

Australian Energy Market Commission

DRAFT REPORT

Review of the Victorian Declared Wholesale Gas Market

4 December 2015

Inquiries

Australian Energy Market Commission
PO Box A2449
Sydney South NSW 1235

E: aemc@aemc.gov.au

T: (02) 8296 7800

F: (02) 8296 7899

Reference: GPR0002

Citation

AEMC 2015, *Review of the Victorian Declared Wholesale Gas Market*, Draft Report, 4 December 2015, Sydney.

About the AEMC

The AEMC reports to the Council of Australian Governments (COAG) through the COAG Energy Council. We have two functions. We make and amend the national electricity, gas and energy retail rules and conduct independent reviews for the COAG Energy Council.

This work is copyright. The Copyright Act 1968 permits fair dealing for study, research, news reporting, criticism and review. Selected passages, tables or diagrams may be reproduced for such purposes provided acknowledgement of the source is included.

Executive summary

In this draft report, the Australian Energy Market Commission (AEMC or Commission) proposes a series of changes to the Victorian Declared Wholesale Gas Market (DWGM). These form part of an integrated package of reforms to Australia's east coast gas markets as part of the wider East Coast Wholesale Gas Market and Pipeline Frameworks Review being undertaken.

The Commission's draft recommendation is for governments, in particular the Victorian Government, to commit to the detailed design of a new Southern Hub trading model covering the existing Victorian declared transmission system. This includes the development of exchange-based trading and a complementary system of entry and exit pipeline capacity allocation.

The proposed changes are anticipated to fundamentally improve the outcomes of the Victorian gas market by providing participants with greater flexibility to physically trade gas in the market, and establishing the preconditions required for financial risk management products to develop. The changes will also create market-driven signals for investment in the pipeline system, a feature currently absent from the Victorian DWGM.

Overall, the proposed reforms are expected to deliver an effective and competitive wholesale gas market which minimises barriers to entry, lowers transaction costs and provides greater price transparency.

This will allow large users and retailers to better assess whether the price they are paying for gas is reflective of underlying supply and demand conditions. It will also support retail choice in Victoria and promote the long term interests of small consumers as lower costs and greater competition between retailers are reflected in retail prices.

Draft recommendation

The proposed changes to the DWGM and associated market carriage arrangements in Victoria are focused on two key areas:

- *Trading gas at the Southern Hub:* The Commission recommends that the DWGM, where trading and balancing currently occurs on a mandatory, operator-led basis, transitions to a new Southern Hub model, where trading would occur on a voluntary, continuous basis, with the hub operator playing only a residual role in balancing. A key feature of the Southern Hub would be the introduction of exchange trading, similar to that in place at Wallumbilla currently.
- *Access to transportation capacity at the Southern Hub:* The Commission recommends that the market carriage model and associated limited pipeline transportation rights mechanisms be transitioned to an entry-exit system for capacity allocation. The current implicit allocation of transportation capacity should be replaced with a new system that allows network users to book firm transportation capacity

rights at each entry and exit point to the Declared Transmission System (DTS). Users would be able to book entry and exit capacity at these points separately.

The Southern Hub trading model and complementary entry-exit system would transform the way in which market participants' access and trade in the market, and the way in which pipeline investment is signalled. Specifically, the enhanced market framework will:

- provide market participants with the opportunity to trade gas independently of its location in the system and with any other participant in the market on a continuous basis, allowing them to better manage their gas portfolios in response to their short and long term needs; and
- contribute to decision-making about future pipeline investment by creating signals driven by market participant choices to book entry and/or exit capacity.

This differs considerably from the existing arrangements which are much less flexible, mandating participants use the market by submitting bids and offers for all gas injections and withdrawals from the system even if they are in balance. It would also change the current market pricing mechanism and the way that pipeline capacity is allocated.

The introduction of exchange trading would allow participants to buy and sell gas from three key sources: the exchange; bilaterally using OTC contracts; and traditional long term gas supply agreements. Price discovery would occur via the exchange initially, with prices struck for exchange traded products being published along with a daily volume-weighted average price. As the market develops, the reference price may be produced and published by a price reporting agency.

Under the proposed entry-exit system, the pipeline owner would continue to be regulated and investment within the Southern Hub would be funded through a regulated revenue allowance reflecting the monopoly status of the pipeline owner. However, by allowing users to signal the need for additional investment through their entry and exit requirements, the risk of inefficient investment would be reduced. In addition, requiring users to book capacity (and to pre-commit to booking new capacity) at entry and exit points will mean they will bear the costs and risks associated with their usage decisions rather than those costs being smeared across all consumers as currently occurs.

The review

The DWGM is generally regarded by participants as having met its original objectives of supporting retail competition and encouraging a diversity of supply and upstream competition in Victoria. However, the preconditions necessary for the development of financial risk management products do not exist in the DWGM. Unmanageable wholesale trading risks may be deterring market entry and resulting in consumers paying more than is necessary for gas in Victoria.

Also absent from the DWGM are the mechanisms necessary for market-driven investment in the pipeline system. Investment therefore occurs predominately through the regulatory process where costs are recovered from consumers. This means that the risk of inefficient investment is falling on those who are not best placed to manage it – that is, consumers.

These issues are amplified by the growing liquefied natural gas export industry. The size of LNG demand - three times the size of the domestic market - as well as the variable nature of the coal seam gas wells supplying the LNG production facilities, is expected to result in participants managing their portfolios more actively than in the past through short term trading. The need for markets which can foster liquidity and support the development of risk management products presents risks and opportunities for Victoria.

This review was requested by the Victorian Government, with the support of the COAG Energy Council, in March 2015. Its purpose has been to consider whether the existing gas market arrangements in Victoria:

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

More broadly, this review has considered whether and to what extent the DWGM continues to promote competition in upstream and downstream markets, in the long term interests of consumers.

We welcome responses on the Commission's proposed changes to the Victorian DWGM outlined in this draft report. Feedback from stakeholders will be used to inform the Commission's final recommendations for the Victorian DWGM review which will be presented to the COAG Energy Council in mid-2016.

The Commission recognises that reforming the Victorian gas market gives rise to significant implementation questions. These relate to the detailed design of the Southern Hub trading arrangements and the accompanying entry-exit model, as well as the transition from the current market arrangements to the new market framework. Stakeholder views on how implementation might best be undertaken, if this model were recommended, are also welcomed through this consultation process.

Submissions are due on 12 February 2016.

Contents

1	Background	1
1.1	Review of the Victorian Declared Wholesale Gas Market.....	2
1.2	East Coast Gas Market and Pipeline Frameworks Review	3
1.3	Review process	4
1.4	Discussion paper	5
1.5	Responding to this draft report.....	7
2	Achieving the vision for the Victorian gas market.....	8
2.1	Current state of the Victorian gas market.....	9
2.2	Packages for reform and overview of the Commission's assessment.....	13
2.3	A Southern Hub with an entry-exit system is recommended.....	18
3	Trading gas at the Southern Hub.....	21
3.1	Trading gas at the Southern Hub.....	22
3.2	Balancing at the Southern Hub	26
4	Access to transportation capacity at the Southern Hub	32
4.1	Booking transportation capacity to access the Southern Hub	33
4.2	Congestion management	36
4.3	Setting tariffs at entry and exit points	37
4.4	Secondary trading of entry and exit capacity.....	38
5	Transition to a Southern Hub with entry-exit.....	40
5.1	Design issues	40
5.2	Transitional issues.....	41
5.3	Transition process	43
6	Implementation and next steps	45
6.1	Transitioning to the Southern Hub model.....	45
6.2	Reforming east coast gas markets.....	46
A	Terms of Reference - Victorian Declared Wholesale Gas Market Review	48
B	Assessment of packages.....	53

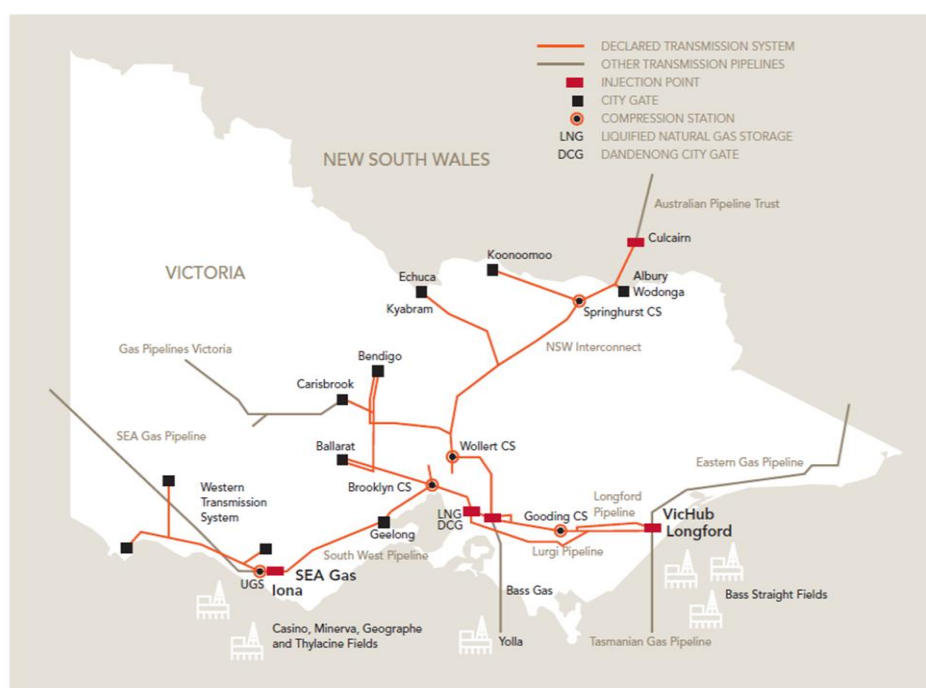
B.1	Assessment framework	54
B.2	Effective risk management in the DWGM.....	55
B.2.1	Assessment of packages	56
B.2.2	Summary of submissions	58
B.3	Signals and incentives for efficient investment in and use of pipeline capacity	60
B.3.1	Assessment of packages	61
B.3.2	Summary of submissions	63
B.4	Trading between the DWGM and interconnected pipelines	66
B.4.1	Assessment of packages	67
B.4.2	Summary of submissions	68
B.5	Promoting competition in upstream and downstream markets	68
B.5.1	Assessment of packages	69
B.5.2	Summary of submissions	70
C	Submissions to the Discussion Paper	72

1 Background

The Victorian declared wholesale gas market (DWGM) is the longest-standing facilitated wholesale gas market in Australia, encompasses the entire declared transmission system (DTS). As illustrated in Figure 1.1, the DTS comprises of pipelines extending from Longford in the east of Victoria, across to Portland in the south west, central Victoria and north to Albury/Wodonga and Culcairn in New South Wales.

Preceding all three short term trading market (STTM) hubs and the recently implemented gas supply hub (GSH) model, the DWGM is the only virtual hub on the east coast of Australia.¹

Figure 1.1 Declared Transmission System



Source: AEMO

The DWGM was established in 1999 by the Victorian government with the objective of supporting retail competition and encouraging diversity of supply and upstream competition. Today, the DWGM is generally regarded by participants as having met these objectives, providing an effective and competitive gas balancing service and facilitating trading of gas in Victoria based on short term prices.

Retail competition in the gas market in Victoria is considered to be effective with low market concentration and high customer activity. Two new retailers entered the market

¹ A gas hub is a location where the transfer of ownership and pricing of physical gas takes place. At physical hubs, this occurs at a specific location on the pipeline system, while virtual hubs typically encompass a large segment, or all, of a pipeline system.

in 2015, bringing the total number to ten. Data available on switching also suggests customers are actively shopping around between the retailers available.²

Notwithstanding the relative success of the DWGM to date, the east coast gas industry is currently facing a significant structural change as a result of the liquefied natural gas (LNG) export industry. It is expected that large volumes of gas from Queensland and South Australia will be dedicated to these operations and end users in these states will have to source increasing volumes of gas from Victoria, transported north via the DWGM and Interconnect, the Eastern Gas Pipeline or the SEA Gas Pipeline. Equally, market participants may seek to transport large volumes of gas into Victoria for sale in the DWGM in instances where the LNG export plants are unable to absorb supply due to, for example, an LNG train being taken offline.

Given that the east coast gas industry is transitioning into uncharted territory, it is paramount that gas market arrangements in Victoria are resilient and flexible to the range of potential scenarios. They must be able to support market participants in actively and effectively managing current and emerging risks in the market, promote investment in pipeline infrastructure that is efficient and timely and facilitate interaction between the Victorian market arrangements and adjacent markets which is as seamless as possible.

1.1 Review of the Victorian Declared Wholesale Gas Market

In light of the significant structural changes underway across the east coast gas markets, the Victorian Government, with the agreement of the Council of Australian Governments (COAG Energy Council), asked the AEMC to conduct a review of the Victorian declared wholesale gas market.

As outlined in the terms of reference received from the Victorian Government on 4 March 2015, the purpose of the review is to consider whether the DWGM provides appropriate signals and incentives for investment in pipeline capacity, allows market participants to effectively manage price and volume risk, and facilitates efficient trade of gas to and from adjacent markets. More broadly, the review is considering whether and to what extent the DWGM continues to effectively promote competition in upstream and downstream markets, in the long term interests of consumers.

The terms of reference are available in full on the AEMC's website and in Appendix A. In summary, the Commission is required to consider the following when undertaking its review of the Victorian DWGM:

- Effective risk management: the ability of market participants to manage price and volume risk in the DWGM, and options to increase the effectiveness of risk management activities.

² AEMC, *2015 Retail Competition Review*, 30 June 2015, p. 150.

- Signals and incentives for efficient investment in and use of pipeline capacity: whether market signals and regulatory incentives are providing for efficient use of, and efficient and timely investment in, pipeline capacity on the DTS which underpins the DWGM.
- Trading between the DWGM and interconnected pipelines: whether producers and shippers can effectively operate across the different gas trading hubs on the east coast without incurring substantial trading costs.
- Promoting competition in upstream and downstream markets: whether the DWGM arrangements continue to facilitate market entry and promote competition in upstream and downstream markets and how this could be improved.

1.2 East Coast Gas Market and Pipeline Frameworks Review

The AEMC has also been asked by the COAG Energy Council to review the design, function and roles of facilitated gas markets and gas transportation arrangements on the east coast of Australia ("the East Coast Review"). The East Coast Review is considering the roles and objectives of the existing markets on the east coast in light of changing market dynamics, and aims to set out a road map for their continued development.

The terms of reference for the East Coast Review, received on 20 February 2015, is also provided on the AEMC's website. Broadly, it requires the Commission to consider the following when undertaking its review of the east coast wholesale gas market and pipeline frameworks:

- The appropriate structure, type and number of facilitated markets on the east coast, including options to enhance transparency and price discovery, and reduce barriers to entry.
- Opportunities to improve effective risk management, including through liquid and competitive wholesale spot and forward markets which provide tools to price and hedge risk.
- Changes to strengthen signals and incentives for efficient access to, use of, and investment in, pipeline capacity.

The terms of reference for the East Coast Review also ask the AEMC to develop specific actions that can be implemented to strengthen the structure and competitiveness of the east coast gas market, and make recommendations for immediate implementation, where possible.

In providing the terms of reference for the Victorian DWGM Review, the Victorian Government noted that there will be links between the recommendations and findings of the east coast and DWGM reviews. Given these linkages, the AEMC and Victorian

Government agreed to combine the initial phase of the Victorian DWGM Review with the East Coast Review. The review process is outlined in the next section.

1.2.1 ACCC inquiry

The AEMC reviews complement the current inquiry being undertaken by the Australian Competition and Consumer Commission (ACCC) in relation to wholesale gas prices in eastern and southern Australia.³ The Australian Government directed the ACCC to commence this inquiry on 8 April 2015 and it is to be completed by April 2016.

The AEMC is working closely with the ACCC to ensure the two processes are co-ordinated, and to understand the extent to which the ACCC's findings can help inform the Commission's considerations regarding market development. We currently intend to provide the final report for this review in May 2016 so that it is able to reflect the ACCC's findings.

1.3 Review process

The East Coast and DWGM reviews have been structured over two phases. Stage 1 of the review was completed on 23 July 2015 with the Stage 1 Final Report presented at the Energy Council's July 2015 meeting.⁴ The Stage 1 Final Report provided an overview of how Australia's gas markets function and outlines areas where reforms may be required to accommodate the changing dynamics created by LNG exports and coal seam gas production. The report recommended four immediate actions for consideration by the Energy Council to enhance the transparency and efficiency of the market.

The commencement of Stage 2 saw the Victorian DWGM Review split from the East Coast Review and continue as a stand-alone workstream.⁵ For both reviews, the intention is to develop detailed options to promote the long term development of the east coast gas markets and to ensure as best as possible that the rules governing the markets and pipelines are fit for purpose in the new gas environment. The key milestones for both reviews are set out in Table 1.1 below.

³ Australian Government, *Inquiry into Competitiveness of the Wholesale Gas Industry*, Terms of Reference, 8 April 2015, p. 1.

⁴ This follows the Stage 1 draft report, released on 7 May 2015. Both the draft and final reports are available on the AEMC's website.

⁵ In addition to the Victorian DWGM Review, Stage 2 of the East Coast Review is being conducted via three workstreams: wholesale gas markets; pipeline capacity trading; and information and bulletin board.

Table 1.1 Review process

Date	Milestone	
	East Coast Review	DWGM Review
20 February 2015	Terms of Reference	
25 February 2015	Public Forum and Discussion Paper	
4 March 2015		Terms of Reference
7 May 2015	Stage 1 Draft Report	
23 July 2015	Stage 1 Final Report	
6 August 2015	Wholesale Gas Markets Discussion Paper	
10 September 2015		DWGM Discussion Paper
18 September 2015	Pipeline Regulation and Capacity Trading Discussion Paper	
30 September 2015	Public Forum	
4 December 2015	Stage 2 Draft Report	DWGM Draft Report
May 2016	Stage 2 Final Report	DWGM Final Report

Concurrent with this draft report for the Victorian DWGM Review, the AEMC has also provided the Energy Council with a draft report for the East Coast Review. The AEMC will prepare the final reports for both reviews and provide them to the COAG Energy Council and Victorian Government in May 2016.

1.4 Discussion paper

On 10 September 2015, the AEMC published a discussion paper for the DWGM Review. This paper was developed to progress the debate on gas market development in Victoria and was intended to further the discussion developed as part of the DWGM Review and the coincident East Coast Wholesale Gas Markets and Pipeline Frameworks Review (the East Coast Review).

This report presented an appraisal of the current DWGM arrangements. In particular, the discussion paper:

- Outlined how market participants can manage price and volume risk currently and discussed the underlying issues which have been preventing greater use of derivatives and other risk management tools.

- Considered the current mechanisms used by various market participants to signal opportunities for investment in pipeline capacity, as well as identified opportunities to improve those signals to facilitate timely and efficient investment.
- Outlined the perceived issues with the framework for regulated investment in the Declared Transmission System (DTS). Specifically, it considered whether the current regulatory framework provides the right incentives and opportunities for the DTS service provider (APA GasNet) to make efficient and timely investments.
- Considered the opportunities for market-led investment in the DTS and explored the reasons why the current DWGM design and market carriage model are not conducive to such investment. It also discussed the interaction between regulated and market-led investment.
- Outlined the transportation arrangements and market actions required for market participants to be able to move gas to adjacent markets. It also outlined perceived barriers to exporting from Victoria and the extent to which recent developments have addressed some of these issues.

Five high level packages for reform were also developed as a way of seeking targeted feedback from stakeholders on the future development of the Victorian gas market. Each package included one or more policy measures which could address the issues identified in the appraisals and were prepared having regard to the terms of reference for the DWGM Review and the COAG Energy Council Vision for Australia's future gas market.

The five high-level packages for reform are illustrated in the figure below.

Figure 1.2 Packages for reform presented in the Discussion Paper

Market improvements	Market development		Market reform	
Package A Targeted measures	Package B Transmission rights	Package C Capacity rights	Package D Entry/Exit model	Package E Hub & Spoke model
Targeted transmission rights	Simplified pricing mechanism	Zone-based pricing and capacity rights	Entry/Exit model	GSHs at Longford and Iona and balancing in Melbourne
Trading of AMDQ rights	Transmission rights			
Clearer AMDQ allocation process				
Review planning standard				

Submissions on this discussion paper closed on 8 October 2015. Submissions were received from 11 stakeholders. Generally, stakeholders considered that the DWGM (and market carriage arrangements) have been successful in achieving their original objectives. Stakeholders were broadly supportive of the AEMC considering a range of market reform packages to meet challenges going forward but stressed the importance of considering any reform as part of the broader design vision for the east coast gas markets. While only limited support was received for any one package outlined by the AEMC in the discussion paper, the majority of stakeholders provided useful comments on various features of each of the packages, including reasons why they considered these measures should (or should not) be explored further.

The views put forward by stakeholders in their submissions to the discussion paper are set out in Appendix C.

1.5 Responding to this draft report

The Commission welcomes responses on the proposed changes to the Victorian DWGM outlined in this draft report. Any feedback received from stakeholders will be used to inform the Commission's final recommendations for the review which will be presented to the COAG Energy Council in the final report due in mid-2016.

Submissions on this draft report are requested by no later than 12 February 2016. Stakeholders are encouraged to include any relevant information and comments in their submissions.

Submissions should refer to AEMC project number "GPR0002" and be sent electronically through the AEMC's online lodgement facility at www.aemc.gov.au.

All submissions received during the course of this review will be published on the AEMC's website, subject to any claims for confidentiality.

As required by the terms of reference for this review, a final report setting out the Commission's final recommendations will be published in mid-2016.

2 Achieving the vision for the Victorian gas market

While the DWGM and associated market carriage transportation arrangements⁶ are generally considered to have been providing an effective gas balancing service and facilitating trading of gas in Victoria historically, market participants currently face unmanageable wholesale trading risks that may be deterring market entry and resulting in consumers paying more than is necessary for gas in Victoria. In addition, the preconditions for market-led investment do not exist meaning that all consumers bear the risk of inefficient investment, rather than that risk falling on those who are best placed to manage it.

In addition, the eastern Australian gas market more broadly is experiencing a period of significant growth and change. In response to the establishment of an LNG export industry, the east coast gas market is experiencing structural changes to demand and supply dynamics. These changes are expected to significantly affect the Victorian gas market in two ways, namely:

- Large volumes of gas from Queensland and South Australia will supply the LNG export plants, with end users in these states likely to source increasing volumes of gas from Victoria, transported north via the DWGM and Interconnect, the Eastern Gas Pipeline or the SEA Gas Pipeline.
- Equally, market participants may seek to transport large volumes of gas into Victoria for sale in the DWGM where the LNG export plants are unable to absorb supply due to, for example, an LNG train being taken offline.

