



**Final Report of the STTM Study  
in response to the  
Frontier Economics Report**

**25 March 2010**

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## Executive Summary

The STTM Study was commissioned by the Australian Energy Market Operator (AEMO) at the request of the Standing Committee of Officials of the Ministerial Council on Energy to review the June 2009 Frontier Economics Report *Short Term Trading Market for Natural Gas*. (FER) The FER was commissioned by the Government of New South Wales to review the STTM and concludes: "Frontier Economics considers that there is significant risk in adopting the proposed design of the STTM in place of the existing NSW balancing arrangements and the NSW Gas Continuity Scheme." (FER Executive Summary, p. 2)

The STTM Study concludes that the STTM will be a positive step forward in the development of competitive energy markets in Australia, and disagrees with the FER's conclusion that implementing the STTM in its current form involves significant risks. However, the STTM Study agrees with the FER that some features of the STTM design are likely to create problems that will have to be dealt with at some point. But this is to be expected in any new market. The issues of concern should be monitored carefully by AEMO and the Australian Energy Regulator (AER) as the STTM is tested and implemented over the next months and as it begins live operation, so that emerging problems can be identified and solutions can be developed for them as they arise.

The STTM study identifies the basic (and closely related) features of the STTM design that are the most likely source of future problems for the STTM. In particular, the STTM: (1) is an unusual-to-unique hybrid of a traditional commodity market that is totally independent of physical delivery operations and a modern network market that determines both market outcomes and physical operations in an integrated process; (2) has no near-real-time market or economic ex post pricing process to deal with the inevitable changes that occur after bids and offers are submitted for the day-ahead market; and (3) does not offer firm day-ahead capacity and hence may not do as much as it could/should to reduce trading risks, particularly for smaller shippers/retailers. This report describes these features of the STTM and some of their consequences in some detail, on the premise that understanding the basic cause of a potential problem will help to identify and solve it if and when it arises.

On the most important specific issues raised in the FER, the STTM Study's conclusions are (in more-or-less declining order of importance):

- **Security of Gas Supply and the NSW Gas Continuity Scheme:** The STTM is a more-than-adequate replacement for the NSW Gas Continuity Scheme (GCS). The FER's conclusion that there are "significant risks" in adopting the STTM in place of current NSW arrangements was based on an analysis that did not consider the STTM's contingency gas provisions (some of which were still in development when the FER was issued) that have the same objectives and essentially the same (or better) implementation mechanisms as the GCS.
- **Priority Market Power Issues:** The most important market power issue for the STTM is the potential for a shipper to withhold gas from the day-ahead STTM to increase the day-ahead and deviation prices, use its pipeline contract to deliver that gas to the hub, and then sell that gas to the STTM at the now-higher long deviation price. This "over-

bidding/bumping" (OBB) strategy can in principle be highly profitable even for moderate-sized shippers/retailers because of two specific features of the STTM design mentioned above: the lack of a real-time/ex post market or pricing process; and the non-firm nature of day-ahead STTM capacity. In practice, the OBB strategy will be limited by the facts that most gas will be sold at regulated or contract, not spot, prices, and that the OBB strategy would be a clear violation of the STTM's "good faith bidding" requirements.

- **Bypassing the STTM:** Large shippers/retailers could, as the FER indicates, use the STTM's market schedule variation process to bypass the day-ahead STTM, and if this happens enough the resulting thinness of the market could increase risks for smaller shippers/retailers and new entrants. But, as the FER also suggests, large players could have exactly the same effect without bypassing the STTM, through a combination of financial contracts among themselves and artificial bidding within the STTM, i.e., offering to sell contract gas to the STTM at \$0/GJ and bidding by buy it back at VoLL. If large players want to make the STTM risky for small players and useless for themselves, they can do so as a technical matter, just as larger players in any market can increase risks for small players at some cost to themselves; the questions concern whether and why they would want to do so, and whether they could get away with it as a regulatory/political matter.
- **Market Operator Service (MOS):** The FER may be correct that the risks involved in providing the Market Operator Service (MOS) used for physical balancing in the STTM could result in high MOS contract prices, at least initially, and that large MOS providers might be able to game the two-day lag between the scheduling and the settlement of MOS. In principle, these effects could, as the FER says, discourage smaller shippers/retailers from competing to provide MOS contracts – although both large and small shippers/retailers responded to the recent Market Trial MOS tender. But the risks in providing MOS will come down as experience with it grows; AEMO and the AER will monitor market behaviour and performance and take action if and as necessary, and AEMO will modify the MOS commercial arrangements if and as necessary. Initial MOS costs may be higher than they "should" be in some sense and higher than they will be eventually, but MOS creates no risks that would justify delaying implementation of the STTM.
- **Bidding Rules, Regulation and Market Monitoring:** The FER suggests that several of the potential problems it describes are due to the large size of some existing market participants and the "absence of bidding rules" in the STTM such as those in the Western Australia electricity market (which require each generator to bid at its short run marginal cost). Such specific bidding rules would be impractical and counterproductive in the wholesale STTM, but existing contractual and regulatory constraints on retail pricing should be retained until a workably competitive market structure is created or evolves. To control the potential for strategic behaviour, general criteria for acceptable bidding behaviour and market outcomes should be defined, market behaviour and performance should be monitored, and possible violations of the criteria should be referred to the appropriate authorities for investigation and perhaps sanction. The monitoring activities could be carried out by the AER itself, but experience in other markets, particularly electricity markets in North America, suggests there is value in an independent market monitor for each specific market.

