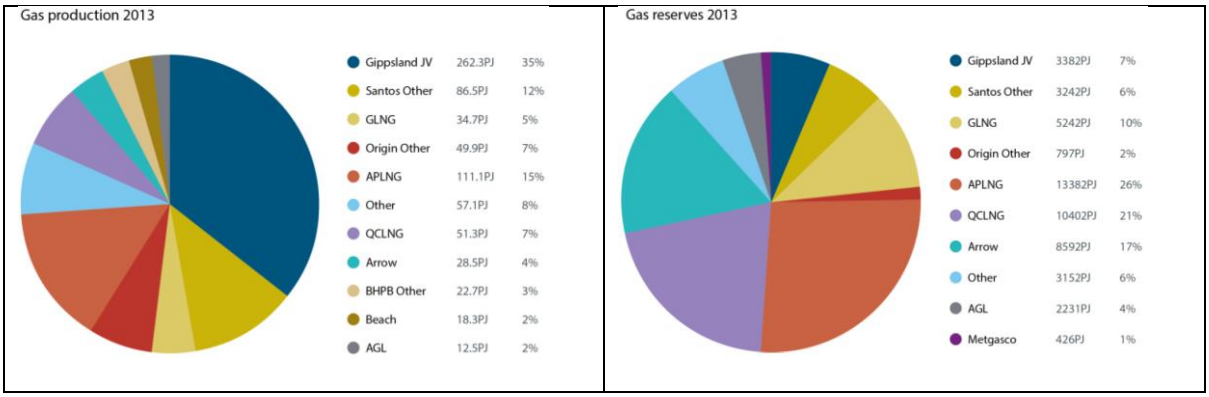
These are addressed below.

## *3.1. Market depth*

APA considers that it is important to develop a market design to recognise the future characteristics of the market. A key aspect is the presence of a small number of large participants in both the upstream and downstream sectors, each of which control enough gas to exert a significant influence on the market – any one of the (future) key players will control enough gas to overwhelm the domestic market.

*Changes in the market*

The Australian gas market is also likely to see a major shift in the production and utilisation of gas and the shift to a small number of large market players once the LNG facilities are all in production. This will mark a change from the current situation in which the top four players make up about 70% of a relatively small market, to a situation in which the top four players (indeed a different top four) will constitute up to 80% of a much larger market; production by a single LNG participant is expected to be greater than the entire current market:




Source: Australian Government, Department of Industry, *Eastern Australia Domestic Gas Market Study*, pp33, 34. (APA acknowledges that gas production is not directly comparable to gas reserves – this analysis is for illustrative purposes only and assumes that production will be largely in proportion with reserves)

APA considers that an enduring feature of the market will be three or four very large participants that control up to 80% of the market's gas. Given the size of any of these participants, it is entirely possible that a single buy or sell order could move the market excessively. Even with a notionally large number of market participants, the small number of large participants is likely to mean that an efficient market will never be able to develop.

So long as the market features a very small number of very large players, others cannot have confidence to enter the market on the basis of a market-determined price alone[5] – they are more likely to rely on the certainty associated with a contract price. In this environment, APA believes it is unlikely that sufficient confidence will develop in a secondary market price as a reference to support a strong financial market.

This is where the single major potential attraction associated with the market carriage or virtual market model (that is, the ability of small users and producers to gain virtual access to the pipeline system and market) falls away. If small entrants cannot have confidence to enter the market on the basis of a market price for fear that the market price can be heavily influenced by the actions of any one large participant, they will invariably seek the certainty of a contracted gas supply. Having made this commitment to gas supply, it is only reasonable to expect that they will want the certainty of a similar commitment to gas pipeline capacity, which would lead to a contract carriage model. The limited trading seen in the DWGM bears this observation out, where market participants largely trade through, rather than in, the DWGM, remain in balance to the extent possible, and seek ADMQ to give some form of supporting firm injection and withdrawals rights.

## *3.2. Market Breadth*

APA considers that the question of market breadth should be considered in the context of voluntary or compulsory markets. As the AEMC noted in its Stage 1 report, compulsory markets demonstrate false liquidity, caused by many shippers being required to trade their own gas through the market.

[5] This is exacerbated where those large participants have knowledge of their operations that is not available to the rest of the market.

As identified by the AEMC in the Stage 1 report, the bidding behaviour observed in the DWGM is a function of this market structure - shippers bidding to sell into the market at zero to ensure dispatch, and also bidding to purchase at the market maximum to ensure delivery, and remaining in balance to avoid exposure to the market price.

Electricity markets have developed a further mechanism that shippers and users have had to put in place to cope with this type of market structure. Electricity generators and buyers have entered into bilateral Contracts For Differences (CFDs) to manage the compulsory trading through the National Electricity Market.