With the first LNG cargoes exported from Gladstone in January 2015, the domestic market is already feeling the effects of greater competition for gas. These developments are expected to put upward pressure on gas prices and have resulted in a renewed focus on the efficiency of the gas supply chain. In Victoria, wholesale prices in the first two quarters of 2015 have increased five and 17 per cent, respectively.⁷

It is therefore critical that the Victorian gas market design is sufficiently flexible to accommodate a range of potential scenarios and that participants are able to actively manage the risks they face. As noted by Ministers at their July 2015 meeting, "the gas market is entering a new era of dynamism, and the imperative was to get the fundamentals right to prepare market participants for new ways of price discovery, trading, investment and risk management".⁸

⁶ The market carriage model, which provides open access to the Victorian DTS uses outcomes from the operation of the DWGM to schedule injections and withdrawals from the pipeline.

⁷ AER Wholesale Statistics, available at:
<http://www.aer.gov.au/Industry-information/industrystatistics/wholesale>

⁸ COAG, Energy Council Meeting Communique, 23 July 2015, p. 2.

This chapter provides an overview of the Commission's appraisal of the DWGM and market carriage arrangements today,⁹ summarises the various packages for reform the Commission has assessed as well as provides an overview of the assessment approach applied and the conclusions reached. It also outlines why the Commission considers that transitioning the existing DWGM to a new Southern Hub model where parties are actively incentivised to trade between one another and access to the DTS is facilitated via a system of entry and exit rights is expected to best address the current and emerging concerns raised to-date.

2.1 Current state of the Victorian gas market

This section provides an overview of the Commission's appraisal of the current DWGM and market carriage arrangements applying in Victoria in the four areas identified in the terms of reference.

2.1.1 Inability to effectively manage risk

Market participants generally have a short term need to trade gas as a result of gas supply and demand differing from what was expected. For example, gas supplies may be subject to unexpected outages and demand may vary depending on weather conditions. This is of particular relevance in Victoria where weather patterns can cause significant, and difficult to forecast, changes in demand over short timeframes due to the significant amount of residential consumers.

To maintain safe operational parameters, it is also necessary for the pipeline or hub operator to be able to intervene by buying additional gas or selling excess gas, when required. Often the reason for this is a result of market participants being collectively short of gas or collectively having excess gas. As such, in most markets there are arrangements to settle the costs of managing imbalances by passing these onto the market participants responsible at pre-determined intervals known as 'balancing periods'.

The current market design applying to the virtual hub¹⁰ in Victoria requires that all gas to be traded during the balancing period is conducted via the DWGM and facilitated by AEMO. Market participants are required to submit price quantity pairs of bids and offers for all gas they intend to inject and/or withdraw from the DTS within the balancing period via the DWGM. AEMO then pools supply offers and matches demand bids to ensure the system is balanced and generates a market price using a reverse auction process.

⁹ For a more in-depth appraisal, please refer to the DWGM Review discussion paper released by the Commission in September 2015.

¹⁰ A virtual hub, like the DWGM, allows for title transfer of gas anywhere within the definition of the hub. This differs from the concept of a physical hub, which allows for title transfer of gas at specific physical locations on the transmission system, typically points where pipelines interconnect. These concepts are discussed at length in the AEMC Wholesale Gas Markets Discussion Paper released in August 2015.

This pooled approach to wholesale gas market design is unique internationally and draws heavily on electricity market design. It places the entire responsibility of balancing on AEMO, and trading on the market is restricted to a daily product only. The market price consequently tends to reflect short term deviations in gas demand or supply from forecast rather than long term market fundamentals.

Market participants are only able to hedge the price risk arising in the market over the longer-term by trading gas bilaterally outside of the market (for instance, with producers at injection points). Approximately 80 per cent of trading takes place outside of the market in this way,¹¹ and has led to most participants aligning their bids and offers in the market to the terms of these gas supply agreements.

In developed commodity markets it is usual for financial derivative products to be available to assist participants with hedging their risk in the spot market. However, such products have not successfully developed for the DWGM. This is likely due to the fact that not all of the trading risk is captured in a single commodity price, with the market being rescheduled intra-day multiple times, as well as deviation and uplift charges. The compulsory nature of the daily product also means that it is not possible to trade physically at the virtual hub, and such trades are pushed to injection points at the periphery of the market where liquidity is low.

As a result, it seems unlikely that financial trading or liquid physical trading can develop in Victoria with the current design of the DWGM. While this may have been of relatively little consequence during the more stable market environment of the recent past, it will become increasingly costly in a more dynamic market.

Significant investment has recently been undertaken in the DTS and other pipelines with the result that the DWGM is now much more interconnected to other east coast markets. It is important that the DWGM can provide a meaningful reference price of underlying supply and demand conditions to promote efficient decisions regarding flows of gas to and from Victoria, and in further investment in the future. A developed, well-functioning market would also be likely to attract further entrants to the market and promote competition in it.

2.1.2 Market-driven investment

The current gas transportation arrangements for the DTS, referred to as “market carriage”, are such that shippers do not have to obtain firm access rights and that such rights cannot be granted to any specific shipper.

The lack of exclusive rights to use any extension or expansion in the system means that shippers have little incentive to underwrite investments in the pipeline. All shippers would benefit from a capacity expansion, irrespective of whether they funded or not. There is hence a “free-rider” problem, which means that market-led investment is highly unlikely to eventuate under the current arrangements.

¹¹ AEMC, *East Coast Wholesale Gas Market and Pipeline Frameworks Review*, Stage 1 Final Report, 23 July 2015, p. 119.

Consequently, rather than being driven by the market, decisions on investment in the DTS generally result from the regulator's review of APA's access arrangement for the DTS, which tends to occur on a five yearly basis.

However, APA has no obligations to expand or extend the DTS to meet additional demand growth or supply requirements. It is at APA's discretion to determine which projects it proposes to the AER as part of its access arrangement process. When proposing forecast capital expenditure in an access arrangement, APA will generally include information on the specific projects it plans to undertake during the period. It may draw on planning information provided by AEMO, and other commercial information or drivers, and submit this to the AER to help build a case in support of its proposed total revenue and tariffs for the upcoming period.

The AER will use the project specific information to assess (ex-ante) whether the forecast capital expenditure associated with each project is likely to be 'prudent' and meet the test for conforming capital expenditure set out in the national gas rules (NGR).¹² Where this criteria is met and the forecast capital expenditure is approved, APA is able to collect revenues to recover the spend, return and depreciation to the extent the projects are expected to be operational in the coming access arrangement period (the reference tariff is set to achieve this).

At the end of the access arrangement period, APA will prepare and propose its revised access arrangement for the forthcoming period. At this point, APA will seek to include the actual capital expenditure in the capital base.¹³ The AER will assess (ex-post) the actual capital expenditure for each project and determine whether it satisfies rule 79. Where it meets this test, the new asset will be included in the capital base.

The costs of all investments approved through the regulatory process are recovered through volumetric tariffs levied on market participants, with participants passing these costs through to end users. Consequently, the risks of inefficient investment decisions in the DTS are borne by consumers. This is one justification for the AER being the body to determine the tariffs based on the efficient level of investment.

However, the AER is unlikely to have the same information or incentives acting upon it as would a market participant, which is why market participants driving investment decisions and bearing the associated risks is the preferred model outside of the DTS. The regulatory process for investment in the DTS, with its five yearly cycle of determinations, has also led to concerns that investment decisions have been insufficiently timely in the past or will react quickly enough to emerging issues.¹⁴

¹² Rule 79 of the NGR sets out the matters the AER must consider when determining whether or not capital expenditure can be rolled into the capital base.

¹³ Importantly, once the forecast capital expenditure is approved and the access arrangement period is underway, a service provider may choose not to proceed with a planned project and to do something else, or nothing at all.

¹⁴ For example, at its August 2015 meeting of the Gas Wholesale Consultative Forum (GWCF), AEMO identified potential constraints on net withdrawals on the South West Pipeline (SWP). At its October meeting, AEMO presented a paper setting out the materiality of constraints and augmentation options on the SWP. Information on this issue, including background and proposed

2.1.3 Trading between Victoria and interconnected pipelines

To maximise the efficiency of trade in gas and facilitate competition in upstream and downstream markets, shippers and producers should be able to effectively operate across different locations on the east coast without incurring substantial transaction costs.

This is of increasing relevance as the east coast gas industry is undergoing a significant structural change to demand and supply dynamics in response to the establishment of an LNG export industry. Large volumes of gas from Queensland and South Australia will supply the LNG export plants, with end users in these states likely to source increasing volumes of gas from Victoria, transported north via the DWGM and Interconnect, the Eastern Gas Pipeline or the SEA Gas Pipeline. Equally, market participants may seek to transport large volumes of gas into Victoria for sale in the DWGM where the LNG export plants are unable to absorb supply due to, for example, an LNG train being taken offline.

It is therefore important that the market design and transportation arrangements in Victoria do not restrict gas flowing to where it is valued the greatest on the east coast.

There do not appear to be material barriers at an operational level to exporting or importing gas to and from interconnected pipelines. Gas flows through the Interconnect, and on the EGP and SEA Gas pipelines over the past five years show that the pipelines are all well utilised for exports from Victoria. While the interface at Culcairn between the DWGM and the Moomba to Sydney Pipeline (MSP) is not entirely seamless, there have been significant improvements made recently, and these are expected to have lasting effect.

However, the inability of the DWGM market design to allow shippers to signal the need for, and underwrite the risks associated with, additional investment means that it may not always be the case that an efficient level of investment is undertaken to support flows into and out of the DTS, or that such investment may not be sufficiently timely. While significant investment has been undertaken to support additional flows to Culcairn in recent years, to some extent this investment was able to proceed due to the contractual commitments entered into by shippers on the MSP side of the Interconnect. If the DTS and MSP had been owned by different parties, this investment may not have proceeded.

2.1.4 Competition in upstream and downstream markets

The DWGM was established in 1999 by the Victorian government with the objective of supporting retail competition and encouraging a diversity of supply sources and upstream competition.

way forward, can be found in the GWCF meeting papers available on AEMO's website: www.aemo.com.au.

Specifically, the market carriage model and the DWGM were seen as a way of encouraging new entry by retailers because they would not need to enter into long term gas transportation agreements or, potentially, gas supply agreements, as they would have equivalent access as incumbent shippers to a mechanism to trade imbalances and purchase gas at the spot price.

The DWGM is generally regarded by participants as having met these objectives, providing an effective and competitive gas balancing service and facilitating trading of gas in Victoria based on short term prices. Retail competition in the gas market in Victoria is considered to be effective with low market concentration and high customer activity. Two new retailers entered the market in 2015, bringing the total number to ten. Data available on switching also suggests customers are actively shopping around between the retailers available.¹⁵

However, as noted above, the only way of hedging the short term prices arising in the DWGM is to enter into a gas supply agreement (generally with a producer at an injection point). Equally, despite the fact that new entrants are not required to enter into gas transportation agreements, they are exposed to risk of congestion uplift charges unless they hold AMDQ or AMDQ cc (which can be obtained in a number of ways, including through regular auctions).¹⁶

In practice, therefore, the DWGM allows new parties to enter the market very easily. However, once above a certain size, the risks present in the market mean that a new entrant is likely to have to enter into additional arrangements to manage these, and the Commission considers there is scope for improving the risk management tools available.

2.2 Packages for reform and overview of the Commission's assessment

Five high level packages for reform were developed as part of the DWGM Review discussion paper released in September 2015. Each package included one or more policy measures to address the issues identified in the appraisal. These packages are illustrated in the figure below.

¹⁵ AEMC, *2015 Retail Competition Review*, 30 June 2015, p. 150.

¹⁶ AMDQ and AMDQ cc both provide holders with a hedge against congestion uplift charges up to Authorised Maximum Interval Quantity and entitles the holder to higher priority than customer with no such rights if there is a tie in injection bids or if curtailment is required to maintain system security.

Figure 2.1 Packages for reform presented in the Discussion Paper

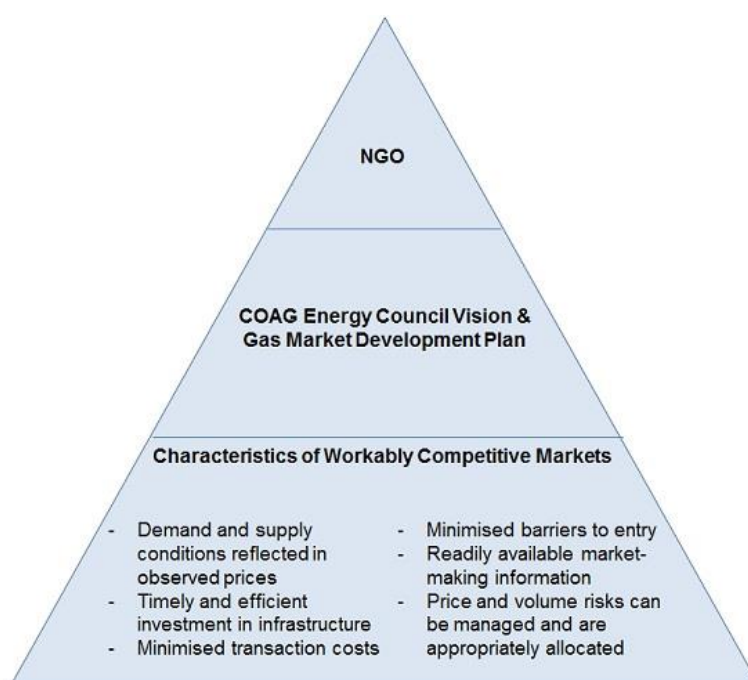
Market improvements	Market development		Market reform	
Package A Targeted measures	Package B Transmission rights	Package C Capacity rights	Package D Entry/Exit model	Package E Hub & Spoke model
Targeted transmission rights	Simplified pricing mechanism	Zone-based pricing and capacity rights	Entry/Exit model	GSHs at Longford and Iona and balancing in Melbourne
Trading of AMDQ rights	Transmission rights			
Clearer AMDQ allocation process				
Review planning standard				

The sections below provide an overview of the Commission's framework for assessing these options as well as the results of applying this framework.

2.2.1 Overview of the assessment framework

The Commission's consideration of the packages is guided primarily by the National Gas Objective with reference to the COAG Energy Council's vision for gas market development, as depicted in the diagram below.¹⁷

Figure 2.2 Assessment framework



¹⁷ This assessment framework can be found in Chapter 2 of the Stage 1 Final Report as part of the east coast review or Appendix E of the DWGM Review discussion paper.

The assessment framework is structured so that the single overarching objective guiding the AEMC is the National Gas Objective (NGO). The NGO is set out in section 23 of the National Gas Law and states:

“The objective of this Law is to promote efficient investment in, and efficient operation and use of, natural gas services for the long term interests of consumers of natural gas with respect to price, quality, safety, reliability and security of supply of natural gas.”

In applying the NGO, the AEMC has had regard to the Energy Council's Vision and Gas Market Development Plan:¹⁸

- The Vision is a statement agreed by the Commonwealth, state and territory energy ministers setting out the high level direction that gas market development should take in Australia for the NGO to be achieved.
- The Gas Market Development Plan is a program of work currently underway that supports the Vision which this Review and the East Coast Review are part.

Overall, the Vision provides the Commission with a high level policy statement to guide its analysis through the review. The elements that make up the Vision can be considered the "means" of promoting the overarching objective – the NGO – through increasing the efficiency of the gas market, for the long term benefit of consumers of natural gas services.

Sitting below the NGO and Vision are high level attributes that the Commission considers support the development of well-functioning, workably competitive markets and that are generally required for the NGO and Vision to be achieved. These are:¹⁹

1. Demand and supply conditions reflected in prices.
2. Timely and efficient investment in infrastructure.
3. Readily available market information.
4. Price and volume risks can be managed and are appropriately allocated.
5. Minimised barriers to entry.
6. Minimised transaction costs.

¹⁸ For a thorough discussion of the Vision please see Chapter 2 of the Stage 1 Final Report as part of the east coast review or Appendix E of the DWGM Review discussion paper. The Vision itself and the Gas Market Development Plan can be found at:
<http://www.scer.gov.au/workstreams/energy-market-reform/gas-market-development/>

¹⁹ We note that these build on factors previously identified and used by the AEMC and others. See, for example: K Lowe Consulting, *Gas Market Scoping Study*, A report for the AEMC, July 2013, p. 86; and: ESAA, *Assessment of the East Coast gas market and opportunities for long term strategic reform*, Final Report, May 2013, p. 37.

These characteristics, if in place, would form a strong foundation for facilitated gas markets and transportation arrangements in eastern and southern Australia to promote the NGO and achieve the Energy Council's Vision.

Further, in assessing these packages, we have explicitly considered the feasibility of implementing the same or similar designs in a 'northern' market. This is consistent with the wider East Coast Review being undertaken, where a main focus has been on concentrating trading liquidity at points on the east coast to support the development of meaningful reference prices. Overall, the Commission considers the simplification and consolidation of market designs operating on the east coast to be an important aspect of reducing transaction costs in order to encourage greater trading and participation.

2.2.2 Outcome of the Commission's assessment

The Commission's detailed assessment of the five packages for reform is included in Appendix B of this draft report. In summary, while packages A-C have been developed to address one or more of the issues identified with the current DWGM design, these packages for reform do not contain all the key attributes required to support the development of well-functioning, workably competitive market. On this basis, they are unlikely to achieve the Vision, and therefore unlikely to promote the NGO relative to the status quo. For example:

- *Demand and supply conditions reflected in prices* – Package A would not provide market participants with a meaningful reference price reflective of underlying demand and supply conditions and would not further aid commercial investment decisions relative to the status quo. While Packages B and C would both support the discovery of a more meaningful reference price by removing the ancillary payment mechanism and simplifying the pricing mechanism, these packages would likely result in higher and more volatile observed prices, and would still require five prices being set per day, which may discourage the development of financial derivatives.
- *Timely and efficient investment in infrastructure* – Package B would promote more efficient investment decisions where overrun charges for non-firm services can be set at an appropriate level. However, this is likely to be a difficult task for the DTS, where the value of spare pipeline capacity varies with demand and supply conditions, as well as across different locations. Similarly, while package C would promote more efficient investment between zones by providing market led-signals for inter-zonal investment, this package would be unlikely to result in significant improvements in the efficiency of investment within zones, relative to the status quo.
- *Minimised barriers to entry* – Packages A, B and C all involve significant increases in complexity to access DTS capacity, which may also act as a deterrent to new entrants. In addition, packages B and C would likely result in higher and more volatile observed prices, which may deter market entry.

Packages D and E contain more of the key attributes required to support the development of well-functioning, workably competitive market. For example:

- *Demand and supply conditions reflected in prices* – By transitioning the DWGM to a system of voluntary trading with market-based balancing, package D would support the emergence of a meaningful reference price which would, in turn, support the development of financial derivative products. Package E may also support the development of financial derivatives but would require sufficient liquidity to develop at both the Iona and Longford hubs, as well as efficient capacity trading on the contract carriage 'spokes'.²⁰
- *Timely and efficient investment in infrastructure* - Package D would contribute to efficient decision-making about future pipeline investment by creating signals driven by market participant choices to book entry and/or exit capacity. Similarly, by converting the DTS to a set of contract carriage pipelines, package E would resolve the lack of investment signals currently provided via the DWGM and encourage timely and efficient investment in pipelines through market-led investment.

However, while packages D and E appear to have most of the characteristics necessary to form a strong foundation for facilitated gas markets and transportation arrangements, the technical characteristics of the DTS mean that package E is unlikely to be appropriate in Victoria. In particular, the multitude of injection and withdrawal points, as well as the need to flow gas across the entire DTS, means that efficient outcomes are likely to be achieved where a single operator is responsible for system operation, including residual balancing.

Further, there are a number of practical challenges associated with implementing package E in Victoria. For example:

- In practice, defining firm point-to-point rights on the DTS is likely to be difficult given that available capacity between any two points is significantly influenced by the expected pattern of injections, withdrawals and flows across the entire network.
- The need to define narrow imbalance tolerances (and the need to penalise shippers who exceed those tolerances) may present a barrier to entry to new shippers and involve large monitoring costs (metering and information systems).
- Variability of flows on the contract carriage 'spokes' may require more frequent scheduling of high cost gas from the Dandenong LNG facility in order to balance the system.

Given these challenges, the Commission is of the view that transitioning the existing DWGM and market carriage arrangements to a system consistent with package D is preferred.

²⁰ The success of pipeline capacity trading is yet unproven on the east coast of Australia and may be particularly difficult in the context of the DTS, as discussed below.

Package D would, over time, enable a liquid wholesale gas market to develop in Victoria, providing participants with greater flexibility when buying and selling gas, and consumers with greater transparency around the demand and supply conditions underlying the gas price. It will introduce a mechanism which allows the market to signal the need for investment in the DTS. This will support the delivery of infrastructure which is efficiently sized, in the right location and on time.

These outcomes are consistent with the broad direction that gas market development should take in order to meet the Energy Council's Vision. Further, through increasing the efficiency of the price setting mechanism in the Victorian gas market, facilitating greater access to risk management tools and improving investment signals, transaction costs should be minimised and reflected in end prices to consumers. This package of reforms should deliver the most comprehensive set of benefits to consumers over the longer term and is therefore most likely to promote the NGO.

The Commission also notes that the market design envisaged under package D would continue to safeguard the security of supply for Victorian gas consumers. In particular, the Southern Hub model allocates the responsibility of maintaining the system's operation to the hub operator who, in the event that participants do not balance their injections and withdrawals sufficiently, will take balancing actions to maintain network pressures within safe operational limits. This outcome also promotes the NGO.

This package of reform is outlined in detail in the section below.

2.3 A Southern Hub with an entry-exit system is recommended

With a view to the longer term, the Commission has developed an option for reform of the Victorian DWGM and market carriage arrangements.

The Commission's draft recommendations are to retain the virtual hub definition in Victoria but to transition the trading arrangements to a system of voluntary and continuous exchange-based trading with market-based balancing. These recommendations involve:

- transitioning from the DWGM where trading and balancing occurs on a mandatory, operator led-basis, to the new Southern Hub²¹ model where trading and balancing would occur on a voluntary, continuous basis and where the hub operator plays only a residual role; and
- supporting this new form of trading with a system of entry and exit rights which, collectively, contribute to gas being able to be traded independently of its location in the system.

²¹ Throughout this report, we refer to the reformed DWGM as the 'Southern Hub' as it aims to develop a 'southern' reference price for gas on the wider east coast.

Our recommendations would transform the way in which market participants' access and trade in the market, and the way in which the need for pipeline investment is signalled. Specifically, market participants would:

- have the opportunity to buy and sell gas with other market participants (and, in some cases, with the hub operator) on a continuous basis, allowing them to better manage their gas portfolios in response to both their short and long term needs; and
- contribute to decision-making about future pipeline development. In choosing to book entry and/or exit capacity, market participants would guide and fund the development of new capacity within the hub to underpin their access rights.

