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12 February 2016

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

Dear Mr Pierce

APA Group response to AEMC Review of the Victorian Declared Wholesale Gas Market (project GPR0002)

APA Group (APA) appreciates the opportunity provided by the Australian Energy Market Commission (AEMC) to respond to the findings and draft recommendations of the Review of the Victorian Declared Wholesale Gas Market (DWGM), prepared as part of the East Coast Wholesale Gas Market and Pipeline Frameworks Review.

The Commission's key recommendation for the DWGM is to convert the current mandatory reverse auction process for allocating pipeline capacity to a European-style entry-exit model with a voluntary virtual hub for gas trading.

APA considers that the AEMC's DWGM Review report is quite conceptual in nature. In this submission, APA draws out some of the key features of an entry-exit system and the VTS, and identifies some of the complex matters that will need to be addressed in any further discussions on converting the existing DWGM to an entry-exit model.

Once these design features have been worked through, the AEMC and industry will be in a better position to assess the costs and benefits of such a change, and whether such a change would be in the best interests of consumers. At this early stage, APA believes the AEMC has underestimated the costs, and overstated the benefits, of transferring to an entry-exit model.

APA comments on the application of a virtual hub in its submission to the Stage 2 Draft Report prepared as part of the East Coast Wholesale Gas Market and Pipeline Frameworks Review.

APA commits to working with the AEMC to further investigate the potential to implement an entry-exit model in Victoria, and looks forward to ongoing engagement in this regard.

For further information on this submission, please contact Peter Bolding, General Manager Regulatory and Strategy, on (02) 9693 0053 or by email at peter.bolding@apa.com.au.

Yours sincerely

Ross Gersbach
Chief Executive Strategy and Development

APA Group

Submission to AEMC
Draft Report:

Review of the
Victorian Declared
Wholesale Gas Market

February 2016

Contents

1 Executive Summary

The Victorian Declared Wholesale Gas Market (DWGM) has fostered competition since it began in 1999. However, as Australia's natural gas market evolves in response to the LNG export industry, there are concerns that the current DWGM structure is not optimal for emerging market conditions.

The AEMC has proposed an entry-exit model with the stated goals of improving competition, ensuring efficient investment, and allowing participants to better manage risk. In the previous decade, many European countries have implemented similar systems. The implementation and operation of these systems provides sound evidence for consideration when determining whether an entry-exit model is right for Victoria.

APA's research suggests that the introduction of an entry-exit regime in Victoria is potentially feasible and, subject to careful design, could bring limited benefits to the natural gas market. For example, slightly firmer capacity rights could improve shippers' ability to export gas from Victoria. However, to be successful the system must reflect the unique characteristics of the Victorian Transmission System (VTS). Notably, the VTS has significant infrastructural and market differences to systems where entry-exit models are operating successfully. Furthermore, a new division of roles and responsibilities between the network owner (APA Group) and the system operator (AEMO) needs consideration, and existing network access rights reflected in AMDQs and AMDQ credit certificates must be transitioned into any new system.

If feasibility of the entry-exit system can be proven, APA considers that a comprehensive regulatory and operational design of the new system must precede a thorough cost-benefit analysis. To avoid value destruction for market participants and consumers alike, an entry-exit system should only be introduced if benefits can be convincingly shown to exceed costs. APA's analysis suggests the benefits are likely lower and the costs and risks higher than suggested by the AEMC. For example, the degree to which increased complexity creates new barriers to entry, the loss of liquidity through the removal of mandatory trading, and the cost of implementation have not been sufficiently addressed. This is partly because costs and benefits largely depend on the design and implementation plan of the entry-exit system – details yet to be decided.

Without a full and detailed system design, APA is able to offer only limited comment either for or against the implementation of an entry-exit system in Victoria. APA is cautiously open to further exploration of the entry-exit model, but are as yet unconvinced that an entry-exit system would offer superior outcomes for Victoria as compared to incremental evolution of the existing DWGM. Adaptions to the current system over time have been successful in improving outcomes for market participants. While wary of placing this value at risk, APA is ready to participate in the development of conceptual and operational details of the proposed changes in order to design a practical solution that suits the market today and in future.

2 Entry-exit models in Europe

Entry-exit models were designed to suit European conditions

APA's research clearly indicates that the entry-exit model was designed to suit the needs of the European gas market. Proponents of the entry-exit model argue it organises gas markets in a way that is transparent, provides equal rights to network users, and fosters competition.[1] In principle, the entry-exit system may be feasible for Victoria, but proving this requires significant consideration, detailed planning, and extensive consultation. Deciding whether an entry-exit model is feasible for Victoria will rely on an understanding of why the entry-exit model is appropriate for Europe, and whether the same rationales hold true for the DWGM.

This section describes the entry-exit model as it currently operates in Europe. Section 3 describes the differences between the European systems where entry-exit models have been applied, and the Victorian system for which an entry-exit model is proposed. Later sections address the benefits, costs, risks, and next steps for implementation, with relevant examples from the European experience.

2.1 Access vs trading

The focal point of any entry-exit model is the principle that network access rights are independent of trading

In entry-exit systems, gas entering the system at an entry point should be available at any exit point for off-take in a fully independent and non-discriminatory way. Transmission system operators (TSOs) should achieve this without imposing any access restriction at internal points within the system. Under normal business operations, shippers should be able to ignore the internal system but still be guaranteed to withdraw the gas they are entitled to at exit points. In practice, this translates into a requirement that shippers nominate day-ahead capacity usage at all entry and exit points. This may require a large number of nominations, as the number of entry-exit points can be numerous if all handover points to the distribution system are included. Shippers do not have to nominate at any other parts of the system.[2]

APA's research indicates that, in entry-exit systems, volume based tariffs are less frequent and length-based fees do not exist. Instead, network users pay for the capacities they book.[3] TSOs are entitled to receive these tariffs according to a tariff structure approved by a regulatory body. The regulated tariff is the minimum that network users will pay for capacity – sometimes they may pay more.

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[1] For example, see Regulation EC No. 715/2009

[2] DNV KEMA, *2013 Study on Entry-Exit Regimes in Gas*

[3] As discussed below, this capacity reservation structure may act as a barrier to entry for new entrant retailers.

As a general rule, European regulation requires that tariffs reflect costs. However, the European approach to cost-reflectivity differs from that taken in Australia. In European entry-exit systems, an expense directly allocable to a given entry or exit point should be accounted for in the setting of the tariffs at that point, while the expense of shipping gas between entry and exit points is uniformly allocated to all network users. Uniform ‘postage-stamp’ fees are also widely applied to entry-exit points when directly allocable costs do not justify differences. Exit points to the distribution network are often charged with the same fee, reflecting their common technical set-up and similar role in the interconnected systems.

Unlike the National Gas Access Regime applicable in Victoria, Europe does not apply capital redundancy rules similar to NGR Rule 85. Investments proposed by TSOs and approved by the regulator become part of the regulated asset base (RAB), and are generally not removed if network flows change. Only in rare cases do regulators and TSOs negotiate the removal of assets from the TSOs balance sheet and RAB. This practice reflects the TSOs’ sole responsibility to ensure gas transport through the system, and the lack of market-based investment signals for the internal network (addressed in Section 4.1).

2.2 Entry-exit systems and virtual hubs

Virtual hubs are a common component of entry-exit systems, but not compulsory

A virtual hub is a trading point where gas titles are transferred between shippers; essentially, virtual hubs are exchanges.[4] Although they are present in many European systems, there are some countries where no virtual hubs have been established.[5] In systems with no virtual hubs, and in many countries with established trading points, gas is predominantly traded through bilateral contracts.

In this regard, the AEMC recommendation to establish an entry-exit system for the VTS is detachable from its recommendation in the *East Coast Wholesale Gas Market and Pipeline Frameworks Review* Stage 2 Draft Report to implement a virtual trading hub.