To summarize the summary: Implementing the STTM with its current design will not create "significant risk" as suggested in the FER, but will reveal problems that may require changes in rules, processes and perhaps even basic design at some point in the future. But such teething problems must be expected in implementing any complex new process. There is no reason the STTM should not be a success in the long run, as long as the appropriate authorities, primarily AEMO and the AER, monitor market behaviour and outcomes for signs of emerging problems and the STTM is able and willing to evolve as and if problems arise.

# **Final Report of the STTM Study in response to the Frontier Economics Report**

**25 March 2010**

## **1. INTRODUCTION**

### **1.1. Context and Purpose**

A Short-Term Trading Market (STTM) for natural gas is being implemented in south-eastern Australia (outside Victoria, which already has a gas market). In 2009, the NSW Department of Water and Energy engaged the consulting firm Frontier Economics to undertake a review of the STTM. The June 2009 report on this review, entitled *Short Term Trading Market for Natural Gas* (the Frontier Economics Report or FER), concludes: "Frontier Economics considers that there is significant risk in adopting the proposed design of the STTM in place of the existing NSW balancing arrangements and the NSW Gas Continuity Scheme." (FER, Executive Summary, p. 2)

The Standing Committee of Officials of the Ministerial Council on Energy has asked the Australian Energy Market Operator (AEMO) to undertake a "STTM Study" to analyse and respond to the issues raised by the FER. AEMO contracted with Market Reform for the services of Dr. Larry E. Ruff, an international expert on electricity and gas markets, to undertake the requested STTM Study. This document is Dr. Ruff's Final Report on the STTM Study.

### **1.2. Scope and Outline of This Report**

The Detailed Scope of Work<sup>1</sup> (SoW) for the STTM Study specifies the following three parts or tasks:

*Task 1, Scoping and Preliminary Advice*

*Task 2, Address Issues Raised by the Frontier Economics Report*

*Task 3, Market Power Examination*

Task 1 above involves preliminary activities that were carried out in late 2009 through a series of consultations between AEMO and jurisdiction officials, including a meeting with officials in Sydney on 09 December attended by AEMO and Market Reform. Tasks 2 and 3 above are the substantive parts of the STTM Study that are the subjects of this Draft Report.

Section 2 below summarizes the STTM Study's conclusions from Task 2, analysis of the issues raised by the FER. The issues addressed in section 2 are those in the FER's Executive summary that were excerpted in the SoW for this STTM Study, slightly restated and rearranged: The possible use of bidding rules and market monitoring in the STTM; the STTM's treatment of capacity and its effects on non-firm shippers; the opportunity for and effects of using "other

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<sup>1</sup> STTM Establishment Project memorandum entitled "STTM Study –Detailed Scope of Work," December 2009 (the SoW), p. 1.

market arrangements" in the STTM; the Market Operator Service (MOS); and the effectiveness of the STTM in preventing and dealing with supply shortages. All of these issues have market power implications, but discussion of these implications is delayed until Task 3, which specifically addresses market power.

Section 3 below describes the analysis and conclusions of the STTM Study related to Task 3 of the SoW, Market Power Examination. The objectives of this task are to "identify any specific issues that may arise from the potential exercise of market power in the STTM," determine whether such issues are caused or made worse by features of the STTM itself (as opposed to matters outside the STTM's control, such as industry structure), and "recommend whether any additional mitigation measures are required and/or possible in the STTM Rules/Procedures." (SoW, p. 3) Section 3 discusses market power in general, describes the results of a modelling analysis of the market power issue given the most attention in the FER and identified as the most important by the STTM Study – what is called here (but not in the FER) the "over-bidding/bumping" (OBB) strategy – and concludes with a summary section recommending an approach to market power and its mitigation in the STTM.