Importantly, participants would no longer be forced to submit bids and offers for all gas injections and withdrawals and a reverse auction style process would not be run to determine the market price. Instead, participants would be free to trade with whoever they wish using a range of methods (eg, via the exchange, bilaterally using OTC contracts and through traditional long term gas supply agreements) and would only be required to nominate quantities to the hub operator to ensure the system is managed safely.²²

Price discovery would occur via the exchange initially in that a daily summary of prices struck for exchange traded products would be published (as is done at the Wallumbilla GSH). The exchange would also publish a volume-weighted end of day price at the Southern Hub, which financial derivative products could reference.

Overtime, various price reporting agencies may choose to report reference prices as they do in other gas markets, which are typically based off an amalgam of both exchange trades and bilateral trades. However, the Commission notes that these bodies provide a service in the commercial interests of gas market participants and considers that their role in the Southern Hub will emerge over time if demanded by the market.

The Commission notes that there are certain characteristics unique to Victoria that strongly support the development of trading liquidity under the Southern Hub model:

- The Southern Hub is a virtual hub that concentrates liquidity and allows gas to be traded independently of its location in the system.
- Parties would be incentivised to 'trade out' imbalances at the Southern Hub under the recommended approach.
- The variable, and unexpected, nature of demand at the Southern Hub creates a short term need to trade gas as a result of gas supply and demand differing from what was expected.

²² In the event that market participants are not collectively balancing their injections and withdrawals sufficiently, the hub operator can take actions to maintain the network within safe operational limits (a process known as 'residual balancing').

- The Southern Hub has the largest concentration of buyers and sellers of all current facilitated markets on the east coast.

Under the proposed entry-exit system, shippers would be able to secure firm access rights to transportation capacity at entry and/or exit points on the DTS. Where feasible, market based mechanisms such as auctions would be used to signal the market's demand, or otherwise, for additional capacity at the relevant entry/exit point. Where demand exceeds available capacity at a particular location, the pipeline owner and regulator would receive a signal indicating that additional capacity is likely to be required in order to meet that demand.²³

The increased level of market-led investment over the current arrangements under the Commission's recommended model represents a shifting of risk to parties who are best placed to manage it. However, while the intention is for all investment to be triggered by entry and exit capacity being booked by participants (ie, a market signal), the entire associated cost may not necessarily be met by participants and so some risk might continue to be borne by consumers. Noting this, the new framework has two advantages relative to the current arrangements:

- by allowing users to signal the need for additional investment in the DTS (including size and timing requirements), the risk of inefficient investment would be reduced; and
- requiring users to purchase capacity (and to pre-commit to purchasing new capacity) at entry and exit points ensures they are the party that bears the costs (and risks) associated with their usage decisions. Allocating risk in this way creates incentives on users to ensure that their decisions on access (and hence the signals they create) are well informed and ultimately efficient.

In aggregate, the recommendations will help to support the development of a liquid wholesale gas market in Victoria, providing participants with greater flexibility when buying and selling gas, and consumers with greater transparency around the demand and supply conditions underlying the gas price. It will also support investment in the DTS responding to market signals and being delivered to an efficient size, in the right location and on time.

These recommendations would provide a more robust gas market framework in Victoria, whatever the future. We expect that the associated benefits may be greater in a future that involves more change from current patterns of demand and supply.

²³ Where a market based mechanism was not deemed suitable for the allocation of entry or exit capacity (for example, where there is a single participant connected at an entry or exit point), a participant seeking capacity over and above that which is available would make a request to the pipeline operator and commit to pay the prevailing capacity charge at that point for a period of time. This would provide the pipeline owner and regulator with confidence that the cost of the investment will be recovered from the party requesting the additional capacity.

3 Trading gas at the Southern Hub

Box 3.1 Draft recommendations

The Commission's recommendation is to retain the virtual hub definition in Victoria but to transition the existing DWGM, where trading and balancing occurs on a mandatory, operator led-basis to a new Southern Hub model where trading and balancing occur on a voluntary, continuous basis and where the hub operator plays only a residual balancing role.

The Southern Hub model will encourage the trading of gas, and hence facilitate liquidity, by:

- retaining a virtual hub that concentrates a range of buyers and sellers of gas in one area while allowing gas to be traded independently of its location in the system;
- incentivising market participants to 'trade out' imbalances; and
- encouraging financial traders to partake in the market.

To implement the new model, exchange trading would be established for the Southern Hub, similar to that currently existing at Wallumbilla. This would allow participants to procure gas, including for balancing purposes, from three key sources: the exchange; bilaterally, using OTC contracts; and traditional long term gas supply agreements. Ownership transfer will occur at the Southern Hub and will be continue to be irrespective of location on the DTS.

Price discovery would occur via the exchange initially in that a daily summary of prices struck for exchange traded products would be published. The exchange would also publish a volume-weighted end of day price at the Southern Hub (as is currently provided for Wallumbilla), which financial derivative products could reference.²⁴

The hub operator will need to conduct residual balancing and a separate balancing platform may need to be established to allow this until there is sufficient liquidity in the spot market. Over time as liquidity develops, this platform could be removed, with all balancing conducted via the exchange.

The exact balancing period to be applied and the strength of the incentive placed on participants to stay in balance will be considered in more detail in finalising this review.

²⁴ Over time, various price reporting agencies may choose to report reference prices as they do in other gas markets, which are typically based off an amalgam of both exchange trades and bilateral trades. However, the Commission notes that these bodies provide a service in the commercial interests of gas market participants and considers that their role in the Southern Hub will emerge over time if demanded by the market.

3.1 Trading gas at the Southern Hub

The Commission recommends that exchange trading be established for the Southern Hub, similar to that currently existing at Wallumbilla, to promote trading of gas in Victoria. The Commission also considers that the market should be redesigned so that:

- participants are incentivised to balance their own injections onto and withdrawals from the DTS over a certain period (known as the 'balancing period') and are able to trade among one another to do so;²⁵ and
- in the event that participants are not collectively balancing their injections and withdrawals sufficiently, the hub operator can take actions to maintain the network within safe operational limits (a process known as 'residual balancing').

This market design is referred to as 'voluntary trading with market-based balancing' since participants are not forced to make bids and offers for gas injections and withdrawals within the balancing period. Rather, they are incentivised to trade to remain in balance. In this sense, it is the market that is primarily responsible for keeping the DTS in-balance.

Participants are able to procure gas for balancing purposes or otherwise from three key sources:

- via the exchange;
- bilaterally, using OTC contracts;²⁶ and
- traditional long term gas supply agreements (GSAs).

Parties would be able to trade gas at the Southern Hub using each of these three means, irrespective of the gas' physical location in the system.

An example of how trading and balancing would operate at the Southern Hub is outlined in the box below.

²⁵ These incentives are outlined in more detail in section 3.3 below.

²⁶ The Commission understands that the Commonwealth Government intends to implement trade reporting of OTC derivative transactions, including for gas derivatives, in line with its G20 commitments. We note that some industry participants consider that the compliance costs for reporting could increase transactions costs and hinder the development of an OTC market. See: <http://www.treasury.gov.au/ConsultationsandReviews/Consultations/2015/OTC-derivatives>

Box 3.2 Overview of trading at the Southern Hub

Suppose a market participant has an expected demand on 12 June of 10TJ and sources it as follows:

- 5TJ priced at \$4.50/GJ from a GSA;
- 3TJ priced at \$4.20/GJ from a week-ahead bilateral trade; and
- 2TJ priced at \$3.80/GJ from a day-ahead exchange trade.

Assume also that the market participant holds sufficient entry and exit capacity.²⁷

On 11 June, the participant nominates 10TJ to the hub operator for the following day.

On 12 June, the market participant now expects to withdrawal 13TJ. The participant has two choices:

1. Procure 3TJ from some combination of their portfolio, the exchange and/or bilaterally. The participant would need to renominate to the hub operator so that they are not out of balance at the end of the balancing period.²⁸
2. Take no further actions and be 'cashed-out' by the hub operator at the end of the day. The participant would be charged for the additional 3TJ at the end of the day by the hub operator (as outlined in section 3.3).

Prices in the second option would be formulated to provide the participant with an incentive to 'trade out' any imbalances within the balancing period (assumed in this example to be one day).

Placing the primary responsibility for balancing on market participants reduces the balancing actions required by the hub operator and supports trading by market participants. More generally, it promotes liquidity as market participants face an incentive to trade on the short term market in order to balance their portfolios.

An important distinction between the proposed Southern Hub and the existing exchange trading on the east coast (ie, the Wallumbilla GSH) can be made in the certainty of delivery that market participants are provided.²⁹ Under the proposed

²⁷ The Commission's draft recommendations on how the entry-exit model should operate to allocate existing, and trigger new, capacity are set out in chapter 4.

²⁸ All trades undertaken in the pre-balancing period and within the balancing period need to be nominated to the hub operator.

²⁹ In particular, in the event that an exchange counterparty defaults on part, or all, of its delivery quantity at the Wallumbilla GSH, they are required to compensate their counterparty for 25 per cent of the value of the variation. Importantly, this compensation is the only remedy available for a breach of a participant's delivery obligations and may under or over compensate a participant for their actual direct costs associated with the delivery default.

model for the Southern Hub, a party purchasing gas from the exchange is guaranteed gas delivery. Specifically, should any party default on a delivery obligation to the Southern Hub they would be incentivised to restore their balance and cashed out if not. This process is designed to ensure that withdrawing parties can withdraw the gas they purchased with certainty.

The Commission's recommended model also provides security of supply for Victorian gas more generally. In particular, the Southern Hub model allocates the responsibility of maintaining the system's operation to the hub operator who, in the event that participants do not balance their injections and withdrawals sufficiently, will take balancing actions to maintain network pressures within safe operational limits.

Under the Commission's recommended package of reform, there would be four specific roles relevant to the operation of the wholesale market at the Southern Hub:

- A hub operator: responsible for physically operating the DTS, including actively buying additional gas or selling excess gas, when required, to ensure the DTS is maintained within safe operational parameters.
- A balancing platform operator (potentially - see section 3.2 below): responsible for administering the separate balancing platform.
- An exchange operator: responsible for running the wholesale gas exchange.
- A pipeline owner: owner of, and responsible for maintaining, the DTS and related facilities.

The Commission notes that further work is required to determine the capabilities required to undertake the various roles associated with the new regime, and the institutions best placed to do those roles. Some, or all, of these roles could be undertaken by the same party. This work will be pursued as part of the detailed design of the Southern Hub.

The process for establishing a meaningful reference price and how this supports the development of financial derivatives is outlined in the section below.

3.1.1 Establishment of a meaningful reference price to support financial derivatives

A key benefit of transitioning the existing DWGM to a system of voluntary trading with market-based balancing is the expected emergence of a meaningful reference price that encourages the development of financial derivative products. Such a price allows parties to take equal but opposite positions in the spot and futures market.

In particular, the Commission envisages that the exchange would publish an end of day, volume-weighted price. The purpose of doing so would be to provide the market a single price for the price of gas that financial derivative products could reference. While we note that various price reporting agencies successfully report reference prices in other gas markets (typically based off an amalgam of both exchange trades and

bilateral trades), these bodies provide a service in the commercial interests of gas market participants and their role in the Southern Hub will emerge over time if demanded by the market.

Financially traded products typically reference a standardised underlying physical product that is commonly traded. This standardisation encourages transactional efficiency and the development of liquidity. The financial gas market is directly linked to the physical gas market and usually evolves from some form of standardised contract for the sale of physical gas.

The establishment of exchange-based trading allows for innovation in products offered and for standardised products to emerge (eg day-ahead products, monthly products and winter 2020 products) and market forces will determine the success of individual products – that is, products will be traded only to the extent that they are useful to participants. In well-established commodity markets, financial derivatives generally reference the price in the most liquid of these products.

Selection of the balancing period and strength of the incentive on participants are likely to be key determinants of the most liquid product. For example, if participants are strongly incentivised to remain in balance over the gas day, then there is a strong foundation for trading in intra-day products to develop as participants 'trade out' their within day imbalance to avoid unfavourable cash-out charges. Selection of the balancing period and the strength of the incentive to remain in balance are discussed in sections 3.2 and 3.3 below, respectively.

The Commission notes that there are certain characteristics unique to Victoria that strongly support the development of trading liquidity under the Southern Hub model:

- The Southern Hub is a virtual hub that concentrates buyers and sellers of gas while allowing gas to be traded independently of its location in the system.
- Parties would be incentivised to 'trade out' imbalances at the Southern Hub under the recommended approach.
- The variable, and unexpected, nature of demand at the Southern Hub creates a short term need to trade gas as a result of gas supply and demand differing from what was expected.
- The Southern Hub has the largest concentration of buyers and sellers of all current facilitated markets on the east coast.

As noted above, the vast majority of participants are effectively managing wholesale price risk by buying wholesale gas straight from upstream producers using bilateral contracts, and then selling it to themselves through the DWGM. Once the Southern Hub becomes sufficiently liquid, we would expect these contracts to transition from

prices based on oil indices (or other products) to prices which reference the hub price.³⁰ Indeed, as certainty about the ability to access gas on the market grows, we would expect to see a lower reliance on bilateral contracts generally. Where long term contracts include hub referenced prices, parties would then seek to conduct financial risk management using derivatives linked to the reference price at the hub.

3.2 Balancing at the Southern Hub

Under the Commission's recommended market design for the Southern Hub, the hub operator can take balancing actions in the event that market participants are not collectively balancing their injections and withdrawals sufficiently, a process known as 'residual balancing'. From a physical-system perspective, this ensures that the network is maintained within safe operational limits. From a wholesale-market perspective, this ensures that trades of physical gas products are honoured.

It is important that the hub operator undertakes any residual balancing at least cost, ie, buys the lowest priced gas available to meet any shortfalls and sells any excess gas for the highest price.³¹ Overall, the costs of its residual balancing actions would be recovered from market participants whose actions have contributed to the imbalance.³²

In a fully functioning market-based balancing model, the hub operator uses the spot market to buy or sell gas and maintain the system balance. This trading by the hub operator can further encourage liquidity in short term trading at the hub.

However, during the initial phase of the market when liquidity is still developing, the Commission considers that the hub operator may need to establish a separate 'balancing platform'. This would allow market participants to offer to sell gas to, or bid to buy gas from, the hub operator for the purposes of residual balancing. Prior to the balancing period, trading participants would provide offers (price and volume) for additional quantities of gas that they could inject into the system and bids for quantities of gas they can take away from the system for the purpose of balancing on the gas day.

Under this approach, the hub operator will monitor the expected system imbalance and, where an imbalance occurs, will buy or sell gas using the balancing platform. If this approach is to be implemented, consideration needs to be given to whether the participants whose bid (or offer) is called upon to balance the system are paid the price they individually bid (or offered), or whether the platform is 'cleared' and all parties

³⁰ This is the case in Western Europe where long term contracts negotiated are moving away from oil-indexed pricing to hubs. FTI, *Conceptual design for a virtual gas hub(s) for the east coast of Australia*, November 2015, p. 63.

³¹ In some European countries, the transmission system operator (TSO) is incentivised through its regulatory incentives to minimise balancing costs, ie by allowing additional revenues to be earned if balancing costs are efficiently managed.

³² Depending on how imbalance charges are structured in the final design, it may be necessary to include a mechanism which accounts for any net residual amount of imbalance payments held by the hub operator.

receive the marginal bid (or offer). The considerations relevant to calculating the costs of operator balancing actions are outlined in section 3.2.2 below.

The balancing platform can be an interim step to allow the hub operator to access flexible sources of gas until liquidity in the spot market in the hub is developed. If a balancing platform remains separate to the trading on the hub, there is a risk of splitting liquidity. Such a platform was employed in the Dutch gas market until it was replaced by wholesale market-based residual balancing in order to encourage liquidity, as outlined in the box below.

Box 3.3 The Dutch TTF: Transitioning from a separate balancing platform to balancing on the spot market

Until recently in the Netherlands, a separate balancing platform was operated by the Dutch pipeline operator alongside the virtual trading hub in the Netherlands (the Title Transfer Facility or 'TTF'). This platform took the form of a 'bid-price ladder', which represented a merit order of different volumes of gas market participants offered to the pipeline operator to respond to system imbalances.

This approach to balancing was considered to have worked effectively and increased the amount of information available to participants. However, there were concerns that the separate balancing platform was constraining liquidity in the TTF and, in October 2014, the Dutch competition authority stated that it was keen to boost the TTF's liquidity by shifting balancing from the bid-price ladder to the TTF by 2014.

In November 2014, the Dutch pipeline operator announced that it would begin balancing its system by trading on the TTF as part of a new agreement announced between the pipeline operator and the exchange (APX-ENDEX). This agreement allowed the pipeline operator to buy and sell balancing gas on the within-day and day-ahead markets.

Sources: Van Dinther, A., and M. Mulder, *The Allocative Efficiency of the Dutch Gas-Balancing Market*, Competition and Regulation in Network Industries, 2013, vol. 14, issue 1, p. 57; Heather, P., *Continental European Gas Hubs: Are they fit for purpose?*, The Oxford Institute for Energy Studies, June 2012, pp. 8-9; and ICIS, *Dutch regulator to decide on natural gas flexibility service by December*, 17 October 2012, available at: <http://www.icis.com/resources/news/2012/10/17/9604877/dutch-regulator-to-decide-on-natural-gas-flexibility-service-by-december/>

The approaches that can be taken to setting a balancing period are outlined in the section below. The section following discusses the approaches that can be taken to calculate the costs of any balancing actions taken by the hub operator.

3.2.1 Balancing period duration

The balancing period is the time within which market participants are required to balance their injections and withdrawals. At the end of the balancing period, participants who are not in balance will incur charges that reflect the costs incurred by the hub operator in addressing the imbalance.

The frequency at which market participants must balance in order to avoid imbalances charges can vary depending on the physical characteristics of the pipelines. For example, pipeline systems with significant volumes of pipeline capacity may be able to maintain greater volumes of gas flowing onto the system than is being withdrawn or vice-versa, over longer periods. Smaller capacity and more highly interconnected pipeline systems, such as the DTS in Victoria, may require more frequent balancing.

At a high-level, the trade-off in selection of a balancing period is as follows:

- Shorter duration balancing periods may:
 - fragment trading so that liquidity in any one period is reduced; and
 - create additional costs for market participants (as there is a greater requirement to trade) that can act as a barrier to entry.
- Longer balancing periods increase the costs of hub operator balancing that cannot be targeted on particular participants and, instead, have to be smeared across the generality of shippers.

Table 3.1 below presents the advantages and disadvantages of the three broad options for selection of a balancing period.

While daily balancing encourages within-day trading, the physical nature of the DTS and the nature of demand may mean that balancing actions may be required frequently, particularly during winter, and that the costs of these actions would need to be smeared across participants. For example, system imbalances may arise during the day that require the hub operator to intervene but, by the end of the day the individual participants may have corrected earlier mismatches so as to be measured in overall balance across the period. In these cases, costs will have been incurred by the hub operator that cannot be targeted back on individual participants and instead would need to be smeared across the generality of market participants.

The Commission sees merit in adopting an approach which does not prescribe a specific balancing period. Under such an approach, shippers' individual positions would only be relevant if the overall system was out of balance. The hub operator would provide each shipper with their balance position (ie, the difference between its forecast position with the actual allocation in near real-time) as well as the system's balance position, on an ongoing basis during the gas day. The information would signal to shippers that the hub operator may soon need to take a system balancing action, the costs of which would be imposed on the shippers with imbalances at the time the action was taken.

This approach creates incentives for shippers to remain in balance (or to maintain any imbalances within small tolerances) such that, in the event the hub operator is required to take a balancing action to correct a system imbalance, they are not exposed the costs of resolving a large imbalance.

Table 3.1 Options for balancing period selection

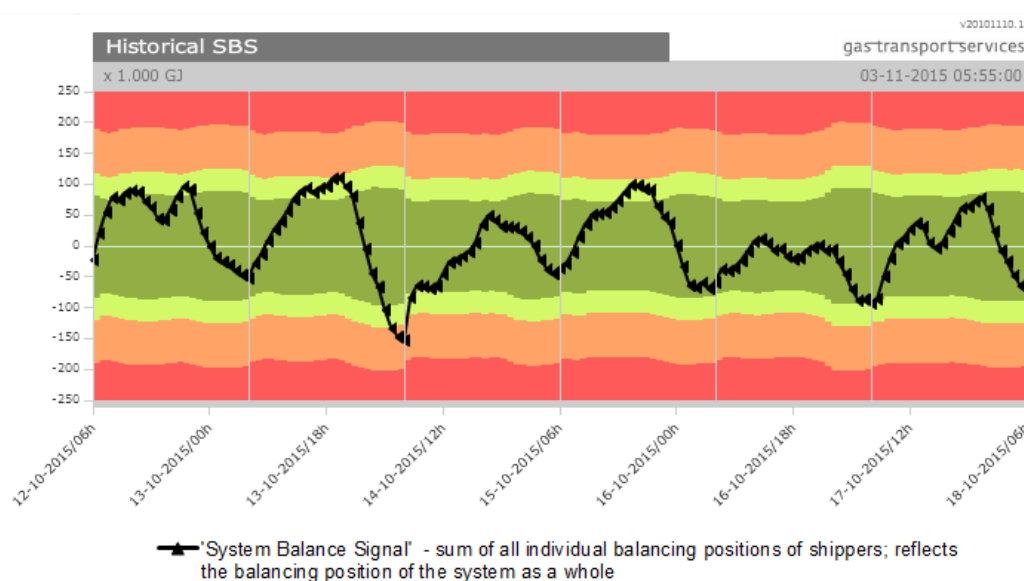
Balancing period	Advantages	Disadvantages
Intra-day - participants are cashed out at certain periods within the day (eg, every 4 hours).	<p>Strengthens price signals and can generate liquidity in short term intra-day gas trading. If the market is sufficiently liquid, it should minimise the hub operator's role.</p> <p>If the hub operator is required to intervene, the costs of doing so can be allocated to those that cause the imbalances.</p>	<p>Requires that balancing be conducted over a relatively short time frame, which can create a barrier to new market entry, particularly in the absence of a liquid hub.</p> <p>The potential costs to new entrants in managing potential imbalances, or facing charges for failing to do so, may outweigh any benefits of efficient price signals.</p> <p>Requires complex arrangements for trading of linepack.</p>
Daily - participants are cashed out once during the day.	<p>Encourages trading within the day.</p> <p>Allows new entrants time to balance their portfolios.</p>	<p>If imbalances arise during the gas day, these are managed by the TSO and costs are shared among market participants.</p>
No specific balancing period - no fixed balancing period and shippers' imbalance positions are only relevant if the overall system is out of balance.	<p>Efficient in that it allows shippers to retain certain imbalances if it is not causing an imbalance in the overall system.</p> <p>Promotes market entry by avoiding balancing requirements when not strictly necessary.</p>	<p>Less certainty on when market participants must balance their positions.</p> <p>Requires significant operational change for both pipeline operators and shippers: in monitoring the balance in the system as well as shippers individual positions.</p> <p>May provide a barrier to entry if the spot market is illiquid.</p>

Source: AEMC and FTI, *Conceptual design for a virtual gas hub(s) for the east coast of Australia*, November 2015.