CFDs allow trades to be executed through the compulsory market, and then "true-up" the differences between the market settlement price and the bilaterally negotiated price. The generator can bid at zero, the buyer can bid at VOLL, and the CFD will translate the market settlement price into the bilaterally agreed price.

The existing compulsory facilitated gas markets have arguably moved the bilateral trade one step upstream – gas is traded before it enters the transmission network, and therefore the shipper is indeed trading through the compulsory market with itself. Electricity Gentailers now apply this type of model as well. While the Gentailers have no need for a CFD, the end result is the same – the market price has no economic bearing on the trade and the apparent market breadth is illusory.

As a result of this "trading with oneself", the STTM is essentially an expensive balancing market – it appears to be liquid due to the volume of trade, but as the AEMC has found, these are predominantly users trading their own gas. Only a small proportion of the gas is traded at a market price.[6] However, all gas "traded" is levied a market fee. This does not, ultimately, increase actual liquidity in traded gas.

APA continues to believe that mandatory transaction through the market results in complex market designs and act as an effective tax on gas, which ultimately makes gas less competitive as a fuel.

APA considers that immediacy and resilience will be related to market depth and breadth. The fewer the number of players in the market, and the lower the volumes traded, the less capable the market will be to process sufficient trading activity to deliver immediacy, and the more difficult it will be for such a market to recover from shocks.

### *3.3. Implications for market design*

APA considers that the small number of large participants in both upstream and downstream markets is a feature of the market that is unlikely, considering the level of investment in gas reserves and LNG plant capacity, to change in the short to medium term.

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[6] And, as the AEMC found in its Stage 1 report, the trading behaviour in these markets draws into question the validity of the market price derived through these markets.

APA considers that the AEMC's market design should recognise and accommodate this feature of the market. But at this stage it is not clear how those large players will interact with the market, and it may not be clear until the LNG plants have all reached a steady state of production. It would be premature, in APA's view, to implement a market design that cannot accommodate the market's key reality – a small number of large players - and the implications this will have on the trading behaviour of all participants.

APA recommends that the AEMC have regard to the immature and growing nature of the market, and the trading structures that have already been put into place. These trading structures should be given the opportunity to mature and flourish, making incremental changes as required, before implementing an over-arching market structure in their place.

### *3.4. Gas Specification*

| Are different gas specifications, such as a higher quality specification for the LNG plants and the odourisation of some transmission pipelines, likely to act as a barrier to trade in the future? |
|---|

Another feature of the market is the narrow gas specification required by the LNG plants – a specification narrower than the Australian Standard in place in the rest of the Eastern Australian Gas Market.

APA considers that there are two key problems associated with differing gas specifications in different geographical segments of the market:

- reduction in liquidity through splitting the market; and
- barriers to market entry for some gas.

In the first case, APA considers that a market which trades a large quantity of gas would be expected to be, all else equal, more liquid than a smaller market. The effect of differentiating the product through differing standards is to create two different, non-substitutable products. This would create one market for Australian Standard gas, and another market for lean gas. This bifurcation of the market would be expected to reduce liquidity, as it would reduce the volume of gas traded in either market, and importantly reduce scope for trading between markets. In order to conduct arbitrage trading between the two markets, the product must be substitutable.

Were the standards mutually exclusive, then distinguishing the product by standard would create two smaller, suboptimal markets. But the standards are not mutually exclusive – the lean gas standard, being more tightly restricted, is a subset of the Australian Standard.[7] That is, the products are substitutable in one direction but not the other.

This creates an uneven playing field in that lean gas can freely enter the Australian Standard gas market, but Australian Standard gas cannot enter the lean gas market without further processing. This creates barriers to entry for Australian Standard gas, whether from southern or Northern Territory supplies, in 1) accessing gas processing

[7] For clarity, it should be noted that all APA pipelines accept Australian Standard gas.

plant capacity and 2) imposing additional costs on Australian Standard gas for additional processing. This places Australian Standard gas at a competitive disadvantage in this market.

The separation of markets along particular users' narrow requirements would externalise the costs of particular market participants. Using the lean gas requirements of the LNG plants as an example, APA understands that the LNG plant proponents chose not to install gas processing facilities at the entry points to their plants, relying instead on the lean nature of the locally produced coal seam gas and lean gas produced from the Moomba gas processing plant. This has created a de facto "lean gas system" northeast of the Moomba gas processing plant.

Requiring all gas entering the "lean gas system" to be processed to that lean standard would require access to gas processing plants to process (or re-process) Australian Standard gas to the narrower standard, and impose additional processing costs on:

- producers or shippers from other markets who have already had their gas processed to the (broader) Australian Standard, and
- users (for example, power plants) situated in the lean gas market area who do not require the narrow lean standards.