### 1.3. Summary of Conclusions

The STTM Study disagrees with the conclusion of the FER that "there is significant risk in adopting the proposed design of the STTM", but agrees with the FER about some of the potential problems. More specifically:

- None of the issues raised by the FER or identified by the STTM Study are "show stoppers" that require changes in the STTM design before implementation (which at this stage would delay implementation) or even necessarily soon thereafter;
- Some of the issues raised by the FER or identified by the STTM Study are likely to create problems in the future, the timing and importance of which will depend on how various factors play out; and
- The issues of concern should be monitored carefully by AEMO and the Australian Energy Regulator (AER) as the STTM is tested and implemented over the next months and as it begins live operation, to identify emerging problems so that solutions can be developed before the problems become too serious.

### 1.4. Some Basic Issues in the STTM Design

The STTM was designed in an industry-led process subject to a set of principles and objectives agreed by the Ministerial Council on Energy. Some of the issues raised by the FER concern realities that exist in any commodity market and are not caused by the STTM design itself. But some of the issues raised by the FER and confirmed by the STTM Study are due to basic features of the STTM design itself that are unusual if not unique and that are to some extent inconsistent with established market design principles and practice. The three most important such features of the STTM are the following.

- **A Hybrid Mixture of Market and Physical Operations:** In traditional contract carriage systems such as those now used in Australia (outside Victoria) and elsewhere, physical operations and market outcomes are determined in totally separate processes. In modern

network markets, physical operations are (apart from some ancillary services) determined in a market process; indeed, integrating market and operational scheduling is the key to efficient and effective competition on a complex network. But the STTM is neither a commodity market separate from physical operations nor a modern network market that determines operations; it is a unique hybrid in which the market has no direct effect on pipeline decisions and actions but is strongly and directly affected by those decisions and actions. Most importantly, each pipeline unilaterally (subject to its contractual obligations to shippers but with no obligation to the STTM) sets the daily parameter "capacity" that is central to the STTM's market-clearing and pricing process;<sup>2</sup> and a firm shipper can use its pipeline contract to deliver gas without a STTM schedule and the STTM must buy that gas (as either a long deviation or MOS gas). Making one process and its outcomes so dependent on another, totally independent process and its outcomes is problematic in principle and unusual-to-unique in practice. AEMO and pipeline operators can be expected to act constructively in their dealings with each other, as they have been doing throughout the STTM design and implementation process, but even with the best of intentions all around it is not clear how and how well this curious hybrid will actually work.

- **Lack of a Near-Real-Time Market or Ex Post Pricing Process:** The STTM has no near-real-time market or economic ex post pricing process to deal with the inevitable changes that occur after bids and offers are submitted for the day-ahead market. This would not matter if the STTM (like a normal commodity market) simply priced and settled its own day-ahead trades and then let market participants and pipelines deal with physical operations; but the STTM is directly affected by physical operations, e.g., through the Market Operator Service (MOS), the market schedule variation process, and deviation pricing. The lack of a market or pricing process to help deal with these matters not only increases the general uncertainty about how and how well the STTM will operate, but is also an important factor in some of the specific potential problems identified in the FER and discussed in this Report.
- **A Non-Firm Day-Ahead Capacity Product:** A primary purpose of an integrated day-ahead capacity-and-commodity market on a network is to assure that commodity sold there will (barring extraordinary events) be delivered on the day for the agreed price. But the capacity product priced and traded in the day-ahead STTM is not even "firm-for-a-day" and as such may not have much value in the market. If pipelines are seldom congested this will not matter much because firm capacity will be irrelevant; but if congestion is economically significant the lack of a meaningful short-term capacity product will greatly reduce the value of the STTM, particularly for smaller shippers/retailers. Small competitors, even if they have longer-term firm capacity, have more need for efficient short-term markets in both gas and capacity than do their larger and (more importantly) more diversified

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<sup>2</sup> It is not at all clear how a pipeline will or should set its daily capacity for the day-ahead STTM, when it must deliver both non-STTM and STTM gas through the same system and has no way to know in advance which pipeline customers will be in the STTM, which offers will clear there, or how much non-STTM (and back-hauled STTM) gas it will have to deliver. This logical and practical conundrum and its potentially serious implications have not been addressed by the STTM Study, because they were not raised in the FER and are not directly related to market power.

competitors, so if the STTM does not provide such a market small players will have to find it elsewhere – or perhaps go out of business. The STTM could become little more than a convenience for large firm shippers trading incremental balancing gas among themselves – honest work, but perhaps not quite as much as hoped by those who conceived the idea of the STTM and laboured so hard to deliver it.