This approach has been applied in the Netherlands. The information provided to shippers signals whether the TSO is nearing a requirement to take balancing actions and is communicated using an interface as below. The coloured zones indicate the extent of balancing actions required by the TSO. Specifically: dark green - balancing action is not required; light green - the TSO will buy or sell end-of-day product from four hours after imbalance (eg, an imbalance at 13:00 will see correction from 17:00 to 06:00); and orange/red: the TSO will buy or sell a one-hour product (eg, an imbalance at 13:00 will see correction from 14:00 to 15:00).³³

³³ Gasunie Transport Services website, available at: <http://www.gasunietransportservices.nl/en/transportinformation/balancing-regime/within-day-balancing-action-wdba>

Figure 3.1 Example of the balancing signal provided to Dutch shippers



Source: AEMC, derived from data on the Gasunie Transport Services website:
<http://www.gasunietransportservices.nl/en/transportinformation/balancing-regime/balancing/sbs/historical/GJ>

However, the Commission recognises that without a sufficiently liquid spot market such a system is likely to present barriers to entry as parties without quick access to flexible gas (eg, small retailers without GSAs) are unlikely to be able to respond and balance their positions when they are required.

The Commission notes that further detailed work is needed before an appropriate balancing period can be determined. As part of this work, there would be merit in investigating the feasibility of implementing a system without a specific balancing period overtime, although a defined balancing period may be required initially as trading liquidity at the Southern Hub develops.

3.2.2 Calculating the costs of operator balancing actions

To ensure the pipeline system remains in balance, the hub operator will take one of two actions:

- buy additional gas to bring onto the system where, collectively, market participants are short, ie, have not procured enough gas to meet demand; or
- sell excess gas from the system where, collectively, market participants are long, ie, have sourced too much gas.

Therefore, in order to incentivise market participants to balance their own positions, the costs of these actions are passed onto those responsible for the imbalance. There are a number of mechanisms that affect the strength of this incentive under a market-based balancing approach.

The general principle applied is that the costs incurred by the operator should be passed on to the shippers with imbalances so that they are compensating the operator for having had to buy or sell gas on their behalf. The imbalance charges are based on the costs of the operators' trades, which take place either on a balancing platform or via short term trading at the hub (if hub liquidity is sufficient). While consideration needs to be given to how parties providing (or taking away) balancing gas are reimbursed (as outlined above), charges to parties causing the imbalance can either cover:

- the average costs of all the purchases or sales of gas taken by the hub operator in order to balance the system; or
- the marginal cost, ie, the price paid by the operator to buy additional gas or the price received for selling excess gas.

The main advantage of charging shippers the marginal price of buying additional gas or the marginal price of selling excess gas is that it sends a clear signal to the market participant to balance its portfolio. However, where markets are less liquid and shippers have less means of balancing their portfolios, this may be considered to deter market entry.

As such, some countries opt for average prices, which will result in lower imbalance charges than under a marginal price approach. It is for similar reasons that tolerances or pooling arrangements are introduced to reduce the impact of the imbalance charges.

Further work is required before the Commission can determine an appropriate approach to incentivising market participants to remain in balance – that is, how the costs of operator balancing actions should be passed onto participants. Cash-out prices need to be designed to provide market participants with strong commercial incentives to balance their contractual and physical positions and therefore avoid exposure to cash out prices. This may include contracting for supply ahead of time, or by maintaining the reliability of their production plant, for example. Both of these measures taken in response to the incentives created by cash-out prices, in turn, help secure supply.

It is important when determining the strength of these incentives that consideration is given to the fact that new entrants may be deterred from participating in the market if the incentive is too strong.

The Commission considers that a decision needs to be made during the detailed design of the Southern Hub exactly how strong the incentive to trade and remain in balance should be.

4 Access to transportation capacity at the Southern Hub

Box 4.1 Draft recommendations

The Commission's draft recommendation is to transition the existing market carriage arrangements to an entry-exit system for allocating capacity.

This would allow network users to book capacity rights independently at each entry and exit point to the system³⁴ and support the development of trading liquidity at the Southern Hub since gas could be traded irrespective of its physical location in the system. Moreover, demand for entry and/or exit capacity would create market-driven signals for investment in the system that currently do not exist.

The Commission's draft recommendation includes the following features:

- An auction process would be used to allocate existing capacity, and potentially to trigger new capacity, at entry and exit points where there are multiple participants active. A market-based mechanism provides clear signals around the need for new capacity and so supports the provision of efficiently sized investment, delivered at the right location and when needed.
- At entry and exit points where there is only one active participant, capacity allocation would be administratively determined and a regulated access charge would apply. Where a participant required additional capacity at one of these points (for example, to meet growing demand), a pre-commitment to pay the regulated charge for a number of years into the future would provide the trigger needed for new investment to occur.

Under an entry-exit system, the revenue earned by the pipeline owner would be regulated, on a similar basis to today and the overall amount of revenue is not expected to be materially impacted. However, requiring users to purchase capacity (and to pre-commit to purchasing new capacity) at entry and exit points will change the risk allocation of that investment as the user bears, at least some of, the costs (and risks) associated with their decisions. Allocating risk in this way creates incentives on users to ensure that their decisions on access (and hence the signals they create) are well informed and ultimately efficient.

Establishing a system of entry and exit rights in Victoria requires decisions to be made on the mechanism for booking transportation capacity to access the hub, the methodology for setting tariffs at entry and exit points and mechanisms, if required, to encourage secondary trading of capacity.

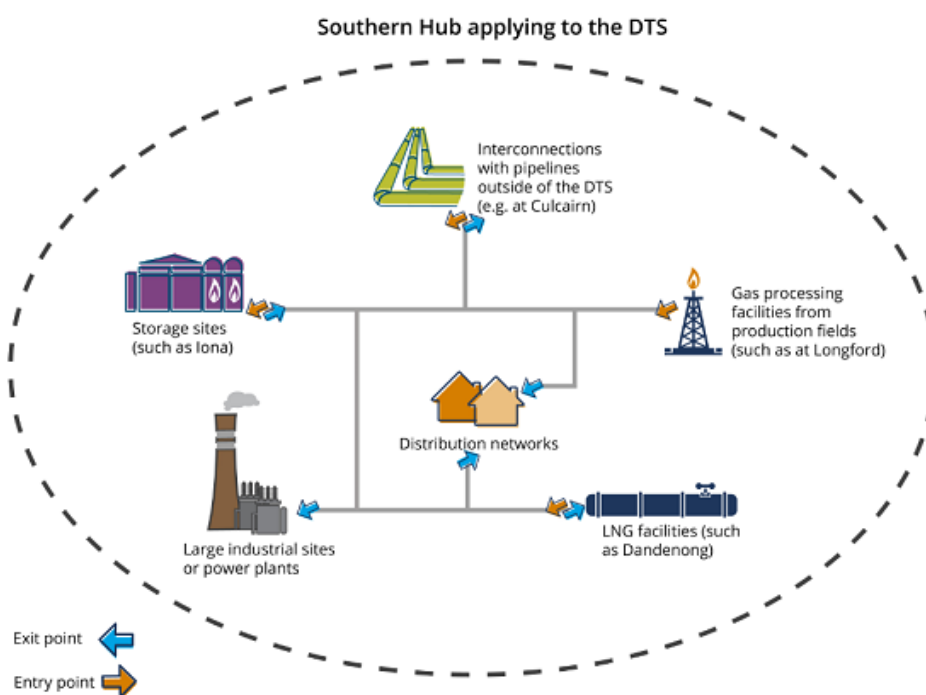
³⁴ Parties wishing to solely trade gas products at the Southern Hub prior to their delivery date (eg, financial traders) would not require entry and/or exit capacity so long as they close out their physical positions prior to delivery.

4.1 Booking transportation capacity to access the Southern Hub

Under an entry-exit system, parties would need to buy one unit of entry capacity in order to flow one unit of gas onto the system and one unit of exit capacity in order to flow one unit of gas off the system. This means that anyone wishing to buy or sell gas at the Southern Hub and have it withdrawn or injected from the DTS would need to hold sufficient entry and/or exit capacity to do so. Parties wishing to solely trade gas products at the Southern Hub prior to their delivery date (eg, financial traders) would not require entry and/or exit capacity so long as they close out their physical positions prior to delivery.

'Entry' points are those where gas is injected onto the transmission network, while 'exit' points are where gas is withdrawn from the transmission network. The DTS has a number of such points, some of which serve both entry and exit purposes, while others serve only entry or exit purposes. These are summarised in stylised figure below.

Figure 4.1 Overview of entry and exit points within the Southern Hub



The process for booking capacity at entry and exit points under the Commission's recommended approach depends on the level of competition for that capacity at each point. Specifically, this process differs for points where there are multiple market participants vying for capacity and for points where there is a single market participant seeking to access capacity. The process for allocating existing capacity and triggering new capacity at each of these types of points is outlined in the sections below.

4.1.1 Booking transportation capacity at points where there are multiple market participants

The Commission's recommended entry-exit system would use an auction mechanism to allocate existing capacity at entry and exit points where there are multiple market participants seeking capacity to access the hub. These points include gas production entry points where there are numerous producers, interconnections, LNG facilities and storage sites. The Commission envisages auctions being established for entry and exit capacity using standardised periods, eg annual, quarterly, monthly, daily and within-day.

In addition to allocating existing entry and exit capacity, the auction mechanism may also provide a market-driven signal for incremental investment at these points. Auctions are used in this way in the UK, where entry capacity into the National Transmission System is auctioned 15 years into the future. Under this approach, should the auction of this long term entry capacity recover 50 per cent of the incremental cost of delivering new pipeline capacity within the hub then the pipeline owner is required to provide the additional capacity, with an additional allowance made available under the revenue cap to fund this.³⁵

The increased ability for the market to signal investment needs over the current arrangements under the Commission's recommended model represents a shifting of risk to parties who are best placed to manage it. Currently, the costs of all investments approved through the regulatory process are recovered through volumetric tariffs levied on market participants, with participants passing these costs through to end users. Consequently, the risks of inefficient investment decisions in the DTS are borne by consumers. This is one justification for the AER being the body to determine the efficient level of investment, as this arrangement attempts to link the decision maker (the AER) with the party that bears the risk (consumers, on which the AER is acting on behalf of).

Under an entry-exit system, the revenue earned by the pipeline owner would be regulated, on a similar basis to today. However, requiring participants to purchase capacity and to pre-commit to purchasing new capacity at entry and exit points would ensure they are the party that bears, at least some of, the costs (and risks) associated with these decisions.³⁶ Allocating risk in this way would create incentives on participants to ensure that their decisions on access (and hence the signals they create) are well informed and ultimately efficient.

As outlined in section 4.3 below, tariffs for DTS capacity would be set for each individual entry and exit point on the transmission system. Where capacity is auctioned, the tariff would be used to set the reserve price for the auction – that is, the

³⁵ FTI, *Conceptual design for a virtual gas hub(s) for the east coast of Australia*, November 2015, p. 53.

³⁶ Participants committing to purchase new capacity would act as a trigger to release additional regulated revenue to fund the capacity expansion. However, it might not be realistic to expect participants to commit to fund 100 per cent of the new capacity and, hence, there may be some risk sharing between participants and consumers (as in the UK).

minimum price at which any market participant would need to bid in order to obtain the entry or exit capacity. When there is more network capacity available than demand (for example, where demand is declining) demand for the relevant entry or exit capacity would be expected to be satisfied at the reserve price.

While the Commission's recommended system of entry-exit rights signals the need for investments through the auction process and supports market driven signals for investment, there are complexities associated with this model. This is particularly evident where a third party has some role in managing capacity for a number of market participants – for example, at entry and exit to storage facilities and for exit to the distribution network.

There are a range of options that could be considered in such circumstances, with either participants or facility operators being responsible for booking capacity. As a further alternative, a hybrid model may be possible where the facility operator acts as a procurer of last resort, to ensure that sufficient capacity is made available over the long term. The Commission intends to consider these issues further over the remainder of the review.

4.1.2 Booking transportation capacity at points where there is a single market participant

There are some entry and exit points on the DTS where there is only one participant with a requirement to inject or withdraw gas to or from the hub. These points include exit to industrial sites and power stations, as well as potential entry from new production fields that may arise. In cases where further entry is an unrealistic prospect, the use of an auction mechanism to allocate existing and new capacity would not be meaningful due to the lack of competition for capacity at these points.

At these points, the Commission's recommended approach is to allocate the required entry or exit capacity on the basis of a regulated capacity charge. The process for determining these charges is outlined in section 4.3 below.

Where a participant requires additional capacity over and above that which is available at the relevant entry or exit point, it would be required to submit a request for the additional capacity to the pipeline owner. Importantly, the participant would also be required to commit to pay the prevailing entry or exit capacity charge at that point for a number of years. This pre-commitment would provide assurance to the pipeline owner, and in turn to the regulator, that the party requesting the additional capacity will pay for it.

This means that the costs of any additional investment required to meet the demand for new capacity at these points will be recovered from the connecting party. Given this commitment made by the connecting party, the AER will have sufficient comfort that any incremental investment required within the hub to meet the party's additional capacity request will fall predominantly on the party triggering the investment.

Similar to where auctions are run to allocate capacity, booking transportation capacity at points where there is a single market participant under the proposed model also represents a shifting of investment risk to parties who are best placed to manage it. Specifically, by allowing users to signal the need for additional investment in the DTS (including size and timing requirements), the risk of inefficient investment would be reduced. In addition, requiring users to purchase capacity (and to pre-commit to purchasing new capacity) at entry and exit points ensures they are the party that bears the costs (and risks) associated with their usage decisions.

4.2 Congestion management

While the Commission's recommended entry-exit system applying at the Southern Hub is designed to signal the need for additional capacity at entry and exit points, it will not provide signals of the precise investments that should be undertaken on the pipelines internal to the hub to provide this capacity. Consequently, changes in patterns of gas flows could mean that congestion arises on the system even though flows at each entry and exit point remain within the specified limits.

Congestion of this nature can be managed through two means: the definition of the rights and operational measures available to the hub operator.³⁷

Firstly, entry and exit rights are typically defined relatively conservatively. To avoid the inefficient under-usage of the system, additional short term rights can then be made available once the hub operator has a better understanding of the flows that are likely to eventuate. Such additional rights can either be firm, with the hub operator able to buy back that (or any other firm) capacity in the event that congestion does arise, or interruptible. The hub operator can either be obliged to offer this additional capacity or can be given a financial incentive to so. In the case of firm capacity, this incentive can be given by allowing the hub operator to trade-off the additional revenue from the sale of the capacity against the risks of incurring buy back costs.

Secondly, and as mentioned above, the hub operator can manage capacity through operational means, principally by buying back firm capacity where the system is unable to support the levels of flows nominated by users. In the first instance, the costs of these buybacks will be recovered from any participants over-running their entry or exit capacities and from the pipeline owner, if it fails to make entry or exit capacity available.³⁸ However, to the extent that costs remain unrecovered, it is likely to be necessary to recover them from the totality of participants.

Capacity management mechanisms will be considered and assessed further as part of the detailed design of the entry-exit system.

³⁷ Where bottlenecks are particularly acute (as has been the case, for instance, between Northern and Southern France), it may be more appropriate to implement two separate entry-exit markets rather than one. However, the topography of the DTS and the level of congestion currently observed strongly suggest that a single entry-exit zone would be appropriate in Victoria.

³⁸ These charges can be thought of as being broadly equivalent to the congestion uplift and DTS Service Provider congestion uplift charges in the current market.

4.3 Setting tariffs at entry and exit points

Under the existing market design, a model of flows on the network is used to determine tariffs for its usage. Under the recommended entry-exit system, a similar model would be employed, but with the difference being that it will determine capacity tariffs, as opposed to volumetric tariffs.

Tariffs for use of the DTS would be set for each individual entry and exit point on the transmission system. The general principle in setting these tariffs is that, in aggregate, they recover the pipeline owner's regulated costs of owning and operating the network of pipes within the virtual hub.

As outlined above, these tariffs are used for:

- setting auction reserve prices for entry and exit points where there are multiple market participants wishing to obtain capacity; and
- setting access charges to enter and exit the system at points where there is only one active party.

When there is more network capacity available than demand, the auctioned capacity can be expected to be satisfied at the reserve price. The Commission understands that certain regions of Victoria exhibit this demand characteristic and so the setting of the reserve price is crucial for entry and exit points in these regions.

There are two broad approaches that can be applied to set tariffs, each recovering a different cost, ie:

- the prospective costs of satisfying additional demand at each entry and exit point - that is, the long run marginal cost (LRMC); and
- the actual cost of investments already incurred.

Basing individual entry and exit tariffs on estimates of their LRMC provides parties with a price signal associated with their locational decision. This is considered efficient in that parties incur costs associated with their actions and can make decisions regarding entering and exiting the market based on these costs.

The LRMC approach differs from an actual cost, or 'postage stamp', approach whereby the total costs incurred by the pipeline operator are divided by the volume of capacity offered and levied on entry and exit points equally.

An actual cost approach is simpler to apply than the more complex calculation of LRMC and aims to recover the actual costs of investments already incurred. However, it does not provide any locational signals to participants as to the gas transportation cost associated with their operations. It therefore would not seek to recover the costs of access from participants in an efficient manner, nor would it influence the siting decisions of those wishing to inject or withdraw gas from the Southern Hub as well as retirement decisions by existing parties.

Box 4.2 Calculating tariffs based on LRMC

Setting tariffs according to the LRMC of servicing additional demand at entry and exit points involves load flow modelling. In particular, a matrix of all of the potential combination of routes between various entry and exit points on the networks is established and the following approach is then applied:³⁹

- Calculate the LRMC of satisfying an additional unit of demand along each transport route in the matrix, ie, between each entry and exit point.
- Take each entry point as a starting point and allocate the LRMC of providing additional capacity on the route to each exit point. If there is more than one route to an exit point, allocate the lowest LRMC to each exit point (this is because, if there are alternative routes, it would be efficient to increase capacity on the route with the least cost).
- Take each exit point as a starting point and repeat the same process to allocate the LRMC to the entry points.
- Check that for every route the combined entry and exit charges add up to the LRMC.

While the majority of the pipeline owner's revenue requirement is intended to be recovered via capacity charges at entry and exit points under both approaches, it is likely a volumetric tariff would also be designed in order to account for any under- or over-recovery of revenue over time. For example, if auctions are consistently above the reserve price, but not high enough to trigger new capacity, then this surplus revenue would be returned to users of the DTS via decreased variable charges.

The specific approaches available to setting capacity tariffs and recovering costs at the Southern Hub will be considered and assessed further as part of the detailed design of the entry-exit system.

While the introduction of an entry-exit system would necessitate changes to the structure of tariffs and, consequently, the allocation of investment risk in the market, it is not intended to impact the overall amount of revenue to be recovered by the pipeline owner.

4.4 Secondary trading of entry and exit capacity

There is a risk with any transportation regime involving the long term reservation of system capacity that shippers will not on-sell unused capacity to others who might be able to use it. This may arise due to deliberate hoarding or simply because there are insufficient incentives available to the holder to make the capacity available, and will impact on the efficiency with which the system used.

³⁹ FTI, *Conceptual design for a virtual gas hub(s) for the east coast of Australia*, November 2015, pp. 46-47.

However, this is less of a risk under an entry-exit model, as opposed to a system of point-to-point rights, as entry-exit rights are more homogenous and fungible, and are consequently easier to trade. It is also likely that the transaction costs associated with any secondary trading can be minimised by facilitating such trading through the same system used to auction long term (primary) rights.

In addition, any incentive on shippers not to on-sell unused capacity can be undermined where the hub operator is able to sell additional short term rights (see section 4.2, above). Where the hub operator is aware that previously sold long term rights are unlikely to be used, it can be given an incentive to sell extra capacity at very little risk. Consequently, shippers with unused long term rights would be better off on-selling them and recovering at least some value from them.

The Commission notes that a number of further capacity release mechanisms have been used in the application of entry-exit models in Europe.⁴⁰ At this stage, the Commission does not have a view on whether any such measures will be required at the Southern Hub, but intends to consider this matter further.

⁴⁰ Market Reform, *International Gas Markets Study*, Report to the Australian Energy Market Commission, June 2015, pp. 14-15.

5 Transition to a Southern Hub with entry-exit

Reforming the Victorian gas market gives rise to significant implementation questions. These relate to the detailed design of the Southern Hub trading arrangements and the accompanying entry-exit model, as well as the transition from the current market arrangements to the new market framework.

This chapter provides an overview of the key considerations in relation to converting the DWGM to a Southern Hub model for trading supported by an entry-exit system for managing capacity. Chapter 6 then places implementation of the proposed Southern Hub within the context of the Commission's broader recommendations for the future development of the eastern Australian gas market.

5.1 Design issues

A number of key design issues relevant to the recommended model are discussed in Chapters 3 and 4. Specific design questions to be considered include the following:

- The means by which the hub operator will procure or sell gas in order to balance the system (that is, through the spot market or via a separate balancing platform).
- How the costs of the hub operator's balancing actions should be passed onto participants (that is, how strong the incentive should be for participants to remain in balance).
- The appropriate length of the balancing period (having regard to limitations of the network to absorb swings in demand or supply).
- The approach to, and mechanism(s) for, allocating entry and exit capacity to participants (for example, the use of auctions). This would include consideration of how to allocate capacity at points where there is connection to a single facility but where multiple parties use that facility (for example, distribution networks and storage points). The issue of hoarding of entry and/or exit capacity, and mechanisms to address it, will also need to be considered prior to implementation.
- The capabilities required to undertake the various roles associated with the new regime (for example, in relation to the exchange operator and the hub operator), and the institutions best placed to do those roles.
- How pipeline services provided under the entry-exit system would fit within the current definition of reference services and hence how they should be treated under the regulatory framework. Further, how the regulated entry and exit tariffs and additional revenue received from any market based capacity allocation mechanism (for example, an auction) would fit with the current price-cap form of regulation.

In addition, to ensure the seamless trading of gas between systems, consideration will need to be given to whether coordination between the entry-exit system in Victoria and contract carriage outside of Victoria is expected to occur efficiently. For example, in Europe where entry-exit systems are interconnected, exit capacity from one system is bundled with entry capacity to another to ensure the seamless trading of gas between systems.

The above is not an exhaustive list, and the Commission recognises the need for substantial further work to finalise a high-level design.

5.2 Transitional issues

In addition to the detailed design issues, a number of transitional issues will need to be resolved to facilitate the move from the current arrangements to the new market framework. Two specific transitional issues are briefly described below.

Transitioning AMDQ and AMDQ cc

To move from the existing market carriage arrangements in Victoria to an entry-exit system for allocating capacity, a key issue to resolve would be the transition of existing (albeit limited) benefits afforded to market participants holding AMDQ and AMDQ cc.