## 4. Physical or virtual markets for gas?

How many and what type of wholesale gas trading markets are required to meet the Energy Council's Vision and how should this be assessed?

The AEMC has presented for discussion two classes of markets – a physical market (Concept 1) and a virtual market (Concepts 2 and 3). APA considers that it is important to understand the characteristics of these market types, and how they might apply to the gas industry, in reaching a conclusion regarding a preferred design.

Further to a discussion of virtual or physical markets is the question of access to transportation. Generally speaking, a virtual market model has been accompanied with an Entry-Exit approach to accessing the gas transmission network, whereas a physical market is associated with tradeable contractual flow path property rights. These models are discussed below.

The key differences between an Entry-Exit model[8] for allocating gas transmission capacity and a flow path model are:

- Whether a shipper has certainty of being able to ship its gas on a particular day; and
- Whether the shipper has a property right that it can trade on the secondary market.

[8] In particular, the Entry-Exit model accompanied with mandatory auctions for Entry-Exit rights, as features in the European *Third Legislative Package*.

### *4.1. Characteristics of virtual markets*

A key underlying assumption to a virtual market is immediate and unconstrained delivery within the market hub zone. The instant delivery assumption may be valid in an electricity context, given that electricity travels at about the speed of light. However, the physical aspects of gas – molecules physically travelling at low speed[9] – render this key assumption invalid.

In short, the need to allow for transportation and delivery of the product acts as a barrier to the efficient operation of a virtual market.

It is this failure to understand and appreciate the fundamental nature of gas supply that has caused policy makers (particularly in the UK and Europe) to apply electricity market structures to gas markets.[10]

This can be observed in the Victorian DWGM where there are a number of unique "uplift" payments that have been introduced to accommodate out-of-merit-order dispatch to accommodate the physical characteristics of gas and the system.[11] The larger the hub area, the more the transport requirements will feature in the market, and the greater the likelihood that the assumption of instantaneous and unconstrained delivery will be violated.

In its proposals for virtual markets, the AEMC discussion paper does not consider or address capacity constraints within hubs – these will still exist and restrict trade.[12] Moreover, the virtual market models create cost socialisation and free-rider issues (like the DWGM) which undermine market incentives to invest within the hub to remove capacity constraints and shifts the regime towards extensive regulatory oversight and central planning.[13]

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[9] In the order of 30 km/h.

[10] A virtual market in gas could conceptually work if there was always a large amount of spare capacity available in the transmission system close to demand centres (as was the case when the DWGM was created), and that capacity was used to store gas, giving the appearance of immediate delivery. APA understands that this was a factor in the UK decision to adopt a virtual market based on the national balancing point. However, there is a substantial cost of carrying the required spare capacity and keeping it filled with gas, and that cost must ultimately be passed on to users.

[11] Perhaps the most striking of these is the "surprise uplift", where unexpected changes in weather conditions cause spikes in demand which cannot be physically supplied from Longford; higher-cost LNG injections are required to meet the demand spike, which are funded through uplift payments.

[12] By way of relativity, should all three LNG plants experience a simultaneous outage (for example, due to a cyclone at Gladstone), the SWQP can only ship about one-tenth of the redirected coal seam gas to southern markets.

[13] In particular, it is not clear how private investment could be attracted to fund a new pipeline should new gas reserves be discovered.

### *4.1.1. European experience with virtual markets*

The AEMC-commissioned report by Market Reform[14] outlined the structures of the European markets and their regulatory frameworks. However, the objective of that report was to "gather detailed information by jurisdiction, and conduct comparative analysis" of industry structure, transmission, storage and trading arrangements, regulatory structures, etc. Importantly, it was not the objective of this report to assess whether the reported frameworks were delivering liquid gas markets.

The European model under the *Third Legislative Package* operates as a collection of virtual markets with Entry-Exit pricing for pipeline systems. It has been described as a system of "interlinked, regional monopolies governed by transmission system operators (TSOs), which plan, operate, and set prices for their share of the EU pipeline system, thus mirroring the regime for power transmission regulation."[15]

The European market model was developed and has evolved within the particular context of multiple sovereign member states, vertical integration of transmission businesses and varying levels and sophistication of third party access regulation. APA considers that it must be considered and evaluated in this context, in particular as a compromise driven by a number of limiting factors. Most importantly, the European gas market has not developed within the same cohesive National Competition Policy structure as is in place in Australia, where principles of competition, third party access, and vertical disaggregation have been common place for almost 20 years.

Further, as discussed above, APA does not consider that it is appropriate to apply a virtual market model, as developed for electricity markets, to gas markets.

While there are a number of factors that influence the development of European markets that are unrelated to market design, pipeline expert Jeff Makholm[16] describes the European market as a "catastrophe" - the European model has not been effective in promoting a free market for gas and promoting investment:

- Investment in new European gas pipelines has been very low, with 33,265 miles of new pipelines planned or under construction in 2014 in the USA and only 2,967 miles in Europe.