2.3 Sale of capacity

In general, TSOs sell capacity products directly to shippers rather than via hubs

Entry and exit capacity rights are sold by TSOs according to regulated procedures.[6] Compared to gas titles, capacity rights are sold in less organised markets, such as

[4] EFET 2013 Guide on the Features of a Successful Virtual Trading Point

[5] Typically, this occurs in countries where gas imports are primarily from Russia through a single shipper, for example Estonia, Finland, Greece, Lithuania, Latvia or Bulgaria.

[6] Also see Oxford Institute for Energy Studies, *The dynamics of a liberalised European gas market,* p63

TSO-organised auctions or within TSO platforms. Although capacities are sometimes traded in exchange-like markets, this is usually not the case. Capacity products differ by system (Figure 1), but always include firm and interruptible rights, as well as long-term (annual) and short-term (day-ahead) bookings.[7] These products allow shippers to ensure sufficient flexibility to match network access to their portfolio. Capacity usage and congestion management is regulated on a European level, to avoid hoarding of network access rights. For example, the use-it-or-lose-it or mandatory secondary trading of unused capacities are anti-hoarding principles applied across Europe.[8]

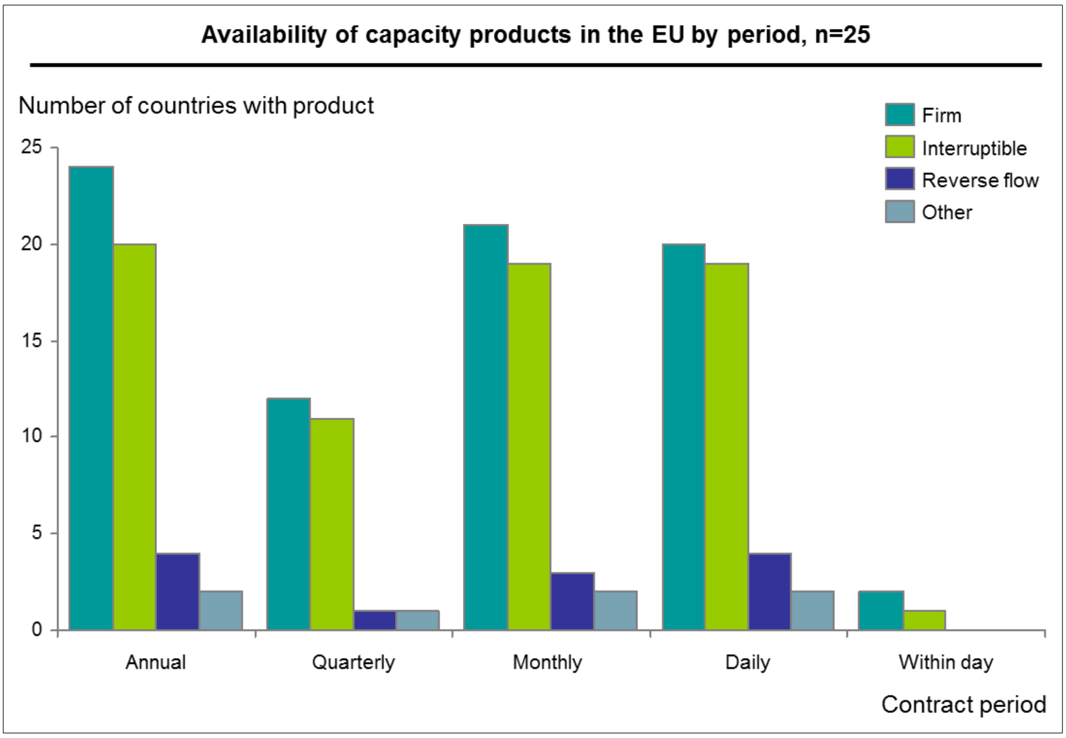

Figure 1: Different systems offer different capacity products over various time periods[9]

2.4 Balancing rules

Balancing rules reflect network characteristics, and are not standardised across countries

In order to ensure security of supply, balancing rules should be created with underlying network characteristics in mind. In particular, balancing rules should reflect network flexibility, potential volatility in supply or demand, and the means available to react to imbalances (such as linepack flexibility or storage). These

[7] DNV KEMA, *2013 Study on Entry-Exit Regimes in Gas*
[8] DNV KEMA, *2013 Study on Entry-Exit Regimes in Gas*
[9] DNV KEMA, *2013 Study on Entry-Exit Regimes in Gas*

characteristics can vary widely across networks; this is reflected in the wide variety of balancing systems in use across Europe.[10]

The logic of the entry-exit system calls for a single balancing zone with a sufficiently long (i.e. daily) balancing requirement. Longer balancing periods encourage maximum market liquidity and give shippers the greatest freedom to trade. Infrastructure constraints – for example, the inability of a system to flexibly serve large consumption increases during unexpected cold snaps – may necessitate shorter balancing periods.[11] In non-constrained systems, daily balancing periods are most common. This includes many European gas systems, which – unlike the VTS – tend to be oversupplied, flexible, and have few infrastructure constraints.[12]

Shippers are responsible for balancing themselves within a tolerance range. If they go outside this range, residual balancing is usually handled by TSOs who take action to keep the system in balance and penalise the shippers responsible for imbalances. If unexpected changes create balancing costs that cannot be allocated to a particular market participant, these costs become part of the TSO's approved costs and are smeared across all participants through general tariff increases.[13]

2.5 Variable implementation

The 'pure' entry-exit model is not fully implemented in all member states of the European Union

APA's research indicates that the entry-exit model is not applied universally to the entire European pipeline network. Many local systems have exceptions that diverge from a full or 'pure' entry-exit model, reflecting domestic infrastructure, existing contracts, and other local conditions at the time of implementation.[14] Some pipelines still operate as point-to-point routes or under a contract carriage model. For example, the interconnector pipeline, built in 1998 to connect the United Kingdom and Belgium, is exempt from the entry-exit rules and operates under a long-term contract carriage model. Additionally, investment typically occurs outside entry-exit systems, with interconnections owned by the government and little or no private investment within zones. The European Commission accepts exemption applications, and may grant exemptions where sustained infrastructure or contractual barriers exist.

There is considerable variability within the various countries' implementation of the entry-exit system, although some design choices are not generally allowed in the EU

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[10] DNV KEMA, *2013 Study on Entry-Exit Regimes in Gas*

[11] Such as the four-hourly balancing periods in Victoria – see Section 3.2

[12] DNV KEMA, *2013 Study on Entry-Exit Regimes in Gas*

[13] DNV KEMA, *2013 Study on Entry-Exit Regimes in Gas*

[14] DNV KEMA, *2013 Study on Entry-Exit Regimes in Gas*

The key design features of typical European entry-exit models are shown in Figure 2. The red perimeter line delineates the options allowed in a generic entry-exit model from options that contradict the main principles of the entry-exit model. Blue shading indicates the most common European options and orange letters the current solutions used in the DWGM.

	Key design issues	Main design options		
Network access	Network access rights	Independent from trading	Bundled with trading	
Network access	Observation of network access	Only at entry and exit points	At internal points too	
Network access	Gas routing principle	Free between any entry and exit point	Along predefined routes (point-to-point)	
Network access	Firmness of network access rights	Firm and interruptible	Only day-ahead firm	Only interruptible
Network access	Duration of network access rights	Short term (e.g daily) and long term (e.g. annual)	Only short term	Only long term
Network access	Manager of network access rights	Integrated transmission system operator (TSO)	Independent system operator (with no network ownership)	
Tariffs	Tariff base	Capacity	Volume	Length
Tariffs	Tariff principle	Uniform postage stamp	Postage stamp and cost-based differentiated	Cost-based differentiated
Tariffs	Capital redundancy	Not applied	Applied	
Trading and balancing	Trading principle	Free trading at virtual hubs	Free trading by bilateral contracts	Mandatory trading, central allocation of supply
Trading and balancing	Number of balancing zones	Single national zone	Multiple regional zones	
Trading and balancing	Balancing period	Day	Hours	
Trading and balancing	Balancing responsibility	Fully on shippers	TSO partly responsible (as e.g. residual shipper)	

xxx Typical EU solution
Perimeter of an entry-exit model
xxx DWGM solution

Figure 2: Key features of an entry-exit model compared to the current DWGM[15]

It is noteworthy that there are only two elements that the DWGM shares with a typical European implementation of the entry-exit model: the gas routing principle and the residual balancing responsibility. Only three other features (tariff base, number of balancing zones, and the balancing period) are in common with other, less typical implementations of the entry-exit model. The remaining eight features of the DWGM are not observed in any application of the entry-exit model.