AMDQ was first allocated at market commencement in 1998. The allocation of 990TJ was (and has remained) commensurate with the capacity of the Longford to Melbourne Pipeline (at the time the sole source of gas supply for the DWGM). Recognising that the DTS was comprised of pre-existing assets that had at least partially been paid for by existing customers of the Victorian Gas and Fuel Corporation, at the start of the market the rights to the existing 990TJ of capacity were allocated to customers in two tranches:

- Tariff D customers - that is, those large customers who had meters measuring daily demand and whose gas tariff included a daily-demand-based component; and
- Tariff V based customers - that is, smaller customers on an energy usage tariff generally based on cumulative gas usage over a two monthly billing cycle.

Tariff D AMDQ was allocated to Tariff D customers individually on the basis of their historic demand. After allowing for diversity of the individual Tariff D customer allocations of AMDQ, the remainder of the 990TJ of available capacity was allocated to Tariff V customers as a block allocation: that is, not to individual customers. There is no designated permanent owner of Tariff V AMDQ. Instead, gas retailers are allocated the market benefits associated with Tariff V AMDQ in proportion to the aggregate of their Tariff V customers' usage. This allocation is adjusted on a daily basis to reflect

customer transfers, which continually change the Tariff V allocations between retailers.⁴¹

Since the commencement of the DWGM, the capacity of the DTS has increased as a result of numerous augmentations. As new pipeline capacity is made available, AMDQ cc are created to provide similar benefits to those arising from AMDQ on the Longford to Melbourne Pipeline. AMDQ cc gives market participants a contractual right to the market benefits of the AMDQ cc.

The increase in pipeline capacity resulting from an extension or expansion project is agreed between APA GasNet and AEMO. Once agreement is reached and the new capacity becomes operational, new certificates are created. AEMO allocates the AMDQ cc to market participants for quantities and periods as directed by APA GasNet. The directions from APA GasNet reflect the outcome of a competitive tender process it manages. In this process, interested market participants are able to tender for an amount of AMDQ cc for a specified period (typically five years in line with the access arrangement period).⁴²

AMDQ and AMDQ cc have value where the customers or market participants holding them intend to flow gas on the parts of the system to which they relate. To provide value, they must be validated with AEMO on the day. Once validated, AMDQ and AMDQ cc provide the holders with: priority to flow gas in the event there are equally priced bids and capacity is constrained and with a hedge against any associated congestion uplift charges which may arise.

In considering whether and how to transition the limited benefits afforded to the holders of AMDQ and AMDQ cc, the Commission will consider (among other things):

- the value that market participants receive from holding AMDQ and AMDQ cc;
- the value to the market in preserving the limited rights provided by (specifically) AMDQ, given these were allocated at commencement of the DWGM; and, if so,
- how to preserve the value of the limited rights in the context of the new market design.

Consideration will need to be given to, in particular, the transition of Tariff D AMDQ given that these are held by individual customers and do not expire or roll away after a period of time. Equally, the appropriateness of continuing arrangements which allocate a certain subset of rights to retailers (ie Tariff V AMDQ) will also need to be considered. Stakeholders will be invited to contribute to this discussion during the next phase of this work.

⁴¹ The rationale for allocating AMDQ to customers rather than market participants, retailers or shippers was to not create a barrier to retail competition. If AMDQ were held by retailers, there was a concern that those retailers who won customers from rival retail businesses would then be forced into a position of either trying to negotiate with that rival retailer to sell them AMDQ, or take on additional risk.

APA GasNet's access arrangement generally extends for a period of five years and sets out tariffs, terms and conditions and non-tariff policies and elements for pipeline services that have been identified as reference services.⁴³ The rules allow for an access arrangement which is shorter than the general five year period.⁴⁴ However, this would require APA to propose the shorter period in its access arrangement, and for the AER to approve the shorter period only if it is satisfied that this is consistent with the NGO and revenue and pricing principles. The AER has no discretion to alter the review period unless proposed by APA in its access arrangement.

The Commission recognises that APA GasNet and the AER will soon be making decisions in relation to the DTS access arrangement commencing 2018 and so will require clarity around whether, and when, the new market arrangements will be introduced. In the instance the next access arrangement is set for the general five year period (from 2018-2022, consistent with the general rule), consideration may need to be given to adopting a transitional version of the Southern Hub model with an entry-exit system until such time as the access arrangement for the DTS can be reviewed (that is, until 2022).

The AEMC will liaise closely with all parties on the detailed design of the new market framework, and in relation to the transition arrangements and timeframes.

5.3 Transition process

The Commission is aware that it is important to ensure a smooth transition to the recommended Southern Hub design where this approach is endorsed by the COAG Energy Council. The transition would need to occur on a timetable which ensures that Victoria remains on course to meet the broader east coast Vision for gas market development, while at the same time minimising uncertainty for market participants and investors, any price or supply impacts on users of gas and allowing for the smooth transition of responsibilities across organisations.

As part of the transition program, the Commission will need to carefully consider the trade-offs associated with the simultaneous introduction of the Southern Hub trading and balancing arrangements with the entry-exit system, or whether there may be benefit in carrying out a staged transition. A staged transition might involve introducing either the new trading and balancing arrangements, or the entry-exit system, ahead of the other.

⁴² AMDQ cc is not differentiated by final customer (Tariff V or D) nor are they allocated directly to customers.

⁴³ Under the current access arrangement, pipeline services that are considered as likely to be sought by a significant part of the market (that is, reference services) are the gas transportation services that are provided to users in agreements made in accordance with the rules contained in Part 19 of the NGR.

⁴⁴ The access arrangement review provisions are set out in Part 8 of the NGR. See rule 50(1)-(4).

For example, the existing market scheduling arrangements may be compatible with an entry-exit system for allocating capacity. Under this option, AEMO would continue to use the (unconstrained) pricing schedule to determine trades between participants across the virtual hub, and the (constrained) operational schedule to manage constraints and congestion in the market. However, participants would need to match their bids and offers to AEMO with entry and exit rights booked through the new capacity allocation mechanism(s). The entry and exit rights would replace the existing AMDQ and AMDQ cc mechanism. While the ancillary and uplift payment mechanism would still be required to manage constraints and congestion on the system, the uplift allocation mechanism may require some revision in the absence of AMDQ and AMDQ cc. Under this approach, it is likely that participants holding entry and/or exit rights would not be liable for congestion uplift.

Similarly, an exchange-based trading model could conceivably operate alongside the existing DWGM, albeit with some amendments. For example, a Victorian virtual GSH based on the Wallumbilla GSH could be used to facilitate bilateral trades of gas for delivery at the DTS nominal reference hub. Participation would be on a voluntary basis and AEMO could be made responsible for centralised settlements and netting of delivery obligations (similar to Wallumbilla GSH). Within-day balancing would then continue to be conducted under the existing DWGM market rules. GSH participants with a physical net delivery obligation would participate in the DWGM (by bidding at 0 or at the market price cap) to ensure that the gas traded at the GSH was scheduled and that transportation to and from the DTS reference hub was secured.

That said, the Commission's initial view is that there are likely to be efficiencies in launching the Southern Hub trading and balancing arrangements and entry-exit system simultaneously, particularly in terms of the direct costs of reform. In addition, each component of the proposed reform, and the issues they are intended to address, are equally important with one no more urgent than the other.

Further, a key risk associated with sequencing the reform process is that latter stages are not progressed if, for example, government and/or industry appetite for change shifts during the transition period (this may occur for a number of reasons). The Victorian Gas Market Pricing and Balancing Review is one example of a three-stage change process which was not progressed beyond the implementation of stage one due in part to a shift in priorities.⁴⁵

⁴⁵ Stage 2 envisaged the introduction of transmission rights (which would replace AMDQ and AMDQ cc) together with a revised tariff structure. This was targeted for implementation in 2008 in line with APA GasNet's 2008-13 access arrangements but did not proceed. Stage 3 envisaged the introduction of locational, hub-based pricing and biddable pipeline capacity rights. This was a more speculative recommendation dependant on the relative success of stages 1 and 2. There was no target date.

6 Implementation and next steps

The Commission's draft recommendation is for governments to commit to the detailed design of a Southern Hub in Victoria, including the development of exchange-based continuous trading and a complementary system of entry and exit capacity allocation.

Reform of the Victorian DWGM is being carried as part of an integrated package of reform of the east coast gas markets. The interaction between the Victorian reforms and those proposed for the broader east coast is discussed in section 6.2.

6.1 Transitioning to the Southern Hub model

The Southern Hub model described in chapters 3 and 4 would require careful implementation and, as such, would necessitate careful management.

To implement the model would require:

- changes to the National Gas Law;
- substantial rule changes;
- the development of exchange based trading and a market-based balancing regime;
- the development of an entry-exit regime, including capacity allocation mechanisms and tariff methodologies;
- changes to the access arrangement for the DTS;
- changes to the market's scheduling, settlement and metering functions; and
- the development of new roles and functions and the identification of the appropriate institutions to take these roles.

The detailed implementation plan will be presented to the COAG Energy Council in the final report. In particular, the final report will set out our recommendations in full, along with the actions to implement them.

Prior to the final report, the Commission will give further consideration as to how the practical challenges associated with implementation should be managed. This may include the subsequent formation of a dedicated team to lead and co-ordinate implementation of the various elements of the reform roadmap. There may potentially also be a role for an advisory panel to provide stakeholder input.

While transition to a Southern Hub with entry and exit would provide many benefits to market participants wishing to trade gas in Victoria and, in turn, consumers of gas, there will also be costs involved in transitioning to the new framework. These include the costs associated with implementation of an exchange (and balancing platform),

integration with existing systems and operations, ongoing operational costs, and implementation and establishment costs for industry.

We are undertaking further work to understand the costs and likely benefits of implementing the reforms proposed and will present these findings in our final report.

Stakeholder views on how implementation might best be undertaken, if this model were recommended, are welcomed through this consultation process.

6.2 Reforming east coast gas markets

The Commission's recommendations for the East Coast and Victorian gas market reviews form a package of integrated reforms, developed with regard to the Energy Council's Vision and Gas Market Development Plan. Together, the proposed reforms support three key outcomes:

- Establishment of an efficient and transparent reference price for gas.
- Participants being able to readily trade gas between hub locations.
- Investment in infrastructure that responds to market signals and is facilitated by a supportive regulatory framework.

Once in place, these reforms would form a strong foundation for facilitated gas markets and transportation arrangements in eastern and southern Australia to promote the NGO and achieve the Energy Council's Vision.

The scope of the reform program will require leadership by the COAG Energy Council in implementing the agreed changes to the market and regulatory arrangements. The reforms should be implemented in a timely manner, but with recognition of the need for a detailed design phase and a clear and comprehensive transition and implementation strategy.

The reform plan will comprise the Commission's final recommendations from the East Coast and Victorian DWGM Reviews which, at this stage, cover three priority areas:

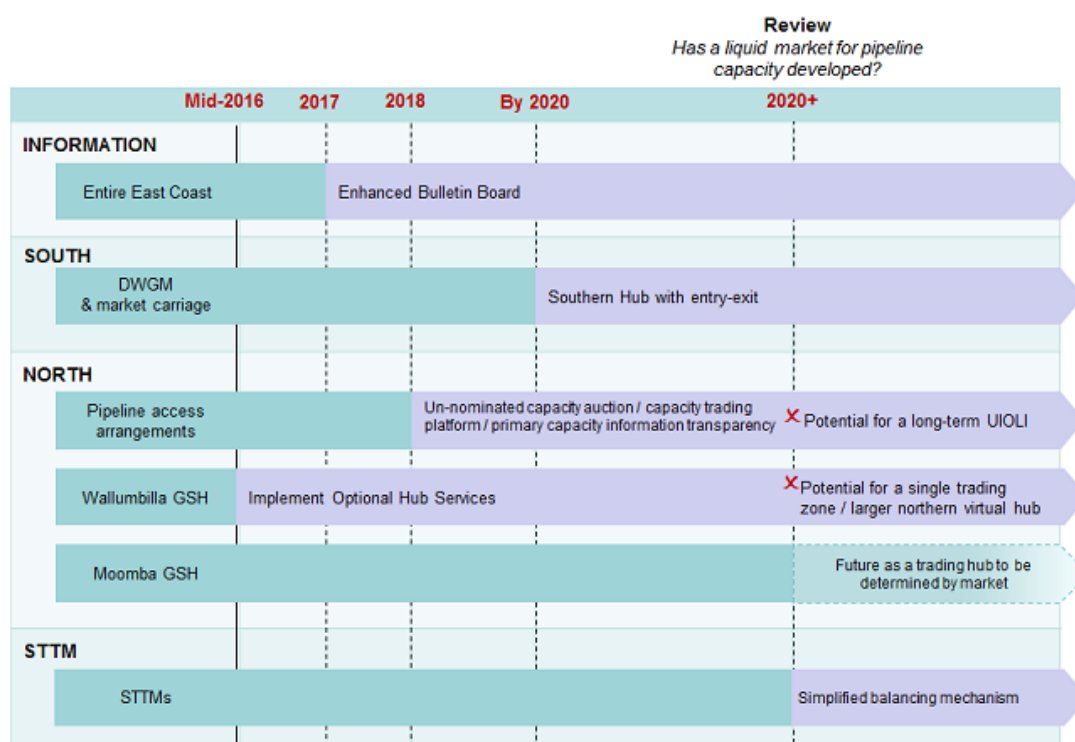
- Transition the Victorian DWGM to a Southern Hub model for trading supported by an entry-exit system for facilitating access to capacity.
- Introduce several mechanisms to facilitate trade in pipeline capacity markets.
- Transition the STTM gas demand hubs to simplified balancing mechanisms.

The incremental development of the existing Wallumbilla GSH, including the introduction of optional hub services, may be sufficient to develop a liquid trading hub in the north, particularly if a liquid market for pipeline capacity develops. However, in the event that this does not occur, it may be necessary to transition the Northern Hub to a single trading zone model at Wallumbilla or to a larger virtual hub similar to the Southern Hub in Victoria. This is a staging question for consideration at a later date.

Each priority area includes a number of specific reforms, some of which will be required to be implemented simultaneous with others, some in sequence with others and a number whose implementation will be contingent on the relative success (or otherwise) of other reform measures the Commission has recommended. On this basis, the Commission envisages that implementation of the integrated package of reforms will occur over several phases.

An overview of the reform process is set out in Figure 6.1 below. For greater detail on any of these workstreams please refer to the Stage 2 Draft Report for the East Coast Wholesale Gas Market and Pipeline Frameworks Review and the supplementary report on Information Provision.

Figure 6.1 Reforming east coast gas markets



A Terms of Reference - Victorian Declared Wholesale Gas Market Review

Background

The Victorian Government recognises that improvements may be made to the operation and efficiency of the eastern Australian gas market, to better facilitate market transparency and transmission capability, and increasing gas supply to meet rising demand at competitive prices.

The Victorian Declared Wholesale Gas Market (DWGM) is a single integrated market that provides participants with the ability to trade imbalances and purchase wholesale gas. The market was established by the Victorian Government in March 1999 to support full retail contestability and encourage diversity of supply and upstream competition.

The DWGM is operated by the Australian Energy Market Operator (AEMO). Between 1999 and 2007, the gas price was determined on a daily ex-post basis. From 2007, the market moved to ex-ante intra-day trading following a review by VENCORP in 2003-04, which found that the existing design did not provide participants with the ability to respond to changing market conditions throughout the day.

The DWGM facilitates trading and balancing arrangements for gas market participants, including retailers, gas-fired generators, large industrial users and producers. Since the inception of the DWGM, the market design has stimulated a competitive retail gas market and safeguarded the security of gas supply for Victorian customers. Currently, there are eight gas retailers competing in the retail market and six gas-fired generators connected to the Victorian Declared Transmission System (DTS). Notwithstanding this, substantial developments are set to impact the market over the next few years.

In response to the establishment of a liquefied natural gas (LNG) export industry, the east coast gas market will experience a structural change to demand and supply. Large volumes of gas from Queensland and South Australia will supply the LNG export plants, with end users in these states likely to source increasing volumes of gas from Victoria, transported north via the DWGM and Interconnect Pipeline or Eastern Gas Pipeline. With exports set to begin from late-2014, the domestic market is already feeling the effects of greater competition for gas. These developments are expected to put upward pressure on gas prices and have resulted in a renewed focus on the efficiency of the gas supply chain.

Given the uncertainty around market outcomes for participants, gas market arrangements need to be flexible enough to support a range of potential scenarios out past 2020. It will be important for end users, such as industrial and commercial customers, as well as retailers, to have the ability to effectively manage risk in the DWGM. To minimise inefficient congestion on the DTS, investment to expand the DTS needs to occur in a timely and efficient manner. Interaction between the DWGM and adjacent gas markets should also be as seamless as possible, as this will reduce

transaction costs and unnecessary volatility for market participants, minimising costs for end users of natural gas.

It is critical that a review of the Victorian DWGM be undertaken to examine whether the significant structural changes underway in the eastern gas market require reforms to enhance the liquidity, transparency and flexibility of the current arrangements.

In this context, the Victorian Government has requested that the Australian Energy Market Commission undertake, in consultation with AEMO, a thorough review of pipeline capacity, investment, planning and risk management mechanisms in the Victorian DWGM. The objective of this undertaking is to ensure arrangements for access to the pipeline capacity promote competition, risk management by market participants and provide appropriate investment signals and incentives.

The AEMC will undertake the review in accordance with this Terms of Reference and provide a report with recommendations to the Victorian Government for consideration. The Victorian Government notes that the COAG Energy Council has separately tasked the AEMC with reviewing the design, function and roles of facilitated gas markets and gas transportation arrangements on the east coast. The two reviews are related in scope and similar in timing and it is expected that the relevant findings and recommendations to be reflected in both reviews (where appropriate).

Purpose

The review is to consider whether the DWGM provides appropriate signals and incentives for investment in pipeline capacity, allows market participants to effectively manage price and volume risk, and facilitates the efficient trade of gas to and from adjacent markets. More broadly, the review is to consider whether and to what extent the DWGM continues to effectively promote competition in upstream and downstream markets, in the long term interest of consumers.

These Terms of Reference are intended to guide the AEMC's review of the Victorian DWGM.

Scope

The AEMC is required to undertake a review of the Victorian DWGM that considers:

1. Effective risk management in the DWGM: the ability of market participants to manage price and volume risk in the DWGM and options to increase the effectiveness of risk management activities.

The Victorian Government is concerned that an inability for market participants to effectively hedge risk in the DWGM is limiting the potential of the market to achieve greater transparency and efficiency of trade in natural gas.

The ASX Victorian Wholesale Gas Futures Product is available but not widely traded as it can only be used to hedge against the ex-ante market price and not uplift charges. Further, while Authorised Maximum Daily Quantity (AMDQ) and AMDQ credit

certificates provide participants with some protection against uplift charges, they cannot be used as a hedge against surprise or common uplift charges.

The AEMC is to investigate the underlying issues that are preventing greater use of derivatives and other risk management tools in the DWGM, outline the features of an efficient financial derivative market for gas and the changes that would need to be made in the DWGM to facilitate this.

2. Signals and incentives for efficient investment in and use of pipeline capacity: whether market signals and incentives are providing for efficient use of, and efficient and timely investment in, pipeline capacity on the DTS.

Investment decisions to augment the DTS are currently largely made in response to a five year regulatory determination process. While the DWGM arrangements provide a form of tradeable pipeline capacity rights, through AMDQ and AMDQ credits, these rights have limitations in terms of providing certainty of access when the pipeline is constrained, and in allowing “free-rider” access when spare capacity is available. Consequently, they have been of limited effect in supporting private pipeline investment in the DTS. Investment guided by regulatory processes may be less efficient and timely than relying on market driven incentives. If firm, tradeable access rights to pipeline capacity were available, in a form that addressed these current limitations, this may enhance private investment, as prices for the access rights would signal the need for future investment.

The AEMC is to investigate whether investment in the DTS is expected to continue to occur in a timely and efficient manner. This investigation should also consider the interaction between regulated and private investment and whether the costs of pipeline investment and usage are allocated to users on an equitable basis. If appropriate, the AEMC is to recommend changes to strengthen the signals and incentives for efficient investment, and enhance access to, and short term trading of, pipeline capacity.

3. Trading between the DWGM and interconnected pipelines: To maximise the efficiency of trade in natural gas and facilitate competition in upstream and downstream markets, producers and shippers should be able to effectively operate across the different gas trading hubs on the east coast without incurring substantial transaction costs.

The AEMC is to examine if, and to what extent, the current DWGM arrangements inhibit trading of gas between the DTS and interconnected facilities and pipelines. Elements like transparent, adaptable pricing between the DWGM and interconnected pipelines, combined with ready access to pipeline capacity, may be required to enable shippers to better manage risk and facilitate the efficient trade of gas between interconnected hubs and pipelines.

In considering items 1 and 2 above, the AEMC should examine alternative pricing, risk management and pipeline access mechanisms for the DWGM that would also enhance efficient trading of gas with interconnected pipelines and facilities.

4. Promoting competition in upstream and downstream markets: whether the DWGM arrangements continue to facilitate market entry and promote competition in upstream and downstream markets and how this could be improved.

Taking into account the analysis and any recommendations from the areas of review above, the AEMC should assess whether the DWGM continues to effectively encourage the introduction of new gas supplies to the market and promote competition among retailers in the sale of gas. The AEMC should also comment on the extent to which the design of the DWGM may be a deterrent to large users of gas from participating in the market where it may otherwise be commercially practical for them to do so, and the extent to which this may have an adverse impact on gas usage, trading and market liquidity.

If the AEMC proposes recommendations for market reform, it should clearly demonstrate to the Victorian Government and Council of Australian Government's (COAG) Energy Council how the recommendations address the issues identified, that they continue to safeguard the security of gas supplies to Victorian customers, are proportionate to the problem being addressed and how they promote the national gas objective.

Considerations

In undertaking the review and forming its recommendations, the AEMC is to consider:

- the physical characteristics, size, maturity and interconnectedness of the Victorian gas market;
- the nature of the commercial arrangements underpinning the supply and transportation of gas;
- developments in other eastern Australian gas markets; and
- relevant international experience.

The AEMC is also to consider and incorporate (where appropriate) the findings and recommendations from its concurrent review of Australia's facilitated gas markets.

More broadly, the AEMC is also to consider:

- the National Gas Objective; and
- the COAG Energy Council's Gas Market Development Plan.

Consultation

The Victorian Government requires that the AEMC undertake a formal stakeholder consultation process, including the release of an issues paper, options paper and a draft report for consultation at minimum. If considered appropriate, the AEMC should also hold public forums and/or workshops.

The AEMC is required to establish a stakeholder reference group that will meet periodically throughout the review and prior to the completion of each of the review milestones, and comprise membership of AEMO, representatives of pipelines, consumers, retailers, producers, large users and any other party the AEMC deems appropriate. This stakeholder reference group will also be used for the AEMC's review of facilitated gas markets on the east coast and additional Victorian-specific representatives may be invited.