Despite these design features of the STTM, the STTM Study concludes that no major changes in the STTM are required prior to market start– which, it is important to emphasize, is not the same as saying that no changes would be recommended if it were much earlier in the process or that no changes should be considered for the future. The basic justification for this conclusion is that all important stakeholders have an interest in seeing the STTM succeed, and hence can be counted on to act constructively as the STTM is tested and begins operation – as they have been doing throughout the process. Once the STTM is operating, problems will arise, as they do with any new market, and will have to be addressed. The point – and prediction – here is that some of the most important problems that will have to be addressed later will be caused by one or all of the three closely related market design features just discussed. Understanding the basic causes of these problems should help in developing the fixes – or even basic design changes – that will make the STTM successful in the long run.

## 2. ISSUES RAISED BY THE FRONTIER ECONOMICS REPORT

The SoW for the STTM Study includes, for reference, the following excerpt from the Executive Summary of FER:

*In principle, the STTM should provide an appropriate replacement for the existing balancing arrangements and for the NSW Gas Continuity Scheme, at least for the STTM hub. However, there is a range of issues with the proposed design of the STTM. A number of these suggest that the price signals provided by the STTM will not be consistent with those that would be observed in a competitive and effective market. Frontier Economics has identified the following gas key issues with the proposed design of the STTM:*

- *The absence of bidding rules provides shippers with a significant degree of freedom to determine the price at which they bid into the market. Given the interaction of the ex ante market with pipeline allocations, there is the potential for the market to be subject to strategic behaviour. This could result in high prices that do not reflect underlying costs and potentially deter new entry.*
- *Allocation of risk through capacity charges is imposed on some participants (e.g. shippers with non-firm capacity) without them being in a position to manage this risk. This is likely to deter participation by shippers with non-firm capacity.*
- *The opportunity for participants to engage in other market arrangements could impact price determination in the balancing market. This also can act to facilitate strategic behaviour designed to deter new entry.*
- *The absence of bidding rules in relation to the provision of MOS provides participants with a significant degree of freedom to determine the price at which they offer balancing gas. This could result in high prices that do not reflect underlying costs and potentially deter new entry.*
- *There is a mismatch between when balancing gas (i.e. MOS gas) is allocated and when it is settled. This mismatch may encourage the MOS provider to influence market prices in favour of its settlement arrangements. This is likely to be a significant problem where there is market concentration for MOS provision, as might be the case in NSW.*
- *There is no financial or other incentive to remain in balance or to avoid curtailment outside the STTM hub provided by the STTM. Indeed, depending on expected price outcomes, the STTM may encourage the diversion of gas from regional areas to the STTM hub, with implications for security of supply outside the STTM hub.*

The issues raised by the FER conclusions above are discussed in this section, in the order they are presented above, but with the substantive analysis of market power delayed until section 3.

### 2.1. Free Bidding, Bidding Rules and Market Monitoring

The FER refers several times in the short excerpt above, and at other places, to the fact that "the absence of bidding rules" provides shippers/ market participants "with a significant degree of freedom to determine the price at which they bid into the market ... [or] offer balancing gas".

The FER does not explicitly say that the STTM should have bidding rules, but includes a section 3.1 (pp. 10-12) that says positive things about bidding rules and their use in other markets. The FER says that the absence of bidding rules "does not constitute a problem ... in competitive and effective markets" (p. 12), but its reference to "the small number of large shippers" (p. 12) in the NSW gas market clearly suggests that the gas markets in the STTM, or at least in NSW, are among those "markets that are not competitive" (p. 12) and hence could presumably benefit from bidding rules (which could not be limited to NSW).

The FER also does not say what sort of bidding rules might be useful in the STTM. It lists (pp. 10-11) the various price caps and thresholds that will limit prices in the STTM, but by "bidding rules" clearly means something much more restrictive – something more like the rules in the Western Australia electricity market that the FER cites as an example. These rules require each individual generator to offer its full supplies at its own short-run marginal cost (or, more accurately, at an easy-to estimate number called "SRMC").

The question of whether or not bidding rules would be a good idea in the STTM should be clearly distinguished from the question of whether market power is a potential problem in the STTM. The latter question is taken up in section 3 here, but to eliminate the suspense the answer provided there is a definite "maybe". But even if market power is a problem, bidding rules are the best solution only under very special conditions that do not exist in the STTM.

The basic problem with rules limiting the bids (or offers; the terms are used interchangeably in the FER and here) of individual market participants is that there is no way for an external observer/enforcer to know what the "right" bids would be even in a perfectly competitive market even if anyone knew what that was. Where bidding rules are imposed, they are typically either so loose that they have little effect or so tight that they distort market outcomes or both (at different times and/or places and/or for different bidders). The more sophisticated they are, the heavier the administrative burden and uncertainty they impose on all involved; the less sophisticated they are, the less effective and/or more distorting they are. There is no good compromise between the extremes, only bad ones.