This serves as an indication of the extent of change required to implement an entry-exit model in place of the DWGM.

2.6 Key differences between the DWGM and European entry-exit systems

The largest differences between the DWGM and European entry-exit systems are network access rights and mandatory trading

Any assessment of entry-exit implementation in Victoria must take into account differences in the underlying conditions vis-à-vis European systems. The current

[15] DNV KEMA, *2013 Study on Entry-Exit Regimes in Gas*

condition of Victoria's DWGM is significantly different from the pre-conditions in Europe at the implementation of entry-exit models.[16] One major structural difference is in the division of responsibilities between the network owner and the system operator, which is in direct contrast to the integrated TSOs in Europe.[17] Key regulatory principles – for example, Victoria's strict cost-based tariffing and capital redundancy rules – also differ to European systems.

The underlying differences, examined in Section 3, indicate implementing an entry-exit system in Victoria cannot be assessed purely by applying the underlying logic behind European reform. Comparing observed European outcomes with expected outcomes in Victoria without considering these differences risks compromising the accuracy of any conclusions.

[16] A key exception is the gas routing principle, which is similar in Victorian and European systems and was at the heart of European entry-exit reform

[17] See Section 4.3; Figure 8

3 The VTS

The VTS has fundamental differences to European systems

3.1 *The VTS is unique*

The VTS is a unique system built around local consumption and adapting to increasing export demands

The VTS has long pipelines and relatively few interconnections. As a result, there is less built-in redundancy and greater demand on key parts of the network. While the network is often described as a mesh, such features indicate mesh is not an accurate description.

There are a number of challenges to balancing the VTS. The VTS carries a variable and unpredictable load, mostly due to a high residential share of gas consumption creating a sensitivity to cold snaps (see Section 3.2). The VTS also has a small amount of linepack and storage capacity relative to other entry-exit model systems. Increasing exports and rising gas prices compound the difficulty of planning and balancing Victorian consumption and export demands.

3.2 *Four-hourly balancing*

The VTS four-hour balancing period will add complexity to an entry-exit model

The VTS requires a four-hour balancing period due to infrastructure features and demand conditions. There is a significant time-lag between injection at Longford and arrival in Melbourne, a distance that takes gas a minimum of 4-6 hours to travel. Furthermore, Victoria's relatively frequent cold snaps cause demand spikes that require the injection of LNG from storage to maintain pipeline pressure. Such events are not infrequent, occurring as many as six times per year. Effective handling of these events is critical to the ongoing security of the system.

The current DWGM handles extreme demand events well. Under an entry-exit model, the drivers of this problem will persist. It is imperative that the design of any new system reflects and accounts for this feature of the VTS. For example, a potential solution may include:

i. a four-hour lag between entry and exit rights, or

ii. a zone delineation at Dandenong City Gate.

APA considers that entry-exit systems should be designed to reflect underlying infrastructure. As such, infrastructure differences between networks are an important factor when comparing entry-exit systems. While Victoria is of a similar land area to an average European country, it is far less populated, and the pipeline network is less extensive and much less dense. Section 3.3 provides further qualitative and quantitative benchmarks.

Balancing in The Netherlands

The gas market in The Netherlands has some similarities to Victoria. In particular, it has sizeable offshore production that meets domestic demand and a very high proportion of households using gas for heating.

The TSO is GTS, who operate 11,900km of pipeline with pressures ranging from 16 to 80 bar (1.6 to 8 MPa). There are 17 feeding points from networks in other countries.

The Netherlands use a unique continuous balancing approach. Market participants receive continuous information from GTS on their balance status as well as the status of the entire system. If the system goes outside a predefined operationally safe band, market participants out of balance in the same direction as the market bear the cost of rebalancing. The balancing period for this event is one hour.

Market stability is aided by the highly interconnected network, large linepack, the closeness of production sources and the hugely liquid hubs located in the area (for example, the TTF).

For further reading, see the DNV KEMA 2013 Study on Entry-Exit Regimes in Gas

Another key difference between Victoria and most European countries is the balancing period. In particular, Victoria's four-hour balancing period is required due to the distance between Longford and Port Campbell (the major injection points) and Melbourne (the key demand location). This physical feature of the system is independent of the market regime, thus an entry-exit system must adapt to it too. In Europe, a daily balancing period is most common,[18] largely made possible by significant amounts of linepack, storage capacity, and alternative routes, all of which provide added flexibility to the network.[19]

In Victoria, the VTS is not comparably flexible (see Figures 3 and 5). In particular, successful entry-exit systems in European benchmark countries have at least two of the three main sources of flexibility (the United Kingdom, Netherlands, and Belgium have linepack and alternative routes; Germany and France have linepack, storage and alternative routes). In contrast, Victoria's relatively short, small diameter pipelines and lack of alternative routes mean that storage is the only source of

[18] See Section 2.4
[19] DNV KEMA, *2013 Study on Entry-Exit Regimes in Gas*

network flexibility. Storage capacity is an important flexibility source, especially short term mobile capacity, which is more or less correlated with total storage capacity, and can depend on technical characteristics of the storage facility. Victoria's total storage capacity to annual demand ratio (approx. 10%) is lower than many European countries. Furthermore, the larger of the two storage facilities at Iona is far from Melbourne, and the LNG tank at Dandenong has only 0.6 PJ of capacity. These constraints limit the flexibility benefits storage capacity can provide the VTS.

Balancing in the UK

The UK system is considered to be one of the best examples of the entry-exit model and it encourages a high level of competition. The UK has the largest gas market in Europe with a consumption of 3,270 PJ that is met by imports and local production in roughly equal parts.

National Grid is the only TSO and has 7,600km of pipeline up to a pressure of 94 bar (9.4 MPa). The network is directly connected to Belgium, the Netherlands, the Republic of Ireland and Northern Ireland.

Balancing is done on a daily basis and market participants are fully responsible for their balanced positions. The large linepack, the existence of alternative routes, the liquid gas market, the diversification of sources (domestic production; LNG terminals; interconnectors), and the sizeable storage capacity help shippers and the TSO to maintain balance.

For further reading, see the DNV KEMA 2013 Study on Entry-Exit Regimes in Gas

3.3 Key differences between the VTS and European networks

There are key quantitative and qualitative differences between the VTS and European networks

In this section, the Victorian system is benchmarked against selected European countries on several quantitative and qualitative descriptors. The countries have been selected on the basis of having entry-exit systems that are considered to be functioning effectively. European data is primarily from the DNV KEMA Study on Entry-Exit Regimes in Gas, which was commissioned by the European Union to review the implementation of entry-exit systems across Europe.

Figure 3 provides a broad overview of key quantitative benchmarks with illustrative examples. Figure 4 illustrates the differences in scale between Victoria and benchmark systems. Figure 5 shows the physical differences between the VTS and the gas networks for selected European countries.