The AEMC is to utilise the experience of the Australian Energy Regulator as appropriate.

Timeframes and deliverables

The AEMC is to undertake the review over a maximum period of 18 months, taking into consideration the indicative timeframes set out below. This will allow the AEMC to undertake extensive engagement with stakeholders and propose well developed recommendations to the Victorian Government.

The Victorian Government notes that these timeframes represent an upper bound and the AEMC should use its best endeavours to complete each stage of the review promptly and ahead of schedule. Public consultation should be for a minimum of four weeks for each report and a copy of the draft and final reports must be provided to Victorian Government officials and the COAG Energy Council officials one week before publication.

Milestone	Timing
Public forum (in conjunction with the Review of Facilitated Markets)	February 2015
Issues Paper	April 2015
Options Paper	August 2015
Publish Draft Report, including request for Victorian Government response on any significant initiatives identified by the AEMC	December 2015
Final Report	The Final Report will be published following receipt of the Victorian Government's response to findings and recommendations in the Draft Report

Before finalising a detailed implementation plan for its proposals in the final report, the AEMC will seek a formal response from the Victorian Government and the COAG Energy Council to some of its recommendations in the draft report.⁴⁶

⁴⁶ For example, if the AEMC proposes significant changes to the National Gas Rules, the AEMC will seek a response from the COAG Energy Council at the draft report stage before finalising the review.

B Assessment of packages

This appendix sets out the Commission's assessment of the following five packages for reform outlined in the DWGM Review Discussion Paper released in September 2015.

Figure B.1 Packages for reform presented in the Discussion Paper

Market improvements	Market development		Market reform	
Package A Targeted measures	Package B Transmission rights	Package C Capacity rights	Package D Entry/Exit model	Package E Hub & Spoke model
Targeted transmission rights	Simplified pricing mechanism	Zone-based pricing and capacity rights	Entry/Exit model	GSHs at Longford and Iona and balancing in Melbourne
Trading of AMDQ rights	Transmission rights			
Clearer AMDQ allocation process				
Review planning standard				

The remainder of this appendix is structured as follows:

- section B.1 provides an overview of the assessment framework applied by the Commission;
- section B.2 assesses the packages in their ability to resolve existing issues associated with risk management in the DWGM;
- section B.3 assesses the packages in their ability to resolve existing issues associated with a lack of signals and incentives for efficient investment in and use of pipeline capacity;
- section B.4 assesses the packages in their ability to promote trading between the DWGM and interconnected pipelines; and
- section B.5 assesses the packages in their ability to promote competition in upstream and downstream markets.

Sections B.2 - B.5 all provide a summary of the existing issues with the DWGM and market carriage arrangements applying in Victoria. For a more thorough appraisal of the existing arrangements, please refer to the Victorian DWGM Review Discussion Paper released in September 2015.⁴⁷

⁴⁷ AEMC 2015, *Review of the Victorian Declared Wholesale Gas Market, Discussion Paper*, 10 September 2015, Sydney.

B.1 Assessment framework

The Commission's consideration of the packages is guided by the terms of reference for the DWGM review. Specifically, the terms of reference request that the AEMC consider the following four issues:

1. Effective risk management in the DWGM.
2. Signals and incentives for efficient investment in and use of pipeline capacity.
3. Trading between the DWGM and interconnected pipelines.
4. Promoting competition in upstream and downstream markets.

In assessing each package's ability to address these four issues, we have applied the assessment framework developed for this review and the wider east coast review.⁴⁸

The assessment framework is structured so that the single overarching objective guiding the AEMC is the National Gas Objective (NGO). The NGO is set out in section 23 of the National Gas Law and states:

“The objective of this Law is to promote efficient investment in, and efficient operation and use of, natural gas services for the long term interests of consumers of natural gas with respect to price, quality, safety, reliability and security of supply of natural gas.”

In applying the NGO, the AEMC has had regard to the Energy Council's Vision and Gas Market Development Plan.⁴⁹

Overall, the Vision provides the Commission with a high level policy statement to guide its analysis through the review. The elements that make up the Vision can be considered the "means" of promoting the overarching objective – the NGO – through increasing the efficiency of the gas market, for the long term benefit of consumers of natural gas services.

Sitting below the NGO and Vision are high level attributes that the Commission considers support the development of well-functioning, workably competitive markets and that are generally required for the NGO and Vision to be achieved. These are:⁵⁰

⁴⁸ This assessment framework can be found in Chapter 2 of the Stage 1 Final Report as part of the east coast review or Appendix E of the DWGM Review discussion paper.

⁴⁹ For a thorough discussion of the Vision please see Chapter 2 of the Stage 1 Final Report as part of the east coast review or Appendix E of the DWGM Review discussion paper. The Vision itself and the Gas Market Development Plan can be found at:
<http://www.scer.gov.au/workstreams/energy-market-reform/gas-market-development/>

⁵⁰ We note that these build on factors previously identified and used by the AEMC and others. See, for example: K Lowe Consulting, *Gas Market Scoping Study*, A report for the AEMC, July 2013, p. 86; and: ESAA, *Assessment of the East Coast gas market and opportunities for long term strategic reform*, Final Report, May 2013, p. 37.

1. Demand and supply conditions reflected in prices: market participants should have access to a meaningful reference price reflective of underlying supply and demand conditions that usefully aids commercial investment decisions.
2. Timely and efficient investment in infrastructure: efficient additions to, and expansions of, infrastructure to enable supply to meet demand while minimising the cost of excess capacity.
3. Readily available market information: efficient outcomes are likely to be achieved when participants (current and potential) have access to clear, timely and accurate information about prices and factors driving prices, such as supply and demand conditions.
4. Price and volume risks can be managed and are appropriately allocated: participants being able to manage operational risks to delivery of physical gas while maintaining safe operating parameters, as well as being able to insure themselves adequately against financial risks.
5. Minimised barriers to entry: barriers to entry (and exit) can be a function of market structure, government regulation, industry-specific sunk costs or geography, and certain barriers have the potential to detract from the ability of markets to deliver efficient outcomes.
6. Minimised transaction costs: efficient transaction costs support timely and efficient investments in infrastructure and encourage competition.

These characteristics, if in place, would form a strong foundation for facilitated gas markets and transportation arrangements in eastern and southern Australia to promote the NGO and achieve the Energy Council's Vision.

Further, in assessing these packages, we have explicitly considered the feasibility of implementing the same or similar designs in a 'northern' market, consistent with the concepts set out in the Wholesale Gas Markets Discussion Paper. The Commission considers the simplification and consolidation of market designs operating on the east coast to be an important aspect of reducing transaction costs in order to encourage greater trading and participation.

Our assessment of each package in light of the four issues raised in the terms of reference is provided in the sections below.

B.2 Effective risk management in the DWGM

Efficient gas markets tend to allow participants to manage the physical operational risks of delivering gas safely, as well as the financial risks associated with price fluctuations. To support effective risk management, market participants need to have access to a meaningful reference price reflective of underlying supply and demand conditions. A meaningful price will aid commercial decision making and the development of financial products.

The Victorian Government is concerned that market participants are unable to effectively hedge risk in the DWGM and that this is limiting the potential of the market to achieve greater transparency and efficiency of trade in natural gas.⁵¹

As outlined in the discussion paper, the ability of market participants in the DWGM to manage their risks is currently limited. This includes both specific risk management tools as well as being able to adapt their actions to better manage risk.

In a developed market, we would expect financial products to be made available so that participants can hedge their risk in the spot market. While the ASX has released a number of such products, it appears that the DWGM currently exhibits a number of characteristics that may limit the uptake of these products. These characteristics include:

- parties not being able to take equal but opposite positions in the spot and futures market for a particular quantity of gas because uplift payments are determined ex-post and not known before;
- the lack of a standardised physical product that financial products can reference; and
- the vast majority of participants are effectively managing wholesale price risk by buying wholesale gas straight from upstream producers, and then selling it to themselves through the DWGM using bilateral contracts.

The Commission's assessment of packages is provided in the section below. The section following then presents the views raised by stakeholders in submissions in relation to the ability of these packages to resolve existing issues relating to risk management.

B.2.1 Assessment of packages

Of the packages assessed, the Commission considers that package D (the entry-exit model) is most likely to facilitate the development of an efficient financial derivative market for wholesale gas in Victoria. Package D involves augmenting the existing DWGM hub design by:

- establishing a virtual hub that represents a purely wholesale gas commodity market (that is, no implicit allocation of capacity); and
- introducing an entry-exit model for allocating DTS capacity.

The Commission considers that to promote wholesale trading of gas, an exchange should be established under package D, similar to that currently existing at Wallumbilla. The Commission envisages that the exchange would publish an end of day, volume-weighted price. The purpose of doing so would be to provide the market with a single price for gas that financial derivative products could reference. Various price reporting agencies successfully report reference prices in other gas markets,

⁵¹ DWGM Review Terms of Reference, p. 2.

typically based off an amalgam of both exchange trades and bilateral trades. These bodies provide a service in the commercial interests of gas market participants and their role in the Southern Hub will emerge over time if demanded by the market.

Importantly, package D would remove the existing ancillary payment mechanism. This would allow for a standardised product to develop (such as the existing Exchange Agreement at the Wallumbilla GSH) and for parties to take equal but opposite positions in the spot and futures market for a particular quantity of gas. Should liquidity develop sufficiently in the market for physical gas, then package D also supports a transition overtime away from long-term bilateral gas supply contracts to where parties procure, or at least price, gas at the wholesale market, as has happened in overseas gas markets.

The success of package D, however, depends on liquidity developing at the virtual hub. If sufficient liquidity does not develop, then the observed DWGM ex-ante market price is likely to be susceptible to both a small volume of trades and a small number of market participants, which encourages volatility in the ex-ante market price and add to the price risk faced by participants. However, the Commission considers that any initial liquidity concerns are secondary to ensuring the necessary preconditions are in place to encouraging the development of financial derivative products.

In addition, there are certain characteristics unique to Victoria and package D that strongly support the development of trading liquidity, namely:

- The variable and unexpected nature of demand in Victoria creates a short term need to trade gas as a result of gas supply and demand differing from what was expected.
- Victoria has the largest concentration of buyers and sellers of all current facilitated markets on the east coast.
- Package D involves a virtual hub that concentrates liquidity and allows gas to be traded independently of its location in the system.
- Parties are incentivised to 'trade out' imbalances under package D.⁵²

Package A (targeted measures) is the only package that retains the existing ancillary payment mechanism. Under this package, there would be no explicit mechanisms to deliver an efficient reference price and, as such, this package would be unlikely to contribute directly to the development of new financial risk management products.

Package A would, however, include a mechanism to allow participants to better manage their short term risk exposure and optimise their portfolios. This measure would enable market participants to transfer all or part of their portfolio of financial benefits associated with holding AMDQ and AMDQ cc to other market participants operating in the DWGM (the holder of the AMDQ and AMDQ cc would remain unchanged). However, the Commission considers that this mechanism would likely

⁵² These incentives are outlined in detail as part of Chapter 3.

result in a more complex operating environment for market participants while only delivering modest improvements to their ability to manage risk.

In both packages B (simplified pricing mechanism with transmission rights) and C (zonal pricing with capacity rights) the existing ancillary payment mechanism would be removed. Specifically, these packages involve having a single schedule that optimises bids and offers subject to all transmission pipeline constraints (for example, similar to the current operating schedule), and adopts the highest priced injection or withdrawal that is scheduled as the market clearing price for the DWGM. The intention of this mechanism would be to simplify and increase the transparency of market prices, and internalise the current ancillary payments in the market price.

While market prices may become higher and more volatile under packages B and C than currently, it is likely that participants would face risks that they are able to hedge. Specifically, the move to a 'cleaner' market price that internalises the costs currently associated with ancillary payments should support the development of complementary financial products that allow DWGM participants to hedge their exposure to price risk.

Packages B and C are therefore similar to package D in that they are likely to support the development of financial risk management products, while not detracting from liquidity. However the simplified pricing mechanism applied under packages B and C would still likely require prices to be administratively set five times a day to ensure the safe operation of the system. The resultant five observed prices during a day may discourage the development of financial products compared to package D.

As with package D, liquidity would also be a concern for package E (the hub and spoke model) where there are two hubs that parties can trade wholesale gas at in Victoria, ie, Iona and Longford. In addition, the success of package E further depends on liquid trading of capacity developing on the spokes. While this outcome is being promoted as part of the wider east coast review, it would be unproven initially. In addition, the Commission is concerned that demand variability on the spokes would result in Dandenong LNG being scheduled more frequently than currently to balance the DTS.

B.2.2 Summary of submissions

Submissions expressed the general view that reform of the DWGM is required to improve the ability of participants to manage the risks they face. However, stakeholders appeared cautious to offer support for specific packages and there was no clearly preferred package of reform expressed in this regard.

The views raised by parties on each package are summarised below.

Package A

GDFSAE and APA both were of the view that package A would not improve liquidity or overcome the issues that prevent the DWGM from providing an efficient reference price, so would not facilitate the development of financial risk management

products.⁵³ Origin also recognised that package A would not deliver an efficient reference price.⁵⁴

ERM considered that package A would not address issues around unmanageable uplift risk and the inefficient allocation of congestion uplift. ERM stated that retaining ancillary payments and uplift charges would not facilitate the development of financial instruments.⁵⁵

Package B

ESAA, Origin and ERM stated that package B, where there is a single market price that encompasses all pricing risk, would reduce complexity, support the development of financial risk management products, enhance price discovery and foster greater market participation and liquidity.⁵⁶ GDFSAE considered that participants would have a greater ability to hedge against the risk under package B.⁵⁷

AEMO considered that participants might be discouraged from using the spot market under package B if they are exposed to risks of high prices due to constraints in other parts of the DWGM.⁵⁸ AEMO further considered that the proposed simplified pricing mechanism could result in gaming as there may be an incentive to push up prices of the wholesale market by withholding cheaper injections to create constraints.⁵⁹

Package C

Origin and MEU considered that the different prices in each of the zones under package C would make it difficult to develop a reference price or a secondary market.⁶⁰ ERM and APA considered that the small number of participants in each zone may result in less liquidity and that the risk of participants using market power to influence prices may be higher.⁶¹

Package D

AEMO considered that a reference price could be derived under package D from the trades that occur on the exchange, and that this may be adequate for developing a forward market and derivatives.⁶²

⁵³ DWGM Discussion Paper Submissions: APA, p. 1; GDF SUEZ, p. 3.

⁵⁴ Origin, DWGM Discussion Paper Submission, p. 1.

⁵⁵ ERM, DWGM Discussion Paper Submission, p. 9.

⁵⁶ DWGM Discussion Paper Submissions: ERM, pp. 3-4; ESAA, p. 3; Origin, p. 2.

⁵⁷ GDF SUEZ, DWGM Discussion Paper Submission, p. 3.

⁵⁸ AEMO, DWGM Discussion Paper Submission, p. 6.

⁵⁹ AEMO, DWGM Discussion Paper Submission, p. 6.

⁶⁰ DWGM Discussion Paper Submissions: MEU, p. 37; Origin, p. 3.

⁶¹ DWGM Discussion Paper Submissions: APA, p. 18; ERM, p. 9.

⁶² AEMO, DWGM Discussion Paper Submission, p. 10.

ERM and APA considered that package D may not be sufficient to increase liquidity since the number of participants in the east coast gas market is not significant and participants with entry and exit rights would likely obtain contracts for gas supply. However, it was recognised that package D may provide greater flexibility for participants managing their portfolios.⁶³

Package E

APGA considered that package E would provide the most conducive environment for liquidity to develop and that it would enable the development of bespoke market services and financial derivatives to assist in price risk management. APGA also considered that Longford and Iona are sufficiently close and could form a single southern supply hub in the future, with contract carriage pipelines between them.⁶⁴

B.3 Signals and incentives for efficient investment in and use of pipeline capacity

Timely and efficient investment in infrastructure involves additions to, and expansions of, infrastructure that enable supply to meet demand while minimising the cost of excess capacity.

For efficient and timely market-led investment to occur, investors need clear signals around the need for capacity extensions and expansions (augmentations). These signals enable potential investors to make informed decisions around the size, location and timing of pipeline investment.

As outlined in the discussion paper, there is currently a lack of fully effective signals to the market regarding the need for investment in new DTS pipeline capacity.

While the market carriage model is generally considered to promote both the efficient use of the DTS (that is, through the operation of the DWGM) and circumvent the need for any pipeline capacity market, it may not promote efficient and timely investment. While some market-led investment has occurred for capacity to move gas out of the DTS, investments to relieve constraints within the system are unlikely to be market-led since expected benefits attributable to such investments are unlikely to outweigh the costs to individual market participants. Specifically, market participants cannot obtain firm access rights for the transportation of gas and therefore have little incentive to underwrite investments in the pipeline system.

In the absence of market-led investment, most capacity expansions in the DTS have been progressed through the five yearly regulatory process. However, with an anticipated need to expand the network going forward to accommodate gas flowing north out of the DTS, it is therefore questionable whether it is appropriate for the risks associated with over-investment to be borne by Victorian consumers.

⁶³ DWGM Discussion Paper Submissions: APA, p. 21; ERM, p. 10.

⁶⁴ APGA, DWGM Discussion Paper Submission, pp. 3-4.

More generally, the issues associated with market carriage become more pronounced as capacity constraints emerge. For example, as capacity constraints emerge on a market carriage pipeline system, any inefficiencies associated with untimely regulatory-driven investment may worsen.

B.3.1 Assessment of packages

The virtual hub and entry-exit model of package D (the entry-exit model) is designed to complement wholesale trading at the Southern Hub and to improve investment signals and the degree of market-led investment in the system more broadly. In particular:

- An auction process would be responsible for allocating existing, and potentially triggering new, capacity at entry and exit points on the DTS where there are multiple participants active. Such a process provides clear signals around the need for new capacity and encourages market-led investment in that new capacity.
- Participants wishing to access entry and exit points where they are the sole active party will continue to face regulated charges to do so. However, should a party wish to have capacity expanded at one of these points (eg, because their operations have expanded), they will be required to provide a pre-commitment to pay the regulated access charges for a number of years into the future. While this also provides a signal that investment is required and an incentive for that investment to be market-led, these are not as strong as for entry and exit points where there are multiple participants active and auctions can be used.

In order to increase entry or exit capacity at particular points on the transmission network under package D, it will be necessary to invest in certain parts of the pipeline system. While the costs of this investment can be attributed to the various entry/exit points that benefit from the additional capacity, there is a less precise locational signal for this investment as compared to under contract carriage.

Where there are physical constraints in the transport capacity available, package D may create challenges in scheduling flows within the entry-exit system. Such constraints can lead to capacity having to be reduced at various entry/exit points in the network in order to manage the constraint and/or significant redirection of flows, which could undermine the flexibility of the entry-exit scheme and potentially increase costs.

As outlined above, package A (targeted measures) would enable market participants to transfer all or part of their portfolio of financial benefits associated with holding AMDQ and AMDQ cc to other market participants. It is anticipated that this, in turn, would encourage more efficient utilisation of the Victorian DTS. This is on the basis that if market participants are able to access the benefits of AMDQ and AMDQ cc, then they may be more willing to utilise existing pipelines and should contribute to the pipeline being expanded only when it is efficient to do so.

Package A also involves establishing a usage charge (called an "expanded asset charge") that would apply to market participants that use an asset whose recent expansion has been privately funded by another market participant, and refunding or rebating the revenue collected from this charge to the foundation market participant as compensation. This mechanism is aimed at resolving the free-riding effect associated with investment in the DTS currently and providing incentives for market-led investment. Key to the success of this package is the development of the usage and allocation rules, which is anticipated to be a significantly complex process and only able to result in an arbitrary allocation between participants.

Overall, the multiple schemes proposed under package A represent a step-change in complexity for participants wishing to buy and sell gas in Victoria. Further, these mechanisms are not, in aggregate, expected to provide signals and incentives for efficient investment in and use of pipeline capacity.

Package B (simplified pricing mechanism with transmission rights) would extend the limited transmission rights included in package A by translating the existing AMDQ and AMDQ cc mechanisms into a transmission right for all DTS assets (ie, both existing and future expansions). It would do so by introducing different tariffing arrangements for use of the DTS. The intention is to provide market participants the opportunity to pay for firm transmission rights and thereby encourage market-led investment in the DTS. Under this package, market participants could contract with APA for the majority of their flows as firm transportation services.

Any investment-signalling benefit associated with package B would depend on being able to set overrun charges for non-firm services⁶⁵ at an appropriate level, which in the DTS is likely to be a difficult task. Requiring participants to acquire transmission rights also represents a significant increase in complexity and transaction costs for parties wishing to trade gas in Victoria.

Package C (zonal pricing with capacity rights) would establish multiple pricing zones and introduce capacity rights between the zones. This would provide a market determined price for usage of the system by users without such rights, and therefore a signal for investment. As the capacity rights would relate only to inter-zonal congestion, the market-led signals would only drive investment between zones – a separate process would be required to govern investment within zones. The Commission does not consider that package C would support market-led investment in the DTS better than package D and would result in a significant increase in complexity and transaction costs for market participants.

Package E (hub and spoke model) would involve converting the DTS to a set of contract carriage pipelines which could resolve both the lack of investment signals currently provided via the DWGM and encourage timely and efficient investment in pipelines via market-led investment. However, the Commission considers that converting the DTS to a set of contract carriage pipelines under package E would present considerable challenges at this stage. For example, the definition of firm

⁶⁵ Overrun charges apply for pipeline usage by users outside of their capacity rights.

point-to-point rights on the DTS is difficult given the available capacity between any two points is significantly influenced by the expected pattern of injections, withdraws and flows everywhere across the network.

In addition, the success of package E would depend crucially on the fluidity and effectiveness of secondary trading of capacity measures on the spokes, which, while this is being promoted as part of the wider east coast review, will be unproven initially. The Commission considers that, even if secondary trading of pipeline capacity were to develop sufficiently in Victoria, participants would be faced with significant associated transaction costs, eg, where traders need to move gas across the DTS and so require capacity to do so.

In its submission to the DWGM Review Discussion Paper, APA proposed a refinement to package E. This alternative would involve transforming the 'spokes' of package E into a set of contract carriage pipelines, but selling a proportion of firm capacity to AEMO to operate the DWGM. Shippers would be able to invest in the high capacity 'spokes' and receive firm rights to capacity.⁶⁶

The Commission considers that, while this refinement may improve the extent of market-led investment on the 'spokes', it suffers from the design challenges outlined above for package E. In addition, the Commission considers that there remain issues relating to stimulating market-led investment for the majority of Victorian demand, ie, residential customers. In particular, the Commission does not consider that a system whereby AEMO acts as an agent for retailers on behalf of end-use customers, would resolve the lack of market-led investment in the DTS. There are also questions around whether AEMO could realistically play the role envisaged in this proposal under its current mandate.

B.3.2 Summary of submissions

Submissions expressed the general view that reform of the DWGM is required to better provide signals and incentives for efficient investment in and use of pipeline capacity. However, stakeholders appeared cautious to offer support for specific packages and there was no clearly preferred package of reform expressed in this regard.