In simple cases, bidding rules can be at least workable. For example, in the WA electricity market cited by the FER, most generating units are coal- or gas-fired, and generators receive a capacity payment that covers most of their fixed costs plus a reasonable profit. This makes it relatively easy to estimate SRMCs as market fuel prices (in \$/thermal unit) multiplied by technical heat rates (in thermal units/MWh) plus an estimate of variable operating costs (in \$/MWh). The prices resulting from bids based on these estimates of SRMCs are adequate for determining energy payments to generators given that generators also get capacity payments, although the absence of price signals for demand in the short run and for investment in the long run is still a problem. In fact, the WA capacity payments and bidding rules make generators more like contractors with performance incentives than participants in a real market.

Trying to define bidding rules for a gas market such as the STTM would be a very different proposition. There is no easy way to estimate the SRMC of gas even at the producing field, because it depends on both short-term factors, such as extraction and pipeline costs and capacities and demand today, and long-run factors such as future gas demand and supply. To make the problem even harder, most of the gas bid into the daily STTM is neither at the

producing field nor at the "city gate". At the time bids are submitted to the STTM's day-ahead market, most of the gas that can be delivered the next day is in transit and/or in storage (if there is any difference) at various locations in the pipeline, where its true SRMC for bidding purposes depends in complex ways on the expected cost of replacement from upstream and the expected value of future usage downstream. It is not clear how much the owner of the gas or even the pipeline really knows about where each bidder's gas is or what its "true" SRMC will be when it gets to the hub the next day, but certainly the STTM does not know. It would be impossible for any administrative process or rule to define the true value/SRMC of any bidder's gas even approximately given (among other things) the complexity and opacity of pipeline operations.

Bidding rules based on estimating SRMCs could not work in the STTM, but it should be possible to define certain types of bidding behaviours, such as sudden changes in bid prices or quantities, or market outcomes, such as large and repeated differences between *ex post* outcomes and market-determined *ex ante* schedules (market deviations), that would trigger requests for explanation and in some cases formal investigation that might result in penalties for anticompetitive behaviour or violation of market rules. Such behaviours or outcomes could not be prohibited *ex ante* or automatically penalized *ex post*, because even actions that may be harmful under some conditions may be harmless or even beneficial for the system overall under other conditions. But a formal system of market monitoring with the potential for follow-up actions should be feasible.

Most modern network markets include some form of independent market-monitoring-with-potential-follow-up arrangements. These arrangements are most advanced in US electricity markets based on the Independent System Operator (ISO) or Regional Transmission Operator (RTO) model; the Federal Energy Regulatory Commission (FERC) requires each such market to establish an independent market monitoring and reporting function that refers suspected violations of rules or laws to the ISO/RTO or to the FERC. The market monitor function is often a part-time job initially – e.g., for an academic economist – but as the job grows in scope and complexity is often contracted to a consulting firm.<sup>3</sup>

The AER in Australia is analogous to the FERC in the United States, in that it has ultimate authority for investigating and potentially penalizing violations of rules and abuses of market power. The AER may have adequate resources to do its own monitoring of the various markets under its jurisdictions, but may find, as the US FERC has found, that it is more effective if each market has – and pays for – its own dedicated, independent, non-governmental market monitor.

## 2.2. Non-Firm Shippers and the STTM's Treatment of Capacity

The FER Executive summary notes that non-firm shippers bear the risks of uncertain daily capacity charges "without them being in a position to manage this risk. This is likely to deter participation by shippers with non-firm capacity." (p. 1, and in the excerpt above). The FER

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<sup>3</sup> For example, in the PJM electricity market, the first market monitor was a part-time academic (Joe Bowring), who eventually became a full-time PJM employee heading up the Market Monitoring Unit and then established an independent consulting firm (Monitoring Analytics) that is now the PJM's market monitor under contract.

also says that "this will reinforce the incentives that shippers have to secure firm haulage on pipelines rather than to attempt to supply the STTM by relying on as available haulage." (p. 15)

It is undeniable that non-firm shippers in the STTM – as in any imaginable gas market – will face larger short-term<sup>4</sup> risks than do firm shippers and that this gives non-firm shippers incentives to secure firm contracts and become firm shippers themselves. These observations by themselves do not suggest there is some problem with the STTM; after all, the original purpose of firm capacity was to assure that shippers who made the long-term commitments necessary to finance the pipeline in the first place would get what they paid for even if the pipeline became congested later. If the market for long-term firm capacity is reasonably efficient, the price of firm capacity will reflect the value of the risk-reduction it provides. New entrants willing to pay that price can buy firm capacity from existing holders willing to give it up or from the pipeline who can invest to provide more of it, while those unwilling to pay that price can (try to) do business without it or stay/get out of the business. That is what markets are all about.