	Network length	Cross-border entry-exit pts	Consum-ption	Import volume	Export volume	Storage capacity	Balancing period
	km	*#*	*PJ/year*	*PJ/year*	*PJ/year*	*PJ*	
Victoria (VTS)	**2,000**	**5**	**200**	**—**	**50**	**20**	**4 hours**
United Kingdom	7,600	9	3,270	2,100	70	150	Daily
Germany	112,000	37	3,060	3,410	770	700	Daily[20]
Netherlands	11,900	17	1,600	770	1,860	180	Continuous[21]
Belgium	4,100	11	710	870	160	30	Daily[22]
France	38,000	11	1,720	1,940	160	490	Daily

Figure 3: Comparison of network characteristics elements in Victoria and selected European countries[23]

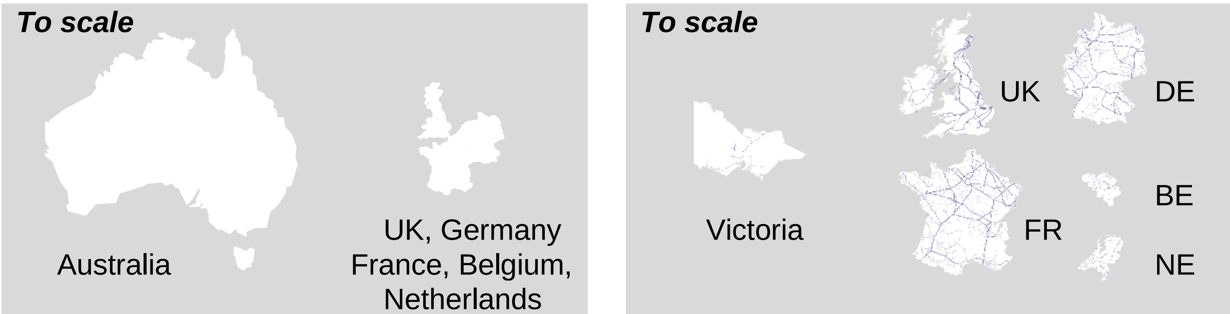


Figure 4: Scale comparisons of selected European countries with Victoria[24]

[20] In Germany some participants face within-day obligations, for example structuring fees for hourly deviations outside tolerance margins

[21] The Netherlands' continuous balancing system has no fixed balancing period. Hourly and cumulative balancing is applied. See call-out box for more information.

[22] In Belgium, hourly imbalances are registered

[23] DNV KEMA, *2013 Study on Entry-Exit Regimes in Gas*

[24] DNV KEMA, *2013 Study on Entry-Exit Regimes in Gas*

Victoria
Population: 6m
Pop. density: 25/km²

- ✗ Substantial linepack
- ✗ High storage levels[25]
- ✗ Many alternative routes

——— 200km

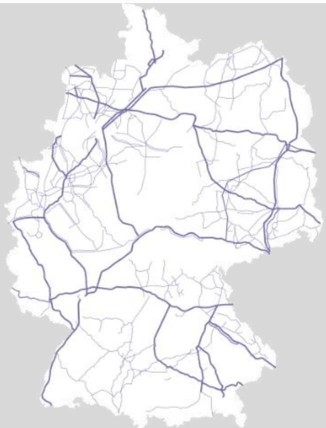
Notes:
- Relatively simple network
- Few interconnection points
- Few points of storage

United Kingdom
Population: 64m
Pop. density: 255/km²

- ✓ Substantial linepack
- ✗ High storage levels
- ✓ Many alternative routes

——— 200 km

Notes:
- Connected to continental Europe via Belgium and the Netherlands
- High import volume



Germany
Population: 81m
Pop. density: 229/km²

- ✓ Substantial linepack
- ✓ High storage levels
- ✓ Many alternative routes

——— 200 km

Notes:
- Highly developed network
- Fully meshed
- Large number of entry/exit points
- Large import volume

Key
- *Pipeline >90cm*
- *Pipeline ≤90cm*

[25] Defined as in-system storage >20% of consumption

Netherlands
Population: 17m
Pop. density: 411/km^2

✓ Substantial linepack
✗ High storage levels
✓ Many alternative routes

200 km

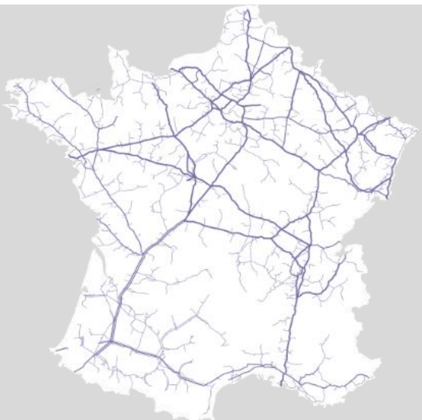
Notes:
- Network serves as major hub for European gas
- Large export volumes relative to neighbours

Belgium
Population: 11m
Pop. density: 355/km^2

✓ Substantial linepack
✗ High storage levels
✓ Many alternative routes

200 km

Notes:
- Many interconnection points



France
Population: 66m
Pop. density: 114/km^2

✓ Substantial linepack
✓ High storage levels
✓ Many alternative routes

200 km

Notes:
- Large import volume
- Large storage capacity
- Few cross-border entry/exit points relative to size

Key
Pipeline >90cm
Pipeline ≤90cm

Figure 5: Comparison of selected European pipeline networks with Victoria[26]

[26] DNV KEMA, *2013 Study on Entry-Exit Regimes in Gas*

4 Implementing an entry-exit model in Victoria

Implementing an entry-exit model in Victoria is potentially feasible but would require significant deviations from European models

4.1 Investment signals

Investment signals are much more important in Victoria than in Europe

Since the introduction of entry-exit systems after 2009,[27] demand for natural gas in European countries has fallen (Figure 6).[28] As a result, there has been little major pipeline investment since the introduction of entry-exit, except for interconnections between countries.[29] Private investors prefer to finance investments in interconnector pipelines through pre-booking of capacities (an open season process), and as such, interconnector pipelines are generally run under special rules that exempt them from the general entry-exit regime.

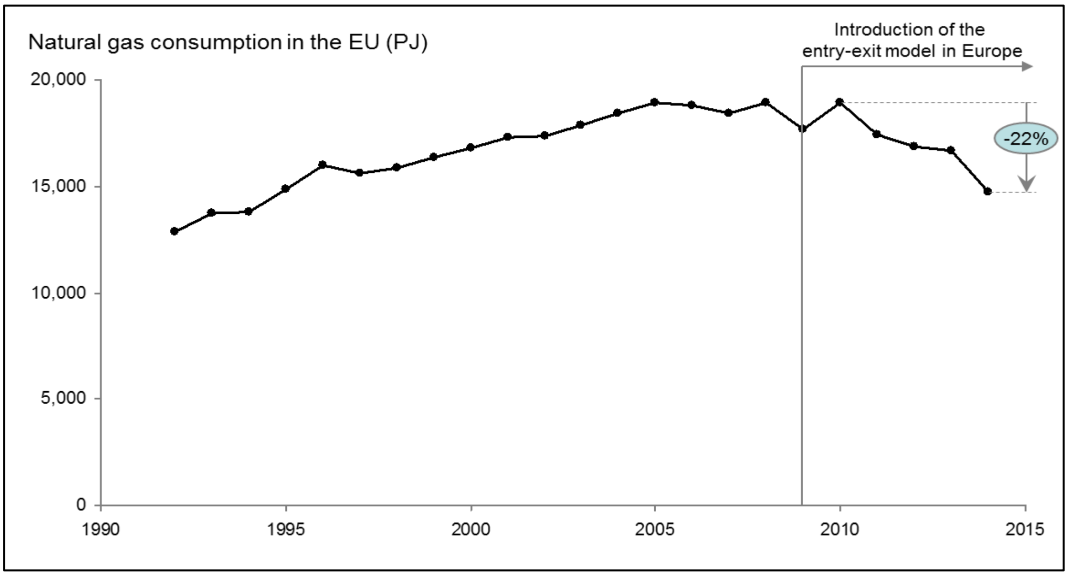


Figure 6: Natural gas consumption in Europe has fallen since 2009, when entry-exit systems were implemented[30]

[27] WIK-Consult 2011 Cost Benchmarking in Energy Regulation in European Countries

[28] Note that the decline in consumption is due to fundamental changes in demand, especially gas fired power plants, and not a consequence of entry exit systems. For more, see Oxford Institute for Energy Studies. *The dynamics of a liberalised European gas market*, p.11

[29] Oxford Institute for Energy Studies, *The dynamics of a liberalised European gas market*, p. 63

[30] EIA, 2014 International Energy Statistics. Figures include the 28 countries currently in the EU. Values for Bulgaria, Latvia, Lithuania, Romania and Croatia imputed as 2014 figures were not available at the time of writing.