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[14] Market Reform, *International Gas Markets Study - Report to the Australian Energy Market Commission*, June 2015.

[15] Jeff D. Makholm, "Regulation of Natural Gas in the United States, Canada, and Europe: Prospects for a Low Carbon Fuel", *Review of Environmental Economics and Policy*, volume 9, issue 1, winter 2015, pp. 107–127, p112.

[16] Makholm (2015) and Jeff D. Makholm, *Gas Markets, Gas Use and Europe's Gas Supply from the East*, Eurasian Natural Gas Infrastructure Conference Istanbul, 9 June 2015.

- The average price of gas in Europe's virtual markets model has been significantly higher than in the US physical market model, resulting in European homes and businesses paying almost half a trillion dollars more for their gas supply than their US counterparts since 2009:

| Year [1] | Average Price* per MMBtu: Europe [2] | Average Price* per MMBtu: U.S. [3] | European Consumption** (Billion MMBtu) [4] | Cost Differential (Billion US$) [5]=([2]-[3])*[4] | Cumulative (Since 2009) (Billion US$) [6] |
|---|---|---|---|---|---|
| 2009 | $4.92 | $4.25 | 19.58 | $13.04 | $13.04 |
| 2010 | $6.31 | $4.35 | 21.09 | $41.44 | $54.47 |
| 2011 | $9.48 | $4.13 | 19.77 | $105.80 | $160.27 |
| 2012 | $9.37 | $2.79 | 19.22 | $126.49 | $286.76 |
| 2013 | $10.56 | $3.72 | 19.10 | $130.77 | $417.53 |
| 2014 | $8.28 | $4.35 | 19.10 | $75.15 | **$492.68** |

**For Europe, average annual price at UK NBP; for the United States, annual average price at Henry Hub*
***2013 and 2014 EIA estimated European gas consumption*
*Sources: EIA, Bloomberg L.P.*

- European gas commodity futures trading is virtually non-existent:[17]

**Table 2: Volume of Commodities Consumed and Traded in Futures**

| Market | Unit | Consumption | Futures Volume Traded | Ratio of Futures Volume Traded to Consumption |
|---|---|---|---|---|
| European Gas | MMcf/d | 43,853 | 822 | 0.02 |
| US gas | MMcf/d | 93,120 | 2,494,349 | 26.79 |
| Brent Crude Oil | Barrels/d | 2,700,000 | 587,924,864 | 217.75 |
| US Corn | Metric Tons/d | 8,955,000 | 27,808,604 | 2.74 |

*Sources: Bloomberg, L.P., International Energy Agency, United States Department of Agriculture.*

** Futures contract volumes are measured using Generic 1st futures or 1-month base futures. Europe natural gas futures include data for Gaspool, NCG, and the Dutch TTF.*

- The European model has also been accompanied by a crushing overhead burden, in the form of extensive TSO and regulatory agencies. ENTSOG is reported to have 51,000 direct staff,[18] in comparison to FERC's 173 full-time equivalent staff.[19]

[17] This lack of gas commodity futures trading could be a function to the linkage of gas prices to oil prices.

[18] Konstantin Staschus (Secretary General, ENTSO-E) and Vittorio Musazzi (General Manager, ENTSOG), *ENTSOG & ENTSO-E information Session on the Completion of the IEM,* 13 October 2014. ENTSOG = European Network of Transmission System Operators for Gas. This figure does not include the staff of the ACER (Agency for the Cooperation of Energy Regulators) member agencies.

The virtual hub model is mandated across Europe through the *Third Legislative Package*, but is virtually non-existent in North America. As Makholm notes, "TransCanada's NOVA System in Alberta, Canada, with its NOVA Inventory Transfer (NIT) pricing hub, is the only place in North America where natural gas trades on a notional gas grid like that in the United Kingdom. The Canadian gas regulator, the National Energy Board (NEB), has blocked the spread of this system beyond its traditional boundaries in Alberta three times in the last five years, citing anticompetitive effects of Entry-Exit as a main factor in its decisions."[20]

APA is cautious about drawing conclusions from observations of other markets; there are invariably so many forces in play that it is very difficult to draw causal conclusions from isolated observations. APA's purpose in raising this material is to point out that application of the European market model should not be seen as the panacea to achieve Australia's policy objectives.

### *4.1.2. Applying virtual gas markets in Australia*

| Could the virtual gas hub design concepts set out in section 8 be feasibly implemented on the east coast of Australia? If not, what barriers exist? |
|---|

The extent of legislative change and imposition of regulatory oversight required to create virtual markets should not be underestimated.