That said, the FER does describe an important effect of the STTM's treatment of capacity that deserves more analysis: A "shipper with as available haulage that is scheduled in the STTM but then displaced [bumped] ... by a shipper with firm capacity ... will face deviation charges as a result of not meeting its scheduled quantities in the STTM." (p. 15) The risk to the non-firm shipper in this situation is not just that it does not know in advance whether and at what price it will be able to buy day-ahead capacity for the next day; that risk is always present in a contract carriage system. The risk in the STTM is that a non-firm shipper will sell gas and (supposedly) buy capacity in the STTM for tomorrow, will adjust its plans and commitments for the day accordingly, and will then be bumped anyway. Of course, if this happens very often shippers will quickly learn that the STTM's day-ahead capacity is not worth much and will stop counting on it or paying much for it; but if that happens, the STTM may not be accomplishing some of its primary objectives.

The FER continues: "The real difficulty for [non-firm] shippers ... is that the extent to which they face deviation charges is dependent to a large extent on the behaviour of [firm] shippers ..." (p. 15) That is true as far as it goes, but stopping here suggests there would be no problem if firm shippers would just behave themselves, and leaves unasked the critical market design question: Is the ability of a firm shipper to bump a non-firm shipper that has been scheduled in the STTM due to something inherent in the situation – e.g., the inviolability of pipeline firm capacity contracts – or is it the result of something specific in the STTM design that could have been (and someday could be) different?

In fact, the effect described in the FER is due to a specific market design decision: the decision to define STTM capacity payments as the day-ahead STTM capacity price multiplied by ex post or actual gas deliveries as scheduled by pipelines – as opposed to the ex ante/day-ahead schedules determined by the STTM. Defining an actual payment as the product of ex ante price

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<sup>4</sup> A shipper with a long-term firm capacity contract runs the long-term risk that capacity will turn out to be worth less the shipper has paid for it. This is a serious risk when an efficient short-term capacity market is introduced on a pipeline with excess capacity. As discussed here, the STTM has defined its short-term capacity product in such a way that it poses little risk to shippers with long-term firm capacity.

and an ex post quantity is always problematic, particularly if the ex ante price and the ex post quantity are determined in separate processes. But this is what the STTM does.

With STTM capacity payments based on pipeline-determined ex post deliveries rather than STTM-determined ex ante schedules, a firm shipper that has supposedly sold its firm capacity in the day-ahead STTM – which is what it does when its gas offers do not clear in the STTM and some non-firm shippers are scheduled to use its capacity – can still use its pipeline contract to schedule the physical delivery of non-STTM gas, in effect "taking back" its capacity; pipeline contracts rather than any market process will then determine which, if any, non-firm shippers get bumped. The firm shipper is not paid for the capacity it takes back, and bumped non-firm shippers are not charged for the capacity they cannot use; but the net effect is that the firm shipper has bought back its firm capacity at the ex ante capacity price.<sup>5</sup> Thus, STTM capacity is not firm even for the day, because the seller has the option to buy it back at the ex ante capacity price at any time (within the constraints imposed by pipeline scheduling processes), leaving the non-firm shipper who thought it had purchased firm capacity for the day exposed to deviation charges for failing to deliver.

It is hard to see why such not-firm-even-for-the-day STTM capacity would have much value in the market. A firm shipper that sells such non-firm capacity is not really giving up much: the firm shipper is not likely (except for strategic/gaming reasons, as discussed presently) to want to schedule additional gas during the day unless forecasted hub demand increases unexpectedly because of a cold snap (to use the most likely example), and if that happens the shipper can simply reschedule more gas and buy back its capacity at the ex ante price. A non-firm shipper that buys such non-firm capacity is not really getting much: if the value of capacity falls during the day because demand forecasts fall or the pipeline releases more capacity during the day (which may be a frequent occurrence), the non-firm shipper will have to pay more than the capacity is actually worth; and if the value of capacity increases during the day the non-firm shipper is likely to be bumped, and thereby exposed to deviation penalties, by firm shippers taking back firm capacity.