The reduced need for investment in Europe means there has been no testing of the effectiveness of investment signals within entry-exit zones. As such, any conclusions about the expected efficacy of investment signals in a Victorian entry-exit system must be drawn with caution.

In contrast, flows in (and through) Victoria are rising, primarily due to increases in exports (Figure 7). Investment will be required to reduce risks to security of supply, both for flows through Victoria and for Victorian consumption. Poor investment signals could compromise the efficacy of such investment; as such, any reform must address how investment signals will operate within the network.

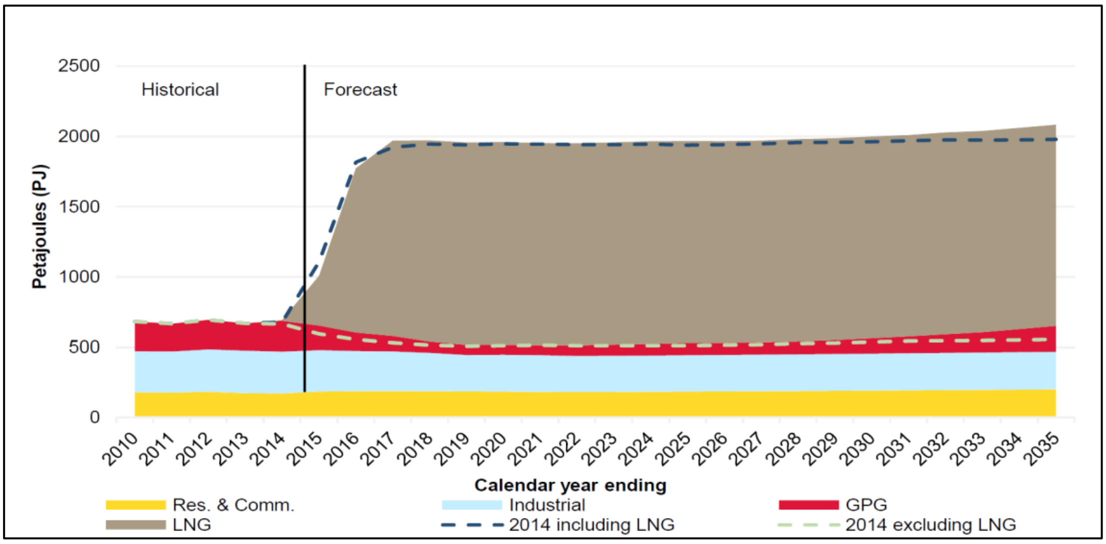


Figure 7: National gas consumption and exports are rising in Eastern Australia[31]

4.2 Assumption of no bottlenecks

Implementing an entry-exit model assumes there are no infrastructure bottlenecks between entry and exit points

In an entry-exit system, access rights are granted at the perimeter of the transmission network. The network owner guarantees the instantaneous[32] flow of the gas between the entry and exit points without any limitation or discrimination between shippers. Therefore, the presence of bottlenecks in the infrastructure requires deviations from a 'pure' entry-exit model. These deviations may be:

[31] AEMO, *National Gas Forecasting Report, Figure 1.*

[32] Because entry and exit capacity is booked separately, the 'pure' entry-exit system inherently assumes instantaneous transport from any entry point to any exit point. As discussed above, many European systems can accommodate this assumption this through abundant line pack and alternate transport routes, features not present in the VTS.

i. a reduction of access rights offered at entry points, which would mean existing infrastructure may not be fully utilised

ii. a prioritisation of access, which would require the operator to assign different capacity rights to network users thus creating potential for discrimination, or

iii. designating an internal location as an access point with a capacity booking requirement (likely the City Gate at Dandenong) and splitting the system into two smaller zones that remain strongly interlinked but sometimes unaligned.

The number of zones is an important issue for consideration. There is a direct trade-off between improving investment signals (more zones), and increasing liquidity and minimising complexity (fewer zones). Considering the relatively small size of the VTS, splitting the market would significantly reduce liquidity and seriously endanger the goals of the entry-exit system.

Since an entry-exit system fails to provide price signals to identify bottlenecks within the entry-exit zone, and given the changes expected in the east coast gas market, APA considers that thorough flow modelling should be conducted to determine the level of further investment required. One existing bottleneck in the VTS is the peak deliverability of the Longford to Dandenong City Gate route,[33] and increases in export demand may exacerbate this constraint.

4.3 Roles of transmission participants

The roles and responsibilities of transmission participants should be clearly defined

The role of the system operator is to ensure non-discriminatory usage of the network, coordinate network development and maintenance, perform the balancing operator role, allocate capacities for the entire market area, and manage necessary curtailments.

In European entry-exit systems, an integrated Transmission System Operator (TSO) carries out the roles of network owner and system operator. In cases where more than one network owner exists in the same market area, one is designated as the system operator.[34] The strong links between their tasks drives the integration of network owner and system operator roles in Europe, which is especially true in an entry-exit system. In particular, network development, balancing, congestion management, and curtailments require close cooperation between operating the asset and operating the system. Integration is even more important in systems

[33] While this pipeline has sufficient *daily* capacity, its distance from Melbourne and low line pack restricts its *hourly* deliverability, requiring injection of LNG during unexpected cold spells.

[34] For example, Germany and Austria – see Figure 8.

where the network is too rigid to handle occasional rapid changes in supply-demand balance. During such events, operators need to act very fast; for example, to release gas from storage, change pressure levels across the network, or curtail certain network users.

On a strategic level, integrated TSOs, in Europe, are optimally positioned to maximise the efficiency of the gas transportation system. The system operators' intention to provide high security of supply is balanced with the network owners' commercial incentives to guarantee sufficient return on investments via high utilisation of the network. Integration also stimulates the development of creative new products, such as flexibility and storage services, which are typically non-regulated (at least initially).

The current Victorian system, in which the owner of the network is separate from the system operator, is atypical (see Figure 8). This separation is a potential source of unwanted complexity in an entry-exit model. Additionally, it raises the question of whether maximum system efficiency is achievable. In parallel with the decision to introduce an entry-exit system, the roles of the network owner and system operator and the rules governing their cooperation should be clearly defined.

In standard European practice, the market operator is independent of the network owner and system operator (Figure 8). This is partly due to cross-border consolidation of hubs and/or hub operators, and partly driven by the regulatory intention to separate network access (where the TSO's role is central) from trading (where the market operator acts).[35] One manifestation of this separation is the existence of non-physical traders, who do not access the network and liaise only with the market operator. Non-physical traders are essential to providing market liquidity and robust price signals, and are necessary for the development of effective financial risk management products.

The separation of system and market operator roles will be important in Victoria too. This would mean either:

i. declaring AEMO as the market operator, and transferring its system operation roles to APA, or

ii. setting up an independent market operator.

The implementation and operational complexity of these and other options should be considered alongside estimates and comparisons of cost.

[35] The separation of gas trading and network access is one of the key recommendations of the AEMC *East Coast Wholesale Gas Market and Pipeline Frameworks Review* Stage 2 Draft Report.