*Australia's competition policy framework*

Australia's legislative framework for access to essential infrastructure is squarely founded on competition policy grounds, notably unlocking bottlenecks in natural monopolies with the ability or incentive to exercise market power. This is reflected in the coverage criteria.

Under a competition policy framework, several pipelines have been found not to satisfy the coverage criteria, and have therefore not been covered. This analysis of coverage is undertaken according to sound economic criteria.

Moving to a virtual gas market would require extensive regulatory oversight over assets which would not satisfy the coverage test. This would mark a significant departure in Australian regulatory philosophy since the development of the National Competition Policy.

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[19] Jeff D. Makholm, *Gas Markets, Gas Use and Europe's Gas Supply from the East*, Eurasian Natural Gas Infrastructure Conference Istanbul, 9 June 2015, slide 27. FERC Gas Division: 173 full-time equivalent staff (total gas division budget in 2015, $35 million).

[20] Jeff D. Makholm, *A Petroleum Tanker of a Different Color: Obstacles to an LNG-based Global Gas Spot Market*, p10. It should be noted that the NOVA system acts primarily as Alberta's gathering system before gas is shipped outside the province's boundaries.

APA considers that policy makers should undertake thoughtful consideration of the imposition of regulatory oversight on assets which do not satisfy the National Competition Policy coverage criteria.

*Australia's contractual access framework*

With the exception of the DWGM, access to Australian pipelines and associated infrastructure is through contract. While the lengths of these contracts vary, some are for significant duration, and have reasonably long terms to run (up to 20 years). APA considers that a virtual market model will necessarily involve disruption of these rights. This is true on both regulated and unregulated pipelines and assets, and is therefore likely to be an issue for both market concepts 2 and 3.

In addition to the costs involved in dissolving these contracts,[21] AEMC should consider the impacts on business confidence that could arise where contracts are displaced by government policy. It is worth remembering that these issues did not arise in a material way in developing the DWGM, as this was achieved at the time of privatisation and before contracts were in place. Similarly, APA understands that virtual market models in Europe were largely applied to vertically integrated government monopolies (some of which have been subsequently separated and/or privatised), such that issues with existing contractual rights were not significant.[22]

APA believes that managing and honouring existing contractual rights is more than a transitional issue, and the direct costs of resolution are likely to exceed benefits derived from a change to virtual markets as unaddressed market structure limitations and the effect on investment incentives from such markets will be further barriers to market liquidity.

Other barriers may include:

- The required cooperation of all governments to pass enabling legislation;
- The establishment and ongoing operation of an East Coast System Operator, including information technology system costs;
- Costs of coordinating technical matters such as gas specification across the hub region;
- The requirement for ACCC authorisation in the event that different pipeline companies would be required to cooperate to make the hub model operational.[23]

[21] Particularly the compensation required should the contracts be dissolved through Commonwealth legislation.

[22] APA understands there have been problems associated with pre-existing long term contracts in transporting gas through Austria to Italy.

[23] For example, APA understands that Germany encompasses two virtual market hubs and 14 pipeline companies who have had to reach agreement regarding the sharing of revenue for gas virtually transported within the hub.

Do existing contractual rights and/or issues around cross border trade preclude any particular gas hub designs?

As discussed above, in its development of the Victorian DWGM virtual market, the Victorian Government had a number of key structural pre-conditions which enabled it to implement the DWGM:

- it was the owner of the transmission system that was to be subject to the virtual market;
- it was the provider of gas transmission services to gas customers in Victoria;
- there was significant spare capacity on the transmission network; and
- it was an "island" from a gas transmission perspective – prior to the development of the EGP and the NSW Interconnect, its system did not need to interface with other gas transmission pipelines.[24]

In APA's view, these features were critical in enabling the development of the DWGM.

These structural pre-conditions no longer exist. To implement a virtual gas hub today would require setting aside a large number of contracts which impart property rights (access to capacity) on parties. The excess capacity that allowed the VTS to behave somewhat like a virtual market are not present in other pipelines. Moreover, as discussed above, it would require the imposition of detailed regulatory oversight on pipelines which are currently not subject to regulatory oversight, as they have been found not to satisfy the coverage criteria.

Market concept 2, featuring a virtual market encompassing the Wallumbilla hub and the RBP, would suffer the barriers to entry issues (including issues surrounding access to the Moomba gas processing plant) discussed in relation to gas specification above.

It is also worth noting that market concept 3 appears to require the revocation of existing greenfields exemptions in place for the LNG pipelines which are scheduled to run for 15 years, as this model will require economic regulation and changes to existing contractual arrangements to create entry/exit rights.

### *4.1.3. Experience with the DWGM*

Makholm[25] notes that, like the European market, the DWGM was developed based on an electricity market model:

> Victoria, Australia, privatized its state-owned gas pipeline and distribution systems in 1997 under a regime that borrowed, virtually word-for-word, the electricity grid regulations enacted a few years earlier to provide for competitive power markets.