The decision to make STTM capacity not-firm-even-for-the-day may reflect the view that, because the STTM cannot interfere with a firm shipper's contractual right to schedule its gas directly with the pipeline, a firm shipper should be allowed to exercise that right with no STTM consequences. It is understandable why firm shippers and pipelines might take this position, but pipeline contracts need not and logically should not determine STTM policies or affect STTM contracts. A firm shipper that does not sell its gas in the day-ahead STTM may have a perfect right and good reasons to schedule its gas directly with the pipeline anyway. But the STTM in turn has a perfect right and good reasons to say that a firm shipper that sells its capacity in the STTM and then delivers gas to the hub without a STTM schedule will be treated the same in the

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<sup>5</sup> The STTM settlement process does not record an ex ante sale and an ex post repurchase of capacity at the ex ante capacity price; it simply multiplies the ex ante capacity price by actual deliveries in ex post settlements. But a firm shipper that sells capacity in the ex ante STTM will know that it will be paid the ex ante price for that capacity if it does not schedule non-STTM gas and that it will lose that price on every GJ of non-STTM gas it does schedule. As an economic and commercial matter this is a sale and repurchase of capacity.

STTM as any other shipper who delivers gas without a STTM schedule and capacity: it will be paid the STTM's long deviation price for the gas, but will pay the STTM's capacity price for the capacity used to deliver that gas.

The STTM could have, and arguably should have, defined its capacity product as firm-for-the-day in the sense just described. Selling such a firm-for-the-day STTM capacity contract would have no effect on a firm shipper's rights or obligations under its pipeline contract; but neither would its pipeline contract have any effect on its rights and obligations under its STTM contract.

To make firm-for-the-day capacity a reality without interfering with a firm shipper's rights under its pipeline contract, the STTM would need a way to determine, not just a day-ahead capacity price based on conditions as expected at the day-ahead stage, but a near-real-time capacity price that reflects actual conditions on the day. Most modern network markets use such a combination of a day-ahead and a near-real-time market or ex post pricing process, but developing such a process would have been difficult even if undertaken early in the STTM process and is certainly out of the question now – even if there were any real interest in such a thing.

Making STTM capacity firm-for-the-day would make no difference if pipelines are almost never congested, because then the definition and even the existence of STTM capacity rights are essentially irrelevant. But if pipelines are congested enough often enough to matter, the present definition of STTM capacity could put smaller shippers/retailers at a significant competitive disadvantage – even if they can get long-term capacity contracts. Efficient spot markets in both gas *and* capacity are more important for smaller and (more importantly) less-diversified players than for their larger, more diversified competitors, because the mismatches between contract and physical positions in both gas *and* capacity will be proportionally larger for less-diversified players. Making STTM capacity firm-for-the-day would also help control gaming strategies that rely on a firm shipper's ability to take back its capacity at no cost to itself (such as the strategy discussed in section 3 below).

As discussed above, it is hard to see why the STTM's not-firm-for-even-a-day capacity product would have much value in the market. If daily capacity prices are often positive, shippers and retailers unable or unwilling to buy longer-term firm capacity may be unable to survive in the business unless they can buy firm short-term capacity in bilateral deals, over-the-counter markets or perhaps new exchanges that develop to trade the kind of short-term firm capacity the STTM does not offer. If smaller shippers/retailers find non-STTM venues for trading short-term firm capacity, they will probably also do their short-term gas trading there, given the advantages of trading spot gas and spot capacity in an integrated process – the basic argument for putting a capacity product into the STTM in the first place.

The STTM can define its short-term capacity as not-firm-even-for-the-day, as firm-for-the-whole-day, with a seller's option to cancel the sale unilaterally, or any other way it chooses; the market will soon learn how much STTM capacity is worth however it is defined and price it accordingly. The issues for the STTM are what the STTM's objectives are and how the definition of capacity can best advance those objectives. If a primary objective of the STTM is to make the gas market more efficient and competitive by creating a level playing field for small competitors and new entrants, the STTM should consider redefining its capacity product as firm-for-the-day and creating the additional market and pricing mechanisms necessary to make such a

definition effective. Otherwise, the STTM may become little more than a balancing gas market for the large firm shippers that can survive without a meaningful short-term capacity market.

### 2.3. The Effects of "Other Market Arrangements"

The FER Executive summary says that the "opportunity for participants to engage in other market arrangements could impact price determination in the balancing market. This also can act to facilitate strategic behaviour designed to deter new entry." (p. 1, and in the excerpt above.) This presumably refers to the discussion in section 3.5 of the FER (pp. 18-19), which says that the STTM is intended to "be a gross pool market ... [in which] all gas supplied through the hub is transacted in the STTM. However, the proposed design includes a mechanism that permits the STTM to be bypassed – at least as far as price determination is concerned. This mechanism is the market schedule variation." (p. 18)