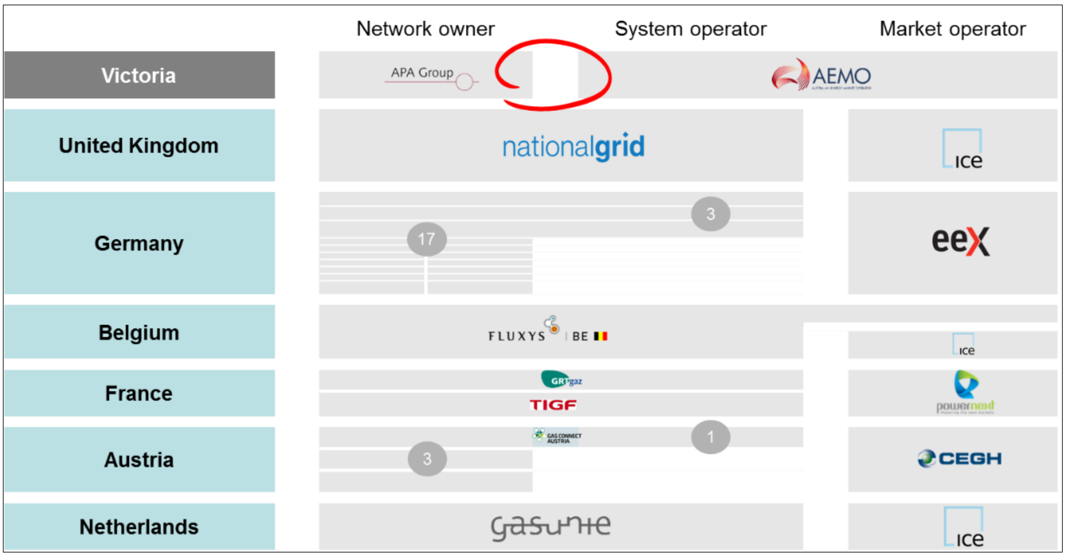


Figure 8: Victoria's split of network owner and system operator roles is unusal by global standards

4.4 Transition

Existing network access rights should be transitioned to the new regime

Prior to network systems reform, the contractual conditions for network access that were valid before reform will need special attention in order to avoid value loss for market participants.

APA understands that in Europe, long-term capacity booking contracts on interconnector pipelines that were signed before the change to entry-exit systems were maintained, since the cancellation of these rights would have caused serious financial and legal troubles for both the operators of the pipelines and these shippers. Active transit shipment contracts may also obtain exemptions from the general rules. For example, if a particular entry or exit point is used primarily for system transit, unique capacity products, potentially specifying particular flow paths, could be available there. Another example of preserving contractual conditions is the non-regulated pricing of capacity rights. Contracts in the market area that are not related to cross-border activities are usually cancelled upon the introduction of a new system, with participating parties receiving compensation for provable losses.

In Victoria, AMDQ and AMDQ credit certificates constitute network access rights, with over 1,500TJ/day allocated to holders of these rights. Plans for their treatment should precede any decision to introduce an entry-exit system.

5 Costs and benefits

The benefits, costs, and risks of implementation must be carefully considered

5.1 Achieving policy objectives

An entry-exit model has been proposed for Victoria based on its suitability for achieving several policy objectives

In general, policy should support the National Gas Objective and promote the interests of consumers with respect to price, quality, safety, reliability and security of supply.

APA considers that there are four main policy objectives for the potential introduction of an entry-exit model in Victoria. They are to:

i. facilitate efficient trade of gas to and from adjacent markets

ii. ensure there is enough competition to serve consumer interests

iii. ensure appropriate signals and incentives are in place for investment in pipeline capacity, and

iv. allow market participants to effectively manage price and volume risk

The AEMC expects entry-exit reform to "deliver an effective and competitive wholesale gas market which minimises barriers to entry, lowers transaction costs and provides greater price transparency."[36] The AEMC argue such changes would "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." Other benefits claimed by the AEMC are the creation of "market-driven signals for investment in the pipeline system", the support of retail choice in Victoria, and the promotion of "the long term interests of small consumers" through cost reduction.

As discussed in Section 4, a carefully designed entry-exit system may support these objectives in principle. However, the extent to which an entry-exit system will help achieve each objective needs to consider infrastructure realities of the VTS. It is the interaction between physical characteristics and system design that will determine the eventual impact of any reform.

[36] AEMC, *Review of the Victorian Declared Wholesale Gas Market, Draft Report*

APA agrees an entry-exit model may bring some of these benefits. However, we believe the AEMC has overestimated the benefits and underestimated the costs and risks of the proposed reforms.

5.2 Design vs realities

Whether these benefits will materialise depends on how well the design of the entry-exit model matches the realities of the VTS

As described in Section 2.5, the design and implementation of entry-exit systems in other markets reflects unique elements of those markets. The VTS and DWGM have specific infrastructure and market conditions that must be considered in any analysis of benefits. The AEMC's proposed benefits and the conditions on which they rely are discussed in the following sections.

5.3 Firm capacity rights

The introduction of firm capacity rights at interconnector pipelines is one potential benefit of entry-exit models

Firmer capacity rights could improve shippers' ability to transport gas through Victoria for export. However, for all intents and purposes, firm capacity can be provided in the current DWGM through the use of AMDQ and AMDQ credit certificates. In theory, an entry-exit model would provide definitive firm capacity rights, although in a practical sense this already occurs.

In European systems, limited multi-year capacity booking has developed,[37] and interconnector pipeline developments are often managed outside of the general entry-exit system (such as by open seasons and long-term capacity constraints). While the lack of multi-year capacity bookings in the core entry-exit systems may be a feature of the high level of spare capacity in the European gas network, it undermines the assumption that long-term capacity rights will be purchased in Victoria.[38]

5.4 Retail competition

Increasing retail competition above current levels will be challenging

Competition in the wholesale and production markets enables retail competition. APA considers the current market model to be sufficiently competitive, a view

[37] Oxford Institute for Energy Studies, *The dynamics of a liberalised European gas market*, pp. 66-67

[38] Oxford Institute for Energy Studies, *The dynamics of a liberalised European gas market*, pp. 66-67

supported by Victoria's exceptionally high switching rates (Figure 9), which indicate a very competitive retail market.

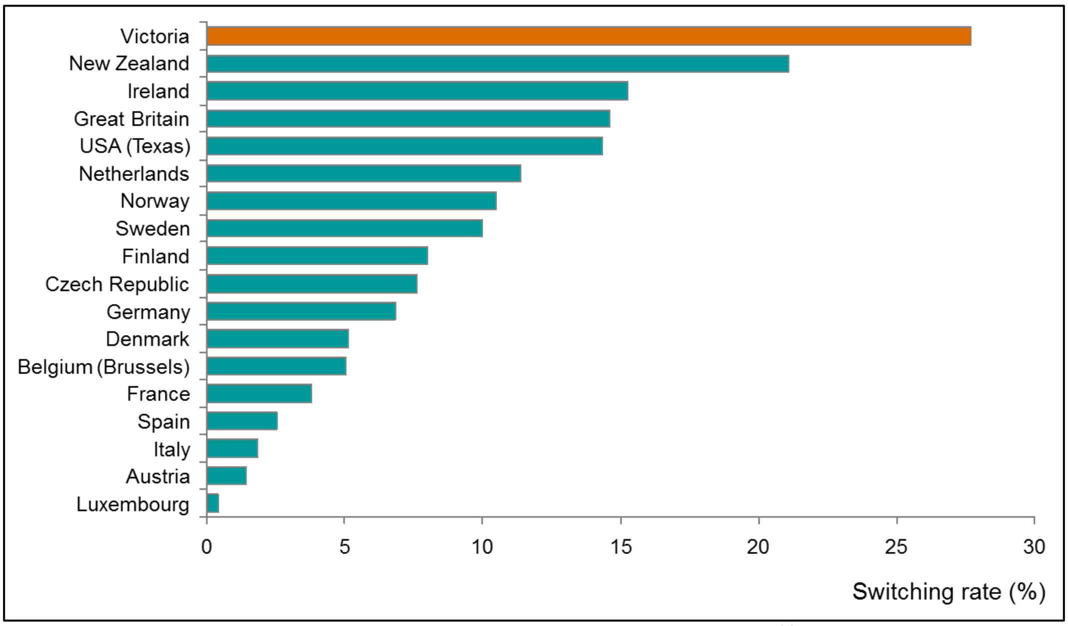
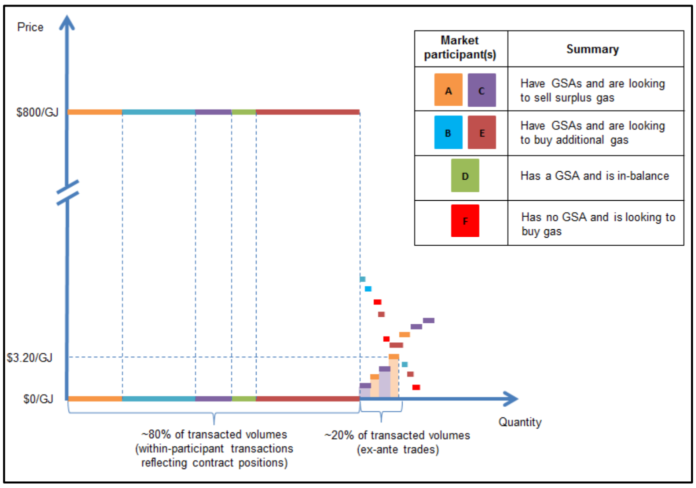