[24] The same applies to the UK gas transmission system at the time of its market design, prior to interconnection with Europe.

[25] Jeff D. Makholm, "Regulation of Natural Gas in the United States, Canada, and Europe: Prospects for a Low Carbon Fuel", *Review of Environmental Economics and Policy*, volume 9, issue 1, winter 2015, pp. 107–127, p116.

Entry-Exit models are very similar to the allocation of AMDQ under the DWGM, in that they both offer independent entry and exits from the transmission system, and can create firm (or firm-like) injection and withdrawal rights.

The AEMC's stage 1 report identified a number of key problems with the DWGM:

- No flow paths creating tradeable property rights;
- Lack of incentives for investment to relieve congestion within the system;
- Market complexity and the value of the ex ante price signal;
- Socialisation of costs and smearing of risks;
- Inability to manage risk; and
- Transaction costs associated with value adding market functions.

These issues would be created on a very large scale under the virtual markets in AEMC concepts 2 and 3. As identified by the Productivity Commission:[26]

> In the Commission's view extending elements of the market carriage model could put at risk the investments needed to efficiently respond to current and future market developments. There would also be significant risks from adopting mandatory pipeline capacity trading provisions that apply in other countries, especially if such provisions involve the over-riding of private property rights.

APA concludes that virtual markets are inappropriate for a gas industry, characterised by the physical transportation of a product through long-distance pipelines.

### *4.2. Characteristics of physical markets*

As discussed above, a key characteristic of the gas market is the obligation to physically deliver a relatively slow-moving product.

In a physical market, participants are responsible for having the gas physically delivered to the trading point – this is consistent with a contract carriage model in which there are tradeable property rights associated with pipeline flow path capacity. That is, a market participant can contractually ensure the supply of the gas and its delivery to a particular location.

This allows more direct alignment of costs and risks; a failure to deliver on a trade can be remedied contractually. Importantly, this means that costs associated with realised risks are not imposed on innocent bystanders through smeared charges such as uplift charges under the DWGM.

This market design allows transmission constraints to be addressed through capacity trading or expansion. APA has pointed to its activities to support capacity trading, and the pending changes in the market that may stimulate that market further (such as full LNG production).

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[26] Productivity Commission 2015, *Examining Barriers to More Efficient Gas Markets*, Commission Research Paper, Canberra, p105.

Makholm (2015)[27] outlines the key factors that have allowed the physical market to flourish in the United States:

- the structural unbundling of pipelines (i.e., breaking the link between pipelines and distributors[28]);
- the functional unbundling of pipelines (i.e., unbundling the gas from the pipe); and
- formation of competitive markets for access to pipeline transport capacity.

In Australia, we have achieved the disaggregation of the gas supply chain into its competitive and monopoly elements by separating the gas transmission from distribution businesses, and have unbundled that gas from the pipelines that deliver it. We have also achieved pipeline capacity trading on market terms, and development of secondary pipeline capacity markets is well on its way. APA notes that previously agreed reforms, such as increased and better information provision to support capacity trading, have not yet been implemented.

This structure and associated agreed reforms should be given an opportunity to work (as it has in the US) before it is replaced with some other market structure.

### *4.2.1. The flow path model*

The flow path model is closely aligned with the contract carriage model. The key feature of this model is that, once contracted, the shipper obtains a property right to the relevant pipeline capacity along that flow path, which it can then sub-let or trade in the secondary market (whether through a facilitated market or through bilateral arrangements).

The critical feature of this property right, however, is the certainty it affords the shipper. The shipper is assured of the ability to transport its gas, and can avail itself of contractual remedies in the event of a failure on the part of the pipeline company.

As discussed below, this certainty is critical where the gas must travel some distance to market across a number of pipelines.

Moreover, the shipper has certainty regarding the cost of the transportation without the need to enter into additional contractual arrangements (AMDQ) to gain certainty on its ability to access the transmission system.

The experience in the United States is that there is a vibrant secondary market for pipeline capacity, driven largely by the ability of shippers to profit from the exploitation of their property rights. This secondary trade is accomplished through trading platforms on each pipeline business' website. The secondary market is sufficiently robust to allow the purchase of secondary capacity over the longer term and across a number of pipelines, to allow firm transport to cover considerable distances.

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[27] Makholm (2015), p116.

[28] In this context referring to local distributor-retailers. Commentators on the European system refer to this as "liberalisation".

### *4.2.2. Application of the models across state borders and adjoining transmission systems*

Historically, Australia's gas market featured single pipelines that delivered gas from a single producing field to a single market. However, with the interconnection of pipelines, Australia's gas market has become more dynamic in recent years, with gas moving much further afield, and across a number of pipelines. 2015 has seen gas move from Queensland through NSW to Victoria, and from Victoria through NSW to Queensland.