The views raised by parties on each package are summarised below.

Package A

ERM considered that targeted transmission rights under package A would involve minimal complexity and provide some incentive for participant funded investment in the DTS. ERM stated that this could involve sharing a component of transmission revenues with participants that invest in future expansions.⁶⁷

⁶⁶ APA, DWGM Discussion Paper Submission, p. 1.

⁶⁷ ERM, DWGM Discussion Paper Submission, p. 6.

AEMO stated that determining an efficient charge for targeted transmission rights under package A would be challenging. AEMO stated that if the price is too low it could disincentivise participants from investing, and that if the price was too high, it would be a barrier to entry for new participants using the pipeline, or could penalise users who inadvertently use additional capacity. However, AEMO considered this could be mitigated through tolerances.⁶⁸

Package B

The ESAA considered that introducing transmission capacity rights under package B into the DWGM would be expected to facilitate market led investment in network expansions. The ESAA further considered that transmission capacity rights should not make the transmission framework more complex in an attempt to align it with incentives for investment under a contract carriage framework.⁶⁹

A number of parties considered that a simplified pricing mechanism would not encourage participants to adhere to their schedules to reduce the probability of constraints.⁷⁰ AEMO, APA and the MEU further considered that the proposed simplified pricing mechanism model would not result in cost to cause allocation of congestion prices as costs of congestion are shared across all users and all locations.⁷¹ APA considered that a simplified pricing mechanism would not provide a signal for investment during times of congestion.⁷²

AEMO considered that determining an efficient overrun charge would be challenging for package B since it would need to consider how to allocate revenue across multiple firm rights holders, the implications of intra-day rescheduling (if any) and how out of merit order gas is treated.⁷³ GDFSAE noted that the overrun charge would need to be high enough to incentivise new investment, but low enough to ensure that any spare pipeline capacity could be efficiently utilised.⁷⁴

Origin stated that any re-balancing of transmission tariffs under package B would create winners and losers and that the effects on various parties should be carefully considered. Origin also considered that the costs of contracting for firm transmission rights would likely be higher than the costs of contracting for AMDQ cc, and that consumers would likely bear the higher costs.⁷⁵

Package C

⁶⁸ AEMO, DWGM Discussion Paper Submission, p. 5.

⁶⁹ ESAA, DWGM Discussion Paper Submission, p. 3.

⁷⁰ DWGM Discussion Paper Submissions: AEMO, p. 6; ERM, p. 4; APA, pp. 15-16; MEU, p. 35.

⁷¹ DWGM Discussion Paper Submissions: AEMO, p. 6; APA, p. 16; MEU, p. 34.

⁷² APA, DWGM Discussion Paper Submission, p. 15.

⁷³ AEMO, DWGM Discussion Paper Submission, pp. 5-6.

⁷⁴ GDF SUEZ, DWGM Discussion Paper Submission, p. 3.

⁷⁵ Origin, DWGM Discussion Paper Submission, p. 2.

GDFSAE considered that package C would provide effective pricing signals that identify where congestion is occurring and therefore stronger signals for investment.⁷⁶

AEMO noted that, as package C is not fully nodal, the prices would still be an approximation and so signals would still be imperfect, although more granular than the current market. It also considered that inter-temporal factors may cause price differentials between zones even if there are no constraints in the capacity between zones. AEMO further considered that capacity rights and pricing could be very complex, given the inter-temporal nature of gas flows that can be managed through linepack.⁷⁷

Origin considered that package C would only partially address the investment signal issue, as investment signals would only relate to the point between zones, not investment that is needed within a zone.⁷⁸

Package D

AEMO, APA and the MEU considered that while an entry-exit system may provide investment signals at the borders of the network, it may not provide adequate signals for investment within the network.⁷⁹ The MEU stated that centralised planning would be necessary to identify and carry out investment within the network.⁸⁰

The ESAA, Origin and APA considered that package D and the current DWGM both offer independent entry and exit rights from the transmission system and can create firm like injection and withdrawal rights. Consideration of this option should clearly state the benefits compared to the current DWGM.⁸¹ The ESAA and Origin also considered that package D would need to carefully consider how congestion would be managed.⁸²

Package E

GDFSAE considered that package E would result in more efficient investment in pipelines and better allocation of investment risk.⁸³

APA considered that the systems and structures to support contract carriage under package E were already in place in other jurisdictions and that significant investment would not be required.⁸⁴ APGA considered that package E would minimise the need

⁷⁶ GDF SUEZ, DWGM Discussion Paper Submission, p. 3.

⁷⁷ AEMO, DWGM Discussion Paper Submission, p. 7.

⁷⁸ Origin, DWGM Discussion Paper Submission, p. 3.

⁷⁹ DWGM Discussion Paper Submissions: AEMO, p. 10; APA, p. 22; MEU, p. 38.

⁸⁰ MEU, DWGM Discussion Paper Submission, p. 38.

⁸¹ DWGM Discussion Paper Submissions: ESAA, p. 3; Origin, p. 3; APA, pp. 21-22.

⁸² DWGM Discussion Paper Submissions: ESAA, p. 3; Origin, p. 4.

⁸³ GDF SUEZ, DWGM Discussion Paper Submission, p. 4.

⁸⁴ APA, DWGM Discussion Paper Submission, p. 28.

for regulatory intervention compared to virtual markets which often result in heavy handed and intrusive regulation.⁸⁵

AEMO and the MEU considered that there could be a reduction in operational efficiency, or a higher risk of pressure breaches, under package E if the management of and balancing provided by pipelines was no longer centrally coordinated. Coordination to maximise usable linepack is particularly important to manage swings in demand from cold weather or surprise events.⁸⁶ The MEU considered that imbalance tolerances may need to be narrowed and penalties increased to manage the limited linepack.⁸⁷

AEMO and ERM both stated that, given the DTS is a meshed network, defining the point-to-point rights for contract carriage would be complex.⁸⁸ AEMO further stated that while contract carriage may encourage investment, this does not necessarily mean the investment would be efficient or achieved at lowest cost.⁸⁹

B.4 Trading between the DWGM and interconnected pipelines

To maximise the efficiency of trade in gas and facilitate competition in upstream and downstream markets, shippers and producers should be able to effectively operate across different locations on the east coast without incurring substantial transaction costs.

During the early years of the development of the east coast gas industry, gas flowed primarily from production sources directly to demand centres. Production around Roma was used to supply Brisbane and Gladstone; production at Moomba supplied Adelaide and Sydney; and Victorian offshore gas fields supplied Melbourne. There was effectively no integration between the sources of supply and demand.

Over the years, the east coast gas industry has changed significantly. Many new pipelines have been constructed, most recently the LNG pipelines in Queensland and, prior to that, the Eastern Gas Pipeline, the SEA Gas Pipeline and QSNLink, amongst others. As a result, the market in eastern and southern Australia is now fully integrated, with transmission pipelines forming an interconnected grid.

In comparison, the market and regulatory frameworks remain somewhat fragmented and disjointed. Today, on the east coast, there are:

- three different facilitated market designs (DWGM, STTM and GSH) with five pricing points;

⁸⁵ APGA, DWGM Discussion Paper Submission, p. 4

⁸⁶ DWGM Discussion Paper Submissions: AEMO, p. 11; MEU, p. 42.

⁸⁷ MEU, DWGM Discussion Paper Submission, p. 42.

⁸⁸ DWGM Discussion Paper Submissions: AEMO, p. 11; ERM, p. 10.

⁸⁹ AEMO, DWGM Discussion Paper Submission, p. 11.

- two different pipeline carriage arrangements (contract carriage and market carriage); and
- four principal sets of pipeline regulatory arrangements (full regulation, light regulation, no regulation and 15 year coverage exemptions).

This is of increasing relevance as the east coast gas industry is undergoing a significant structural change to demand and supply dynamics in response to the establishment of an LNG export industry. Large volumes of gas from Queensland and South Australia will supply the LNG export plants, with end users in these states likely to source increasing volumes of gas from Victoria, transported north via the DWGM and Interconnect, the Eastern Gas Pipeline or the SEA Gas Pipeline. Equally, market participants may seek to transport large volumes of gas into Victoria for sale in the DWGM where the LNG export plants are unable to absorb supply due to, for example, an LNG train being taken offline.

It is therefore important that the market design and transportation arrangements in Victoria do not restrict gas flowing to where it is valued the greatest on the east coast.

B.4.1 Assessment of packages

Packages A (targeted reform), B (simplified pricing mechanism with transmission rights) and C (zonal pricing with capacity rights) are primarily designed to fix issues 'internal' to Victoria but all include a variety of transmission right mechanisms that allow shippers to signal the need to invest to support 'export' flows. However, as noted above, the Commission considers that each of these mechanisms represents a significant increase in complexity and associated transaction costs for parties wishing to trade gas in Victoria.

Package E (hub and spoke model) has been designed primarily to test the concept of converting the transportation arrangements applying to the DTS from market carriage to contract carriage, consistent with the remainder of the east coast. Package E would therefore result in a simplification of the transportation arrangements on the east coast and, subject to the effectiveness of secondary trading of pipeline capacity, encourage greater trading of gas across the east coast.

Package D (the entry-exit model) allows participants to procure firm entry and exit capacity at points where the DTS interconnects with other east coast pipelines. In particular, parties would be able to procure these capacities via an auction and, once procured, these would be treated as firm.

In Europe, where entry-exit systems are interconnected, exit capacity from one system is bundled with entry capacity to another to ensure the seamless trading of gas between systems. If package D is to be implemented, consideration would need to be given as part of the detailed design as to whether coordination between the entry-exit system in Victoria and contract carriage outside of Victoria is expected to occur efficiently.

The Commission envisage that the exchange established under packages D and E would have the same registration, prudential requirements, trading terms and conditions as the GSH at Wallumbilla. This would therefore support trading in wholesale gas across the east coast.

B.4.2 Summary of submissions

The ability of the proposed packages to contribute to the trading of gas between the DWGM and interconnected pipelines was not commented on extensively in submissions received to the DWGM Review Discussion Paper.

Santos and EnergyAustralia considered that any changes to the DWGM should not reduce the ability for gas to be exported from Victoria to other regions. Victoria's abundant gas resources should be available to those who value it the highest.⁹⁰

APGA considered that package E would best support the development of the east coast gas market given Victoria's domestic gas use is flat and exports to other jurisdictions are increasing. Introducing contract carriage may be the best option to give certainty of transportation rights.⁹¹

B.5 Promoting competition in upstream and downstream markets

The DWGM was established in 1999 by the Victorian government with the objective of supporting retail competition and encouraging a diversity of supply sources and upstream competition.

Specifically, the market carriage model and the DWGM were seen as a way of encouraging new entry by retailers because they would not need to enter into long term gas transportation agreements or, potentially, gas supply agreements, as they would have equivalent access as incumbent shippers to a mechanism to trade imbalances and purchase gas at the spot price.

The DWGM is generally regarded by participants as having met these objectives, providing an effective and competitive gas balancing service and facilitating trading of gas in Victoria based on short term prices. Retail competition in the gas market in Victoria is considered to be effective with low market concentration and high customer activity. Two new retailers entered the market in 2015, bringing the total number to ten. Data available on switching also suggests customers are actively shopping around between the retailers available.⁹²

However, as noted above, the only way of hedging the short term prices arising in the DWGM is to enter into a gas supply agreement (generally with a producer at an injection point). Equally, despite the fact that new entrants are not required to enter

⁹⁰ DWGM Discussion Paper Submissions: Santos, p.1, Energy Australia, p.2.

⁹¹ APGA, DWGM Discussion Paper Submission, p. 11.

⁹² AEMC, *2015 Retail Competition Review*, 30 June 2015, p. 150.

into gas transportation agreements, they are exposed to risk of congestion uplift charges unless they hold AMDQ or AMDQ cc (which can be obtained in a number of ways, including through regular auctions).⁹³

In practice, therefore, the DWGM allows new parties to enter the market very easily. However, once above a certain size, the risks present in the market mean that a new entrant is likely to have to enter into additional arrangements to manage these, and the Commission considers the scope for improving the risk management tools available.

B.5.1 Assessment of packages

As outlined above, package A (targeted reform) aims to facilitate access to unused pipeline capacity, which may increase competition between market participants. It would do so by broadening the tools available for portfolio management, lowering barriers to entry for new market participants and enhancing participation by end users in the DWGM. However, as noted above, the numerous mechanisms included in this package represent a significant increase in complexity for parties wishing to buy and sell gas in Victoria and, on that basis, may act as a deterrent to new entrants participating in the market.

Packages B (simplified pricing mechanism with transmission rights) and C (zonal pricing with capacity rights) would both involve the removal of the existing ancillary payment mechanism, which is considered to act as a deterrent to new entrants currently. However, both packages involve marked increases in complexity to access DTS capacity, and may thus act as a deterrent to new entrants.

The entry-exit model of package D would continue to promote competition and encompass low barriers to entry for new players in the market. Package D would provide parties with the ability to operate on one side of the market only and hence encourage new entrant retailers and upstream suppliers. For example, a shipper could limit its activities to bringing gas onto the system to sell at the virtual hub, and thus require only entry capacity. Alternatively, it could book exit capacity only and source all gas from the virtual hub. However, these parties would be required to procure capacity on a regular basis, which is something they are currently not required to do.

There is a risk with any transportation regime involving the long term reservation of system capacity (such as packages D and E) that shippers will refuse to on-sell unused capacity to others who might be able to use it, ie, that they may 'hoard' capacity. However, the homogeneity and fungible nature of entry and exit capacity rights relative to point to point capacity rights are considered to lessen these concerns for package D compared to package E (hub and spoke model).

⁹³ AMDQ and AMDQ cc both provide holders with a hedge against congestion uplift charges up to Authorised Maximum Interval Quantity and entitle the holder to higher priority than customer with no such rights if there is a tie in injection bids or if curtailment is required to maintain system security.

Package E may act as a deterrent to new entrant shippers relative to the status quo given they would need to procure gas transportation from where they procure wholesale gas (ie, Iona or Longford) to wherever they wish to consume it. While shippers may be able to procure transportation services in the primary or secondary market under this package, both represent a level of complexity above that which currently exists (ie, where DTS transportation is allocated implicitly in accordance with market participant bids and offers).

The conversion of the DTS to a system of contract carriage pipelines under package E would also likely necessitate the imposition of imbalance tolerances and penalties on shippers. This may present a barrier to entry and involve large monitoring costs for shippers via new metering and information systems. The transaction costs for traders wishing to bring gas across the DTS but do not have firm capacity to do so are likely to be high under package E.

B.5.2 Summary of submissions

A number of parties expressed the view that the DWGM has been effective in promoting competition and encouraging new entrants in Victoria. Hydro Tasmania, for example, stated that the structure of the DWGM has resulted in a relatively efficient market and high retailer participation and competition. Hydro Tasmania considered that changes to the DWGM should not increase barriers to entry without sufficient efficiency benefits.⁹⁴

EnergyAustralia considered there is limited benefit in major reform without encouraging new entrants and investment upstream and that these should be progressed simultaneously.⁹⁵

AEMO considered that if the price set for targeted transmission rights under package A is too high then it would be a barrier to entry for new participants using the pipeline, or could penalise users who inadvertently use additional capacity.⁹⁶ The MEU considered that transmission rights under package A may result in capacity hoarding and this could impact downstream competition.⁹⁷

ERM stated that removing the ancillary payment/uplift regime under package B would reduce barriers to entry as new and smaller participants disproportionately bear the risks of these payments.⁹⁸ On the other hand, ERM considered that having multiple zonal prices under package C would make it difficult for participants to understand market outcomes using bid stack and other published data.⁹⁹

⁹⁴ Hydro Tasmania, DWGM Discussion Paper Submission, p. 2.

⁹⁵ Energy Australia, DWGM Discussion Paper Submission, p.2.

⁹⁶ AEMO, DWGM Discussion Paper Submission, p. 5.

⁹⁷ MEU, DWGM Discussion Paper Submission, p. 30.

⁹⁸ ERM, DWGM Discussion Paper Submission, p. 4.

⁹⁹ ERM, DWGM Discussion Paper Submission, p. 9.

The MEU considered that an entry-exit system under package D should be designed to reduce the ability of participants to hoard capacity.¹⁰⁰

ESAA and ERM both considered that there are significant trade-offs with package E. For example, transitioning from market carriage to contract carriage in the DTS may improve investment signals, but it may also constrain new market entry.¹⁰¹

The MEU considered that contract carriage under package E would not necessarily provide more timely investment than market carriage, and it may be related to whether the pipeline is regulated or unregulated. The MEU noted that there are instances where investment does not occur in contract carriage due to a new entrant having to underwrite the cost of the augmentation.¹⁰²

¹⁰⁰ MEU, DWGM Discussion Paper Submission, p. 38.

¹⁰¹ DWGM Discussion Paper Submissions: ESAA, p. 2; ERM, p. 10.

¹⁰² MEU, DWGM Discussion Paper Submission, pp. 8-9.

C Submissions to the Discussion Paper

This appendix sets out a summary of submissions of the issues raised relating to the Victorian DWGM Discussion Paper, including to the AEMC's appraisal of the current market and regulatory arrangements and the proposed packages for reform. It also sets out the AEMC's response to the issues raised. Note that where stakeholder views relate to the same issue, they have been grouped together in the table and responded to by the AEMC collectively.

Table C.1 Summary of submissions

Issues raised	Stakeholder(s)	AEMC response
General		
Any changes to the DWGM should not reduce the ability for gas to be exported from Victoria to other regions. Victoria's abundant gas resources should be available to those who value it the highest.	Santos, p.1, Energy Australia, p.2.	The AEMC agrees and notes that the ability for shippers and producers to be able to effectively operate across the different gas trading hubs on the east coast without incurring substantial costs is a key consideration in this review.
The optimal design for the DWGM should not be decided until the whole eastern market design is established. This is a good opportunity to remove some of the inconsistencies between the different markets on the east coast. Greater harmonisation of market structures may reduce transaction costs and facilitate the development of financial derivatives.	Santos, p.2; Hydro Tasmania, p.1, APGA, p.2.	The AEMC agrees and notes that, as identified in the terms of reference for this review, there are linkages between the findings and recommendations of the broader East Coast Review and the DWGM Review. Chapter 6 places implementation of the proposed Southern Hub within the context of the Commission's broader recommendations for the future development of the eastern Australian gas market.
The structure of the DWGM has resulted in a relatively efficient market and high retailer participation and competition. Changes to the DWGM should not increase barriers to entry without sufficient efficiency benefits.	Hydro Tasmania, p.2.	The AEMC agrees and notes that the ability of the Victorian gas market arrangements to continue to promote competition in upstream and downstream markets is a key consideration in this review.

Issues raised	Stakeholder(s)	AEMC response
Before deciding to replace the current arrangements, the theoretical concepts in the discussion paper must be applied to the physical and operational realities of the DWGM. Congestion, pipeline routes and forecast flows must be considered.	Energy Australia, p.1; MEU, p.16.	The AEMC agrees and notes that, while this draft report identifies the Commission's preferred model for reform of the Victorian DWGM, a substantial amount of work is still required to develop the model and assess it in detail. The Commission's final recommendations (and actions to implement them) will be presented to the COAG Energy Council in May 2016.
Before committing to any of the proposed options, there needs to be greater detail of the proposed design, including modelling and examples. This will allow assessment of the advantages and disadvantages of each option.	GDF SUEZ, p.4.	The discussion paper published in September 2015 set out possible packages for reform of the Victorian gas market. The AEMC carried out a high level assessment of each of the packages and has identified the option which it considers warrants further exploration and detailed development. The high level assessment is set out in Appendix B of this draft report.
Any proposals to make fundamental changes to the DWGM should be informed by modelling and analysis of the impacts on different market participants. It should also involve a robust cost benefit analysis.	ESAA, pp.2-3; ERM, p.8.	
Any changes to the DWGM or DTS to manage increased LNG demand or other east coast issues should not disadvantage Victorian customers.	MEU, p.26.	In conducting this review, the overarching guiding principle for the Commission is the NGO. Overall, the outcomes of this would be expected to promote efficiency of the gas market for the long term benefit of consumers of natural gas services. Appendix B sets out the Commission's assessment framework in detail.
The ability to manage price risks is fundamental to a successful market design.	GDF SUEZ, p.2.	The AEMC agrees and notes that the ability of market participants to manage price and volume risk in the Victorian gas market is a key consideration of this review.
The risk of uplift payments has significantly reduced since the introduction of intra-day trading. Participants hedge where they can, such as through storage agreements. AEMO's forecasting has also improved and reduces the risk of surprise uplift.	MEU, p.20.	The AEMC notes this comment. While ancillary payments have been low (or non-existent) in recent years, this may not necessarily be the case going forward. For example, while APA has nearly trebled the capacity of the Victoria - New South Wales Interconnect to accommodate gas flows northwards out of

Issues raised	Stakeholder(s)	AEMC response
		Victoria, this may result in constraints emerging elsewhere in the DTS and hence greater levels of ancillary payments in future years.
The costs of implementing a new market design to address uplift charges may be significantly greater than the costs of uplift charges, which are only \$9,000 to \$15,000 per year.	APA, p.3.	As above. In addition, while the transition to a Southern Hub with entry and exit would provide many benefits to market participants wishing to trade gas in Victoria and, in turn, consumers of gas, there will also be costs involved in transitioning to the new framework. The AEMC will undertake further work to understand the costs and likely benefits of implementing the reforms proposed and will present these findings in the final report.
AEMO should publish uplift reports on the ancillary payments made. This would enable potential reductions in ancillary payments to be considered by the AER in assessing proposed capital expenditure.	APA, p.6.	The AEMC notes this comment.
Key considerations for the development of the Victorian DWGM need to ensure the COAG Vision is met.	Energy Australia, pp.1, 2.	The AEMC agrees with this comment.
There is limited benefit in major reform without encouraging new entrants and investment upstream. These should be progressed simultaneously.	Energy Australia, p.2.	The terms of reference for this review require the AEMC to consider the promotion of competition in upstream and downstream markets. As outlined in the assessment framework, a competitive market would be indicated by timely and efficient investment in infrastructure and minimised barriers to entry. Assessment of each of the packages against this issue is provided in Appendix B.
Incremental reforms to address known issues should be pursued in the first instance. More significant reforms should only be considered where there is still a proven market failure.	ESAA, p.2; Origin, p.1.	The Commission's assessment in this draft review is that transitioning to a Southern Hub is the best way to address the issues outlined in the discussion paper.