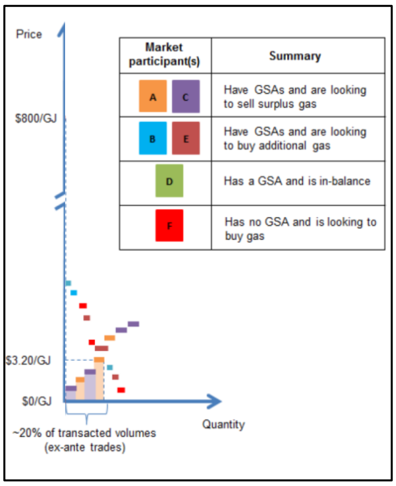
Figure 9: Victoria has the highest retail switching rate in the world[39]

As the east coast gas market changes, Victorian gas exports will become more important. Freer trading in Victoria (for example, removing mandatory trading obligations) will help producers to export, but this will not necessarily help retailers in Victoria to source gas at the lowest possible cost. If mandatory trading were removed, retailers would require a liquid market with many supply options in order to purchase gas at competitive prices. There is no evidence that suggests such a market could exist in the absence of mandatory trading provisions.

The DWGM currently provides a proxy for competitive prices through mandatory trading. This is evidenced by the fact that many DWGM bids are within-participant transactions reflecting contract positions, i.e. volumes are bid in at zero and out at VoLL (Figure 10). Mandatory trading – the forced existence of other bids – protects retailers who do not have production assets or the negotiating power to secure favourable sourcing contracts.

[39] VaasaETT, *2012 World energy Retail Market Rankings*. Switching is defined as the movement of a customer from one supplier to another by free choice of the customer.





Figures 10, 10a: Comparison of size of mandatory[40] *vs voluntary markets*

If an entry-exit model were implemented, smaller participants may become less competitive through new barriers to entry. This is because, under the DWGM, small shippers can book pipeline capacity that exactly matches their load profile. Small retailers do not necessarily have the financial ability to book long-term capacity rights, nor will they be able to match large shippers' superior risk management and negotiation capabilities in a more operationally complex environment. The need for capacity bookings will also disadvantage small shippers with volatile portfolios, as their unit cost of capacities will be higher than for larger shippers with flatter portfolio profiles.

5.5 Size of the DWGM

The VTS and DWGM may be too small for non-physical traders to participate

APA's research indicates that, in the European experience, non-physical traders participate in the market with material share only if the market is relatively large and liquid, in order to reduce their risk of being in uncovered positions. The AEMC's parallel report, the *East Coast Wholesale Gas Market and Pipeline Frameworks Review*, recommends that the Victorian DWGM be converted to a virtual hub with voluntary trading. In APA's view, this would mean that the volume of gas traded would not include all the currently observed "self-trades" bid into the market at zero and out of the market at VOLL, as depicted in Figure 10. However, as depicted in Figure 10a, an organised market with the removal of the mandatory trading obligation would likely be smaller with less liquidity – features that are not supportive of non-physical trade.

[40] AEMC 2015 Stage 1 Final Report: East Coast Wholesale Gas Market and Pipeline Frameworks Review

5.6 Investment signals

Investment signals favour entry-exit points at the expense of the wider network

In entry-exit systems, market signals for investment occur only at entry and exit points. Market signals for investment in internal network bottlenecks are inherently less transparent than signals at entry or exit points. Furthermore, a single transportation zone would provide less granular information on shippers' intentions to use particular elements of the internal network than is currently provided in the multi-zone DWGM.

In Victoria, identifying – and subsequently investing in – internal bottlenecks is crucial for securing supply for consumers (as discussed in Section 4.2). Furthermore, the capital redundancy provisions applicable in Victoria (as per the National Gas Rules) create risks for network owners that investments may be removed from the regulated asset base in response to changes in the market. These risks are exacerbated by the relative lack of internal investment signals in the entry-exit model. APA's research indicates that capital redundancy provisions are not observed in European entry-exit systems.

APA considers that, before implementing an entry-exit model, there is a need to develop a new investment approval process including detailed descriptions of roles and responsibilities between network owners, system operators and regulatory bodies. This process should, similar to European models, reflect the crucial role of TSOs in routing gas within the system. Under an entry-exit model, giving more importance to the technical planning of the network owners and system operators is unavoidable. Economic Regulators still have to approve network development proposals,[41] but those who are solely responsible for the free and non-discriminatory transport of gas through the system should have the means and responsibility to propose investments that make this role possible.

5.7 Financial risk management products

The demand for and efficiency of financial risk management products in the DWGM is unclear

As noted by the AEMC, "the preconditions necessary for the development of financial risk management products do not exist in the DWGM."[42] However, it remains unclear whether an entry-exit model would create the necessary conditions. APA considers that the extent to which risk management products are developed and used depends on a number of factors.

[41] Oxford Institute for Energy Studies, *The dynamics of a liberalised European gas market*, p. 63

[42] AEMC, *Review of the Victorian Declared Wholesale Gas Market, Draft Report*

i. Demand for risk management products will reflect the flexibility of retailers' pricing regimes, that is, their ability to change retail prices in line with wholesale price changes. In Victoria, the deregulation of retail pricing allows retailers to change prices without regulatory approval, and only competitive pressures limit their use of these provisions. Market price contracts provide a natural hedge for retailers to limit their exposure to large wholesale price changes, and reduce the need for external hedging products.

ii. Market size is an important factor in determining the cost of risk management products. Due to scale effects and higher relative volatility, smaller markets generally have more expensive hedging products. Market size is driven by consumption, and there is a strong possibility the Victorian market is too small to support reasonably priced hedging products (Figure 11). For example, APA understands that the Hungarian market – which has somewhat higher gas demands compared with Victoria – has not developed effective hedging products.

iii. The development of financial risk instruments relies on the existence of non-physical traders (see Section 4.3). Such traders provide liquidity to the market and thus increase the robustness of the price signal. While an entry-exit system will predominantly promote liquidity of short-term and balancing markets, it is questionable whether liquidity will increase enough for products that have horizons far enough for market participants to want to hedge themselves (see Section 5.5).

iv. The short balancing periods necessitated by low network flexibility (Section 3.2) can make spot prices volatile. Volatility in spot prices will make hedging products more difficult to develop and expensive, and may deter use.

v. The ability of market participants to trade outside the hub can further limit its liquidity. In the current DWGM, the majority of bids are artificial within-participant offers. In a voluntary market, many of these deals are likely to move to bilateral contracts and bypass the market entirely (see Figure 10a).