This movement of gas involves a number of pipelines: gas from Victoria could travel via the EGP and MSP to get to Moomba, or alternately through the SEAGas pipeline and MAPS, or via the VTS and MSP. These routes involve a patchwork of regulatory models.

Importantly, this movement of gas has been successfully accomplished through bilateral negotiations between shippers and the pipeline companies. The services provided have been quite flexible, and incorporated bi-directional haulage services, storage, and park & loan services. This has been accomplished notwithstanding the interface issues associated with the DWGM.

It is important, then to consider how the Entry-Exit model operates where gas must travel across a number of pipelines to reach its destination. The EU *Third Legislative Package's* Capacity Allocation Methodology requires bundling of exit and entry products and auction-based allocation of rights. That is, when a shipper is successful at winning the auction to exit a pipeline system (system 1), it also acquires the right to enter the adjoining system (system 2). However, to ship its gas to a user in the second zone, it must independently be successful in the auction to enter system 1. In this example, a shipper must independently (and simultaneously) win two auctions: to enter system 1, and to exit system 1/enter system 2. A failure to win either of these auctions will result in a failure to deliver. This could be a concern in either of the AEMC's virtual market models.

The auction model would introduce a level of "compound uncertainty" that is very difficult for the shipper to manage. Further, where capacity constraints mean that investment is required in "transit" pipelines, it is very difficult to allocate costs and value to that capacity constraint so that it is addressed.

It could be argued that the Entry-Exit model was workable in the islanded UK or Victorian system (as it was configured when the DWGM was created), but quickly becomes unworkable when more Entry-Exit pipeline zones are required to interface.

The impact of this uncertainty cannot be overstated. GazProm, a major supplier of gas to the European market, has a number of legacy long term supply contracts that transfer ownership to the gas on delivery. In some cases, this gas must traverse four EU member state borders, and four Entry-Exit nodes, to reach its destination.[29] GazProm is reported to have been investigating significant investment in alternative supply routes, notably Nordstream 1 and 2 (predominantly on the floor of the Baltic Sea), and SouthStream

[29] For example, Mendelshein deliveries must cross the Ukraine/ Slovakia, Slovakia/ Austria, Austria/Germany, and Germany/France borders to reach its destination. (Yafimava p33).

(predominantly on the floor of the Black Sea to bring gas through Bulgaria)[30] as a strategy to bypass the compound uncertainly associated with multiple auctions.

On the surface, the option of creating larger (and fewer) Entry-Exit zones may appear attractive. This has, to some extent, been done in Germany, which features 2 Entry-Exit trading hubs and 14 pipeline operators. However, the physical nature of gas (discussed above) and Europe's population density would make this structure very difficult to apply in Australia. The European market serves 532 million people;[31] Germany has 81 million people in a space less than one-fifth the size of Queensland.[32] As discussed above, a single east coast Entry-Exit virtual hub market would be unworkable, owing to the need to transport gas across the vast distances involved.

### *4.2.3. How many trading nodes are required for a physical market to operate effectively?*

| Does having multiple gas hubs contribute to or detract from the objective of achieving a liquid wholesale gas market and why? |
|---|

APA considers that this is ultimately a question for the market to answer. APA considers that it is not necessary to create as many physical trading points as depicted in the AEMC paper in concept 1.

There is also a genuine risk that too many trading hubs could fragment that market such that none have sufficient critical mass to develop the liquidity necessary to succeed. For a gas market the size of Australia's, two market hubs may well be sufficient.

The US experience has been that markets grow where they are supported by industry. Several trading nodes have been proposed, not all of which have been successful.

The Henry Hub, for example, connects nine interstate and four intrastate gas pipelines. The Hub is the physical pricing point for natural gas futures traded on the New York Mercantile Exchange (NYMEX). NYMEX created the Henry Hub to satisfy the US financial markets' demand for a standardized physical point at which to define futures contracts.

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[30] Katja Yafimava, *The EU Third Package for Gas and the Gas Target Model: major contentious issues inside and outside the EU*, Oxford Institute for Energy Studies NG 75, 13 April 2013, p26.

[31] ENTSOG & ENTSO-E information Session on the Completion of the IEM**,** Konstantin Staschus (Secretary General, ENTSO-E) and Vittorio Musazzi (General Manager, ENTSOG) *Moderator: Geoffrey Feasey* 13 October 2014.

[32] Germany population 81.6 million, area 357,022 square km; Queensland population 4.3 million, area 1,852,642 million square km.

# 5. APA's proposed model

APA recommends a voluntary physical east coast market, potentially featuring a northern hub and a southern hub. The northern hub could be located at Wallumbilla, as this is already operating and has already been accepted by industry.