Issues raised	Stakeholder(s)	AEMC response
Balancing arrangements should be considered as part of the development of any package. This should include the balancing period, balancing tools, the balancing market model, locational requirements and information requirements.	AEMO, p.2	The AEMC agrees. Potential balancing arrangements for a Southern Hub are discussed in Chapter 3 and will need to be considered further in developing the final recommendations.
In Victoria, many events occur within a gas day and the market must provide signals to encourage efficient behaviour, such as accurate forecasting. This is why an ex post market price was amended to intra-day pricing in 2007.	AEMO, p.3.	The AEMC notes this comment. Under a Southern Hub model, trading and balancing would occur on a voluntary, continuous basis and would be designed to promote efficient behaviour. See section 3.2 for further discussion of the Southern Hub balancing arrangements.
In addition to congestion, inter-temporal congestion should be considered. This refers to the ability for distant supply sources to respond to an unexpected change in demand. If linepack is unavailable, injections from LNG storage may be required to maintain system security.	AEMO, pp.2-3.	The AEMC notes this comment and agrees that the consideration of inter-temporal congestion is important. This will be considered further when developing the balancing and congestion management processes.
Any recommended course of action must have regard to the NGO. This may be at odds with the option that best promotes liquidity.	APA, p.1.	The NGO is the overarching objective guiding the AEMC in conducting this review. Consistent with the terms of references, the AEMC has also had regard to the COAG Energy Council's Vision and Gas Market Development Plan, as well as the key characteristics of a workably competitive market. The assessment framework is provided at Appendix B.
An alternative package would be to operate the high capacity 'spoke' pipelines connecting Longford, Culcairn and Iona through Wollert to contract carriage, and sell a proportion of firm capacity to AEMO to operate the DWGM.	APA, p.1.	The AEMC notes this suggestion. While it may improve investment on the 'spokes', there would be challenges defining firm point to point rights, given that the available capacity is influenced by the pattern of gas flows across the network. See Appendix B.3.1 for further discussion on this matter.

Issues raised	Stakeholder(s)	AEMC response
<p>Removal of the redundant asset provisions should be considered. Improving investment signals for APA GasNet may be suitable in Victoria, but the issue of uncertainty negatively impacts all covered pipelines. The NER does not include a redundant asset provision.</p>	<p>APGA, p.2</p>	<p>The discussion paper published in September 2015 discusses the regulatory framework for investment in the NGR, including the redundant asset provisions. It noted that changing the redundant asset provisions would be a significant departure from the current arrangements with regard to who bears the risk of investment decisions.</p> <p>The AEMC will consider further how the Southern Hub model would fit within the current regulatory framework as it develops its final recommendations to the COAG Energy Council.</p>
<p>Further consideration should be given to improving investment under the regulatory process. This could include improving the ability of APA GasNet to identify, plan and gain approval for investments. It could involve setting performance standards for the DTS, with some exclusions from the redundant asset provisions. AEMO's involvement in the process could be expanded to an asset planner.</p>	<p>ERM, p.6.</p>	<p>The AEMC notes these suggestions. Introducing a Southern Hub with entry and exit rights would help to improve the investment signals necessary for APA to make investment decisions, as discussed in Chapter 4. The AEMC will consider matters associated with regulatory investments it develops its final recommendations to the COAG Energy Council.</p>
<p>Some aspects of the current regulatory investment framework do not work well with a market carriage system. For example, surcharges could be applied, but the operator cannot guarantee access to capacity. The speculative account could enable investment, but the operator cannot sell the additional capacity because it is subject to AEMO control. If the redundant asset provision removes an asset from the capital base, it can still physically be used by AEMO.</p>	<p>APA, pp.7-8.</p>	<p>The AEMC notes these comments. Interaction between the Southern Hub model and the regulatory framework for investment will be considered further in the final report for this review.</p>

Issues raised	Stakeholder(s)	AEMC response
Package A - Targeted measures		
Targeted measures could be used to improve efficiencies in the near term.	Hydro Tasmania, p.1	While package A seeks to promote efficient use of, and investment in, pipeline services, it does not contain all the key attributes required to support the development of well-functioning, workably competitive market. On this basis, it is unlikely to move the Victorian gas market towards the Energy Council's Vision.
Package A does not address the issues identified with the DWGM. It does not improve liquidity or overcome the issues that prevent the DWGM from providing an efficient reference price, so would not facilitate the development of financial risk management products.	GDF SUEZ, p.3; APA, p.1.	The AEMC agrees that package A does not include an explicit mechanism to deliver an efficient reference price and so would be unlikely to contribute directly to the development of new financial risk management products. See Appendix B.2.1 for further discussion on this matter.
The package does not deliver an efficient reference price, which is one of the AEMC's stated characteristics of a well-functioning market.	Origin, p.1.	
The package does not address issues around unmanageable uplift risk and the inefficient allocation of congestion uplift. Retaining ancillary payments and uplift charges means it will not facilitate the development of financial instruments.	ERM, p.9.	
Determining an efficient charge for targeted transmission rights will be challenging. If the price is too low it could disincentivise participants from investing. If the price is too high then it would be a barrier to entry for new participants using the pipeline, or could penalise users who inadvertently use additional capacity. This could be mitigated through tolerances.	AEMO, p.5.	The AEMC notes these comments. While targeted transmission rights may provide some incentive for participant funded investment, it would likely add significant complexity to the market arrangements. In addition, the other packages are likely to provide stronger signals for timely and efficient investment in the DTS. See Appendix B.3 for further discussion.

Issues raised	Stakeholder(s)	AEMC response
Targeted transmission rights could involve minimal complexity and provide some incentive for participant funded investment. It could involve sharing a component of transmission revenues with participants that invest in future expansions. It should not be used to allocate constraint costs.	ERM, p.6.	
Transmission rights may result in capacity hoarding and this could impact downstream competition.	MEU, p.30.	
AMDQ cc would need to be allocated to a complete flow path of existing shippers, in order to be effective.	APA, p.10.	
Targeted transmission rights may not fit easily with the existing market carriage framework. Its implementation is likely to be costly and complex.	Origin, p.2.	
The previous rule change process on AMDQ trading found the benefits were not very high. A cost benefit analysis should be carried out before deciding to progress this option.	Origin, p.2.	The AEMC notes these comments. The introduction of a trading mechanism for AMDQ and AMDQ cc would be expected to promote efficient use of, and investment in, pipeline capacity. However, the costs, benefits and risks associated with this mechanism would need to be considered before the proposal was progressed.
A voluntary AMDQ trading mechanism could be valuable, but the systems changes are likely to be complex.	APA, p.12.	
An AMDQ trading mechanism must still ensure that the AMDQ follows a user if they change retailer.	MEU, p.31.	

Issues raised	Stakeholder(s)	AEMC response
The process for AMDQ allocation could be more transparent. The current rule change on this topic is welcomed, but there is scope to consider this further.	Origin, p.2; MEU, pp.27, 33.	The AEMC notes this comment. See the AEMC's draft rule determination for the AMDQ Allocation rule change request. ¹⁰³
There should be more clarity over how the DTS planning standard is determined and applied.	APA, p.7.	While reviewing the planning standard does not form part of package D, reviewing the planning standard may be relevant to the introduction of a Southern Hub. This may be considered further in the final advice.
An appropriate planning standard is a policy question and should be subject to extensive consultation with government and industry. It should reflect the acceptable frequency of gas supply interruption to customers and the associated safety issues.	AEMO, p.5.	
A conservative planning standard may be suitable, given the limited linepack in the DWGM. A less conservative standard may result in greater use of the storage facilities, at a higher cost to participants.	MEU, p.33.	
Package B - Transmission rights		
Having a single market price that encompasses all pricing risk would reduce complexity, support the development of financial risk management products, enhance price discovery and foster greater market participation and liquidity.	ESAA, p.3; Origin, p.2; ERM, pp.3-4.	Package B would support the discovery of a more meaningful reference price by removing the ancillary payment mechanism and simplifying the pricing mechanism.
Removing the ancillary payment/uplift regime will reduce barriers to entry as new and smaller participants disproportionately bear the risks of these payments.	ERM, p.4.	However, this package would likely result in higher and more volatile observed prices, and would still require five prices being set per day, which may discourage the development of financial derivatives. See Appendix B.2 for further discussion on this matter.

¹⁰³ This is available on the AEMC website: www.aemc.gov.au

Issues raised	Stakeholder(s)	AEMC response
A simplified pricing mechanism does not facilitate intra-day incentives. Having a single ex post price does not encourage participants to adhere to their schedules to reduce the probability of constraints. However, having multiple prices under constrained schedules could result in large price movements and create considerable risk for participants, leading to higher spot prices and higher futures prices.	AEMO, p.6; ERM, p.4; APA, pp.15-16; MEU, p.35.	
A simplified pricing mechanism is likely to increase price volatility, but participants would have a greater ability to hedge against the risk.	GDF SUEZ, p.3.	
An alternative to the simplified pricing mechanism is to remove congestion uplift, but retain surprise and common uplift charges. Surprise uplift would allocate costs to those who have deviated from their schedule. However, not having a single market price may make it difficult to develop financial hedging products.	ERM, p.4.	The AEMC notes this comment. Effective risk management is a key issue being considered in this review. The AEMC agrees that while removing congestion uplift would reduce price risk for some participants in the market, retaining other forms of uplift would not address current issues around the lack of financial risk management products in the DWGM.
Any consideration of a simplified pricing mechanism should be coupled with an examination of pipeline transportation arrangements.	ESAA, p.3.	The AEMC notes these comments.
The proposed simplified pricing mechanism model does not result in cost to cause allocation of congestion prices. Costs of congestion are shared across all users and all locations.	AEMO, p.6; APA, p.16; MEU, p.34.	
Participants might be discouraged from using the spot market if they are exposed to risks of high prices due to constraints in other parts of the DWGM.	AEMO, p.6.	

Issues raised	Stakeholder(s)	AEMC response
The proposed simplified pricing mechanism could result in gaming as there may be an incentive to push up prices of the whole market by withholding cheaper injections to create constraints.	AEMO, p.6.	The AEMC notes these comments.
A simplified pricing mechanism does not provide a signal for investment during times of congestion.	APA, p.15.	
The DWGM price cap should be reviewed to ensure risks are manageable and that new entrants are not deterred.	ERM, p.4; MEU, p.27.	
Introducing transmission capacity rights into the DWGM would be expected to facilitate market led investment in network expansions.	ESAA, p.3.	The AEMC notes these comments and considers that while targeted transmission rights may provide some incentive for participant funded investment, it adds significant complexity to the market arrangements. Additional complexity may act as a deterrent to new entrants. See section B.3.1 for further discussion.
Transmission capacity rights are likely to make the transmission framework more complex in an attempt to align it with incentives for investment under a contract carriage framework. It is likely to be ineffective at encouraging market led investment.	ESAA, p.3; ERM, p.5.	
Any re-balancing of transmission tariffs will create winners and losers. The effects on various parties should be carefully considered.	Origin, p.2.	
The costs of contracting for firm transmission rights is likely to be higher than for contracting for AMDQ cc. Consumers will likely bear these higher costs.	Origin, p.2.	
In considering transmission capacity rights, the potential impact on AMDQ and AMDQ cc must be taken into account.	ESAA, p.3.	The AEMC agrees.

Issues raised	Stakeholder(s)	AEMC response
Constrained on payments are unnecessary under this package as constrained on injectors are already compensated through a constrained market price.	AEMO, p.6.	The AEMC notes this comment.
The overrun charge would need to be high enough to incentivise new investment, but low enough to ensure that any spare pipeline capacity can be efficiently utilised.	GDF SUEZ, p.3.	The AEMC notes these comments. The investment-signalling benefits from package B depend on the ability to set overrun charges for not-firm services at an appropriate level. This is likely to be difficult and is discussed in Appendix B.3.1.
If the overrun charge is paid to firm rights holders, determining an efficient charge will be challenging. It would need to consider how to allocate revenue across multiple firm rights holders, any implications of intra-day rescheduling and how out of merit order gas is treated.	AEMO, pp.5-6.	The AEMC agrees.
Usually, overrun would not cause system constraints and overrun charges would increase unhedgeable risks.	MEU, p.36.	The AEMC notes these comments.
The use of AMDQ in providing curtailment protection should be reviewed. It seems inequitable that some tariff D customers are more likely to be curtailed simply because they were not in existence when AMDQ was first allocated.	ERM, p.5.	The AEMC notes this comments and considers this issue to be relevant in the context of the transition of the AMDQ and AMDQ cc mechanism to the Southern Hub model with entry and exit rights. See section 5.2 for further discussion.
Package C - Capacity rights		
Package C would provide more effective pricing signals that identify where congestion is occurring and therefore stronger signals for investment.	GDF SUEZ, p.3.	While package C would promote more efficient investment between zones by providing market led-signals for inter-zonal investment, this package would be unlikely to result in significant improvements in the efficiency of investment within zones, relative to the status quo. See Appendix B.3 for further discussion on this matter.
This package only partially addresses the investment signal issues, as investment signals would only relate to the point between zones, not investment that is needed within a zone.	Origin, p.3.	

Issues raised	Stakeholder(s)	AEMC response
The zones in the package do not reflect locations of congestion. A useful first step would be to define what a zone should constitute and what might cause them to change. Then the zones could be specified.	AEMO, p.7.	The zones in the discussion paper were for illustration only. Further development of this package would have required the zones to be carefully defined.
As the proposed model is not fully nodal, the prices would still be an approximation. Signals would still be imperfect, although more granular than the current market.	AEMO, p.7.	The AEMC agrees.
Inter-temporal factors may cause price differentials between zones even if there are no constraints in the capacity between zones.	AEMO, p.7.	The AEMC notes this comment.
Capacity rights and pricing could be very complex, given the inter-temporal nature of gas flows that can be managed through linepack.	AEMO, p.7.	The AEMC agrees.
Having multiple zonal prices will make it difficult for participants to understand market outcomes using bid stack and other published data.	ERM, p.9.	The AEMC notes this concern.
If there are different prices in each of the zones, it would be difficult to develop a reference price or a secondary market.	Origin, p.3; MEU, p.37.	The AEMC agrees that multiple observed prices may discourage the development of financial products.
Given the small number of participants in each zone, there is likely to be less liquidity and the risk of participants using market power to influence prices may be higher.	ERM, p.9, APA, p.18.	The AEMC notes these comments.
Participants would need to manage price risk in each zone. This additional complexity would likely outweigh any benefits with regard to investment.	Origin, p.3.	

Issues raised	Stakeholder(s)	AEMC response
Package D - Entry/exit model		
While this package appears to have merit, the details of the proposal are unclear, such as how prices are set and the balancing arrangements. These would need to be closely evaluated.	ERM, pp.9-10; GDF SUEZ, p.4.	Chapters 3 and 4 of this draft report provide an overview of the recommended arrangements for a Southern Hub with an entry-exit system for allocating capacity. Further detail, including on the trading and balancing arrangements, will be provided in the final report for this review.
An exit/entry model and the current DWGM both offer independent entry and exit rights from the transmission system and can create firm like injection and withdrawal rights. Consideration of this option should clearly state the benefits compared to the current DWGM.	ESAA, p.3; Origin, p.3; APA, pp.21-22.	The proposed changes to the DWGM are anticipated to fundamentally change the outcomes of the Victorian gas market by providing participants with greater flexibility to physically trade gas in the market, and establishing the preconditions required for financial risk management products to develop. The changes will also create market-driven signals for investment in the pipeline system, a feature currently absent from the Victorian DWGM.
Package D would need to carefully consider how congestion would be managed.	ESAA, p.3; Origin, p.4.	The Commission notes these comment. Congestion and capacity management mechanisms are discussed further in section 4.2.
An entry/exit model without schedules would need to have some form of interruptible supply or pro-rata arrangement to manage congestion. This may not result in the lowest value gas being curtailed first.	AEMO, p.10.	
The 'no constraints' assumption for the entry/exit network pricing means the operator may need to purchase LNG to maintain system security.	APA, p.23.	
The trading model could involve a virtual trading point, continuous voluntary trading and mandatory balancing.	AEMO, pp.7-9.	The Commission's proposed Southern Hub model would involve the trading and balancing of gas on a voluntary, continuous basis. Chapters 3 and 4 discuss the Commission's proposed model in more detail.

Issues raised	Stakeholder(s)	AEMC response
<p>While an entry/exit model may provide investment signals at the borders of the network, it may not provide adequate signals for investment within the network. It is not clear whether an entry/exit model would encourage investment when demand increases.</p>	<p>AEMO, p.10; APA, p.22; MEU, p.38.</p>	<p>While the Commission's recommended entry-exit system applying at the Southern Hub is designed to signal the need for additional capacity at entry and exit points, it will not provide signals of the precise investments that should be undertaken across the pipeline system to provide this capacity.</p> <p>Consequently, changes in patterns of gas flows could mean that congestion arises on the system even though flows at each entry and exit point remain within the specified limits. Congestion and capacity management mechanisms are discussed further in section 4.2.</p>
<p>Centralised planning will be necessary to identify and carry out investment within the network.</p>	<p>MEU, p.39.</p>	<p>Under the proposed entry-exit system, investment within the Southern Hub would continue to occur on a regulated basis. However, by allowing users to signal the need for additional investment, the risk of inefficient investment would be reduced.</p>
<p>Liquidity may be reduced by introducing continuous voluntary trading. The number of participants in the east coast gas market is not significant and participants with entry and exit rights would likely obtain contracts for gas supply. However, it provides greater flexibility for participants managing their portfolios.</p>	<p>AEMO, p.10; ERM, p.10; APA, p.21.</p>	<p>A Southern Hub with continuous trading and balancing would provide participants with the opportunity to trade gas independently of its location in the system and with any other participant in the market on a continuous basis, allowing them to better manage their gas portfolios in response to their short and long term needs. This will enable a liquid wholesale gas market to develop in Victoria.</p>
<p>Managing constraints and balancing could be more challenging under a continuous trading model as there is less opportunity for centralised planning. However, participants will have greater flexibility to manage their gas requirements throughout the day.</p>	<p>AEMO, p.10.</p>	<p>Placing the primary responsibility for balancing on market participants reduces the balancing actions required by the hub operator and supports trading by market participants. More generally, it promotes liquidity as market participants face an incentive to trade on the short term market in order to balance their portfolios.</p>

Issues raised	Stakeholder(s)	AEMC response
There would be no single market price with a continuous voluntary trading model. A reference price could be derived from the trades that did occur. This may be adequate for developing a forward market and derivatives, but may not provide signals to efficiently manage congestion.	AEMO, p.10.	The AEMC notes this comment.
This option would need to consider the equitable allocation of capacity, in particular whether the same process applies to existing and new capacity. The market should be designed to reduce the ability of participants to hoard capacity.	MEU, p.38.	The AEMC notes this comment. The mechanisms to allocate capacity and matters associated with the secondary trading of capacity are discussed further in Chapter 4.
Package E - Hub and spoke model		
Package E would result in more efficient investment in pipelines and better allocation of investment risk.	GDF SUEZ, p.4.	The Commission notes these comments. The technical characteristics of the DTS mean that package E is unlikely to be appropriate in Victoria. In particular, the multitude of injection and withdrawal points as well as the need to flow gas across the entire DTS means that efficient outcomes are likely to be achieved where a single operator is responsible for system operation, including residual balancing. Further, there are a number of practical challenges associated with implementing package E in Victoria. See Appendix B.3.1 for further discussion on this matter.
Package E minimises the need for regulatory intervention, compared to virtual markets which often result in heavy handed and intrusive regulation.	APGA, p.4	
Package E enables the development of bespoke market services and financial derivatives to assist in price risk management.	APGA, p.4	
Longford and Iona are sufficiently close and could form a single southern supply hub in the future, with contract carriage pipelines between them.	APGA, p.4	
Package E would best support the development of the east coast gas market given Victoria's domestic gas use is flat and exports to other jurisdictions are increasing.	APGA, p.4	

Issues raised	Stakeholder(s)	AEMC response
Introducing contract carriage may be the best option to give certainty of transportation rights.		
The systems and structures to support contract carriage are already in place in other jurisdictions and significant investment would not be required. The DTS would operate like a large distribution network.	APA, p.28.	
Having physical voluntary hubs would provide the most conducive environment for liquidity to develop. It is reasonable to expect that most gas will continue to be contracted under relatively long term contracts. Supply hubs and voluntary trading markets would support increased liquidity of marginal gas.	APGA, p.3	
While there are challenges and costs with a hub and spoke model, virtual markets have drawbacks that are difficult and complex to address. This is demonstrated by the current complexity of the DWGM and options put forward in the other packages to improve the DWGM.	APGA, p.3	The AEMC notes this comment.
Capacity trading should be available with this model to support allocative efficiency.	AEMO, p.11.	The arrangements for pipeline capacity trading would be consistent with those proposed (and explained) in the draft report for the East Coast Review.
There are significant trade-offs with this package. Transitioning from market carriage to contract carriage in the DTS may improve investment signals, but it may also constrain new market entry. Moving to a voluntary wholesale design may reduce operational costs for market participants, but could also lead to lower trading volumes and reduced market liquidity.	ESAA, p.2; ERM, p.10.	The AEMC notes these trade-offs and discusses the merits of each package in Appendix B.

Issues raised	Stakeholder(s)	AEMC response
An alternative would be to transform the 'spokes' into contract carriage, but sell a proportion of firm capacity to AEMO to operate the DWGM. Shippers would be able to invest in the high capacity 'spokes' and receive firm rights to capacity.	APA, p.30.	The AEMC notes this suggestion. See Appendix D.3.1 for further discussion.
There could be a reduction in operational efficiency or a higher risk of pressure breaches if the management of and balancing provided by pipelines is no longer centrally coordinated. Coordination to maximise usable linepack is particularly important to manage swings in demand from cold weather or surprise events.	AEMO, p.11; MEU, p.42.	The AEMC agrees and notes that narrow imbalance tolerances may need to be imposed under package E, which may present a barrier to entry for certain participants.
Imbalance tolerances may need to be more narrow and penalties higher, to manage the limited linepack.	MEU, p.42.	
If the current intra-day functions of the DWGM were replaced by day-ahead approach seen in other markets, the DWGM would no longer be responsive. This would be a significant market regression.	Origin, p.4.	The AEMC notes this comment.
Contract carriage does not necessarily provide timelier or lower cost investment than market carriage. It may be related to whether the pipeline is regulated or unregulated. There are instances where investment does not occur in contract carriage due to a new entrant having to underwrite the cost of the augmentation.	MEU, pp.8-9; AEMO, p.11.	Investment is generally efficient where it is led by users and where those users bear the risk of investment decisions.
The DTS is meshed and defining the point-to-point rights for contract carriage would be complex. Even the Longford to Melbourne pipeline has multiple intake and off-take points and splits off from Pakenham to Wollert.	AEMO, p.11; ERM, p.10.	The AEMC agrees.

Issues raised	Stakeholder(s)	AEMC response
A virtual hub is more suited to the meshed Victorian network, as evident from overseas examples.	Origin, p.4.	The AEMC agrees. The technical characteristics of the DTS mean that package E is unlikely to be appropriate in Victoria. In particular, the multitude of injection and withdrawal points, as well as the need to flow gas across the entire DTS, means that efficient outcomes are likely to be achieved where a single operator is responsible for system operation, including residual balancing.