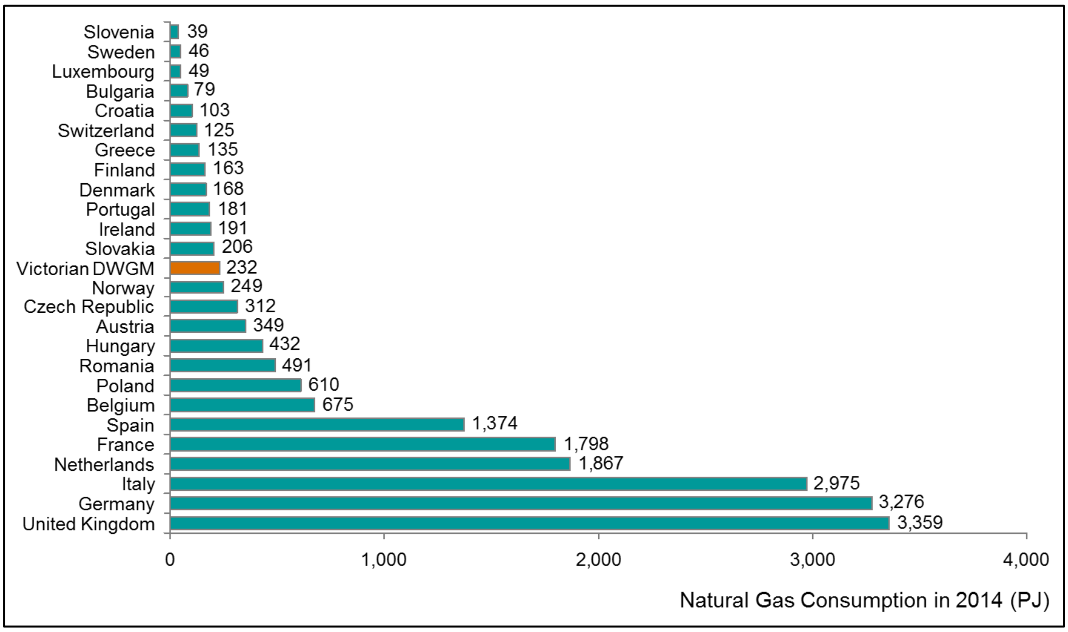


Figure 11: The Victorian DWGM is small compared to most European countries who have successfully implemented entry-exit models[43]

5.8 Risks to be addressed

Several risks must be addressed before implementing an entry-exit model

APA lists a number of the key risks of implementation below. While not comprehensive, this list details important issues for consideration before implementation occurs. Section 6 also addresses some of these risks.

i. Any transition to an entry-exit model must carefully manage existing contractual arrangements. Some market participants highly value AMDQ and AMDQ credit certificates, and those participants are unlikely to view similar instruments offered under an entry-exit system as adequate substitutes.

ii. The implementation of an entry-exit model has the potential to cause significant disruption to the market. It is important that the details of any transition are clearly articulated, well communicated, and executed according to a full implementation plan.

iii. As noted above, a weakness of the entry-exit model is the relative lack of investment signals within the entry-exit zone. Details of any arrangements to ensure efficient and timely investment for the benefit of all market participants must be clear and available, prior to any change.

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[43] EIA, 2014 International Energy Statistics

iv. While an entry-exit model may be beneficial to competition in some respects, increased complexity may create new barriers to entry. As such, it is important that intelligent system design eliminates complexity wherever possible.

v. The volatility of demand combined with low system flexibility requires extreme care when designing balancing rules. The most likely scenario is that current within-day balancing periods will have to remain. This would break trading volumes into smaller chunks, limit liquidity, and reduce the effectiveness of the hub at providing market signals.

vi. Close cooperation between the network owner, owners of stored gas, the system operator, and shippers is necessary. The rules for imbalance tolerance, penalties, and the source and pricing of balancing gas are key factors in the successful implementation of the entry-exit system. Distribution of the costs of keeping the system in balance (for example, by holding storage in reserve and injecting LNG) is another issue for careful consideration.

5.9 Transitional costs

Market participants will incur additional costs when transitioning to an entry-exit model, which is likely to affect retail prices

APA's research indicates that, based on international examples, implementing an entry-exit model requires significant investment in new capabilities and integrated IT platforms for capacity booking, nomination, balancing and allocation. In European markets similar to Victoria, system operators invested approx. A$10m in initial capital expenditure, and a further A$2m per year (approx.) in ongoing operating expenditure for IT support, with each shipper typically incurring costs of A$10–15m over five years to update IT systems and capabilities. This is a significant barrier to entry for smaller shippers hoping to enter the market, who often start with very small investment and cash flows.

Based on these examples, the overall cost of changing the system could amount to tens of millions of dollars, with millions more in additional ongoing costs. This is likely to result in a small increase in prices for consumers. Furthermore, there may also be additional costs relating to interconnection with neighbouring systems. Establishing system interfaces between potentially different IT solutions and creating a common platform that enables capacity allocation and monitoring at border points may require an IT investment similar in size to the initial one-system development.

6 Issues to be addressed

Multiple issues must be addressed ahead of potential implementation

Whether the costs of introducing an entry-exit model in Victoria outweigh the benefits largely depends on the combination of design choices for the new system and the assumptions around trading activity. In this section APA lists a series of issues that, while not exhaustive, capture the most significant unresolved elements of the entry-exit model design. For the industry to be in a position to comment on the potential benefits and costs of implementing an entry-exit model, the following must be addressed.

6.1 Role of network owners, system operators, and market operators

The discrepancy in roles between network owners, system operators, and market operators in Victoria versus European entry-exit systems must be resolved

APA believes further development of the entry-exit proposal requires:

i. a clear description of how the roles of network owner, system operator and market operator are to be divided

ii. identification of services that will be part of the regulated revenue cap, and

iii. an outline of scope for the introduction of new revenue-generating services, indicating how regulators will approach such services.

6.2 Allocation of capacity

Allocation of capacity must be optimised

APA believes further development of the entry-exit proposal requires:

i. a method for discouraging hoarding – for example, a use-it-or-lose it mechanism that returns unused capacity to the system operator

ii. a description of how the new system will balance the competing goals of firm contract provision and maximum utilisation of assets, and

iii. a decision on whether the AEMC recommendation that the rest of Australia use mandatory capacity auctions would also apply to Victoria if the DWGM transitioned to an entry-exit model.

6.3 AMDQ and AMDQ credit certificate

The value of AMDQ and AMDQ credit certificate rights must be transitioned into a new regime

APA believes further development of the entry-exit proposal requires:

i. a decision on how to transfer AMDQ and AMDQ credit certificates rights to the new regime, and

ii. a method for calculating compensation if AMDQ and AMDQ credit certificates are cancelled.

6.4 Trading hub

A trading hub must reflect the features of the VTS and size of the DWGM

APA believes further development of the entry-exit proposal requires:

i. a decision on whether a virtual hub is needed

ii. a description of the rules under which a virtual hub would operate, and

iii. an indication of the services the virtual hub will offer to shippers.

6.5 Balancing rules

Balancing rules must consider the competing goals of liquidity and system security

APA believes further development of the entry-exit proposal requires:

i. a decision on whether to balance the market as a whole, or by sub-zones

ii. a decision on the number of sub-zones, if more than one zone is required

iii. a decision on the period over which imbalance tolerances apply, and how balancing costs will be dispersed across the market to prevent 'surprise uplift' issues,[44] and

iv. a detailed mechanism for the system operator to use to ensure market participants are in balance for the nominated period.

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[44] "Surprise uplift" is one of the major features of the current market that was cited as being a barrier to the creation of financial risk management products.

6.6 Consultation and education

Extensive consultation and education should take place with as many participants as possible, as soon as possible

APA believes further development of the entry-exit proposal requires:

i. a plan for consultation to occur before implementation, once details of any reform have been announced

ii. educational materials for stakeholders, particularly shippers, to ensure they understand the new system, and

iii. a decision on the time allowed, before implementation, to educate shippers.

6.7 A substantial programme of work

A substantial programme of work must be undertaken to address these issues before implementation can begin

APA stresses the substantive importance of the issues raised throughout this document and particularly in this section.

These issues require substantial work before a decision of whether or not to implement an entry-exit system can begin. If the AEMC choose to further investigate the possibility of implementing an entry-exit model, APA is prepared to actively participate in the development process.

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