The location of a southern physical hub is a question that should be addressed following the AEMC's stage 2 review of the DWGM. As discussed above, the location of the southern hub should consider the expected future configuration of the VTS, including the scope for future capacity expansion.

In order to promote as much liquidity as possible, and to allow arbitrage between the two market hubs, it will be important for the gas specification to be consistent across the east coast gas market. This will allow inter-hub trading and avoid introducing an uneven playing field by creating barriers to entry to Australian Standard Gas delivered into Queensland.

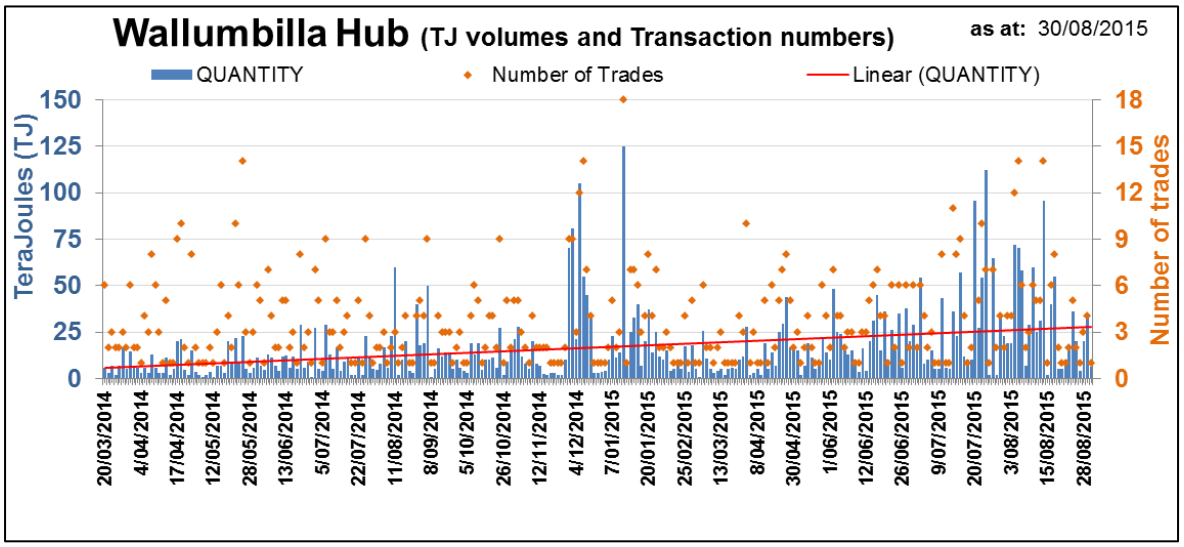
## *5.1. Allow existing structures the opportunity to work first*

APA is concerned that development of complex markets is a very large step, from which it is very difficult to step back. In this regard, APA suggests caution before embarking on a significant market reorganisation. This is particularly the case where a proposed market design is based on assumptions of how gas supplies will move in the future.

Before embarking on that task, APA considers that it is important to carefully examine the status of current markets in assessing whether government intervention is required to impose wholesale changes on existing markets.

The Wallumbilla Gas Supply Hub is in the early days of its operation - gas flows associated with the LNG production facilities only commenced in December 2013. However, this market is showing clear signs of regular and growing trading activity: Once all the LNG trains are operational, it would be reasonable to expect a greater volume of trades, and more liquidity.

There is also investment being undertaken at the Wallumbilla hub to broaden the scope of trading activity through the creation of hub services, which will allow for the flow of gas between any physical receipt and delivery point. This is clearly a case of the market design developing and evolving to meet the needs of the market.




Source: APA analysis based on AEMO data.

There are also considerable, and growing, volumes of gas traded bilaterally. These are known as “in-pipe trades”. APA’s analysis indicates that there is currently significantly more gas being traded bilaterally than through the Wallumbilla hub. This level of bilateral trading in a physical market is an encouraging sign that existing market structures are starting to work.

APA considers that existing markets should be given the opportunity to “settle in”, develop, and flourish before being subject to major structural change. Minor adjustments or modifications may occur over time, but these should be considered as incremental to the existing market structure.

The key advantage of an incremental approach is that it allows the market to develop in modest, low-cost steps, based on the industry’s demonstrated needs, rather than major, costly market designs based on assumptions of future market needs.

## *5.2. Conclusion*

In summary:

- APA supports a physical market over a virtual market;.
- APA supports a voluntary market over a compulsory market; and
- APA recommends that the existing Wallumbilla Gas Supply Hub, with integrated trading nored, be given the opportunity to develop and flourish in response to demonstrated industry needs before being replaced by a costly market design founded on assumed future needs.

Moreover, as APA has consistently maintained, an industry-led low-cost model is preferable to government-imposed regulatory solution.