To use the market schedule variation process, a gas buyer and a gas seller agree a bilateral trade between themselves of some quantity of gas – call it Q – at any price, stay out of the day-ahead STTM entirely, and jointly submit a market schedule variation to the STTM indicating that the seller wants to schedule a delivery of Q to the hub and the buyer wants to schedule a withdrawal of Q at the hub. The STTM records these matching quantities and then treats them as STTM schedules in the ex post settlement process, even though the traded volumes never appear in the ex ante STTM market and have no effect on STTM prices. The STTM imposes a small "variation charge" on market schedule variations to discourage their use, but (according to the FER) if "the prices in the STTM are too volatile" (p. 18) the benefits of the stable, agreed price could easily offset the variation charge.<sup>6</sup>

After describing the market schedule variation process and suggesting that it poses a threat to the STTM, the FER acknowledges that market participants could accomplish the same thing "outside the market by signing a swap, settled against the ex ante price" – and without paying even the variation charge. "Given this, it seems unlikely that market schedule variations will be used to any significant extent to avoid facing the ex ante price." (p. 19)

The FER does not explicitly say why or how trading outside the STTM would be a threat to the STTM, other than that it allows market participants "to avoid facing the [volatile] ex ante price." But the fact that market participants can find ways to avoid facing the ex ante price cannot in itself be a problem: it is anticipated, desirable and even essential that most gas will be traded under contracts that protect against STTM price volatility, with the STTM and its prices used primarily for incremental balancing. The threat to the STTM must come from elsewhere.

The threat posed by trading outside the STTM is that, if it is done on a large enough scale, the volumes traded in the STTM could become so small that the volatility and levels of STTM prices fail to reflect the underlying economic realities. This would be particularly hard on smaller shippers/retailers – even those with long-term firm capacity contracts – because incremental balancing transactions in both gas and capacity will be proportionally larger for smaller than for larger shippers/retailers. By doing enough of their trading outside the STTM, large

<sup>6</sup> All the examples here and in section 3.5 of the FER assume the traders have firm capacity rights if the pipeline is congested.

shippers/retailers can – incidentally or deliberately – make the gas business riskier for small and potential competitors. But they could have much the same effect without actually going "outside" the STTM and without even paying variation charges: they could enter into financial contracts for differences (CfDs) such as swaps to protect themselves from STTM prices and then bid their financially-contracted gas into the STTM at economically meaningless prices, e.g., offering to sell gas to the STTM at \$0/GJ and bidding to buy gas from the STTM at VoLL. The contracted gas volume would be "in" the STTM but would have no more effect on gas prices than if it had been "outside" the STTM.<sup>7</sup>

The FER suggests (p. 19) another way that a large, integrated, firm shipper/retailer could use market variations to make life difficult for small players: withhold (say) Q TJ of gas from the day-ahead STTM in order to drive up the day-ahead price and the deviation price that is based on that price; use its firm capacity to schedule delivery of Q TJ to the hub; use a market schedule variation to protect itself from deviation charges; and then refuse to sell gas to smaller shippers who need it to meet an unexpected demand increase, thereby preventing smaller shippers from using market variations and forcing them to pay the high deviation charge. But to avoid paying the high deviation charge itself, the large shipper must match its Q TJ of non-STTM-scheduled deliveries with Q TJ of non-STTM-scheduled demand, which would require it either (1) to withhold Q TJ of both supply and demand in the day-ahead STTM and hence having no effect on the day-ahead price, or (2) to know when to expect an unexpected demand increase, which is something of an oxymoron.

If large, integrated shippers/retailers want to make the STTM dangerous for small and new competitors and useless for themselves, they can always do so as a technical matter, using either the physical contracting/market variation or the CfD/artificial bidding strategy just discussed. They could also use gaming strategies more logical and plausible than the one proposed by FER and described in the previous paragraph. But large players in any market can make life difficult for smaller competitors by refusing to do business with them. The real questions concern whether and why they might want to do so, and whether they could get away with it as a legal/regulator/political matter.

The STTM needs a market variation process for two basic reasons: (1) Shippers/retailers are not required to do business through the STTM, so some mechanism must be provided to allow them to serve customers at the hub without trading their gas in the STTM; and (2) the STTM has no market process operating after the day-ahead market to deal with the changes that always occur after day-ahead bids and offers are submitted, so even if a shipper wants to do all its business through the STTM it cannot do so. If the STTM had a near-real-time market or ex post pricing

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<sup>7</sup> These two strategies could have different effects on capacity prices. For example, if the pipeline sets the daily STTM capacity on the assumption that all gas will go through the STTM and then significant volumes are traded outside the STTM using market variations, the pipeline may appear to be uncongested in the day-ahead STTM but be heavily congested when the non-STTM gas is scheduled, requiring non-firm shippers to be bumped. If the pipeline knows in advance how much non-STTM gas will be scheduled it should set the daily STTM capacity accordingly; but if firm shippers shift between STTM and non-STTM trading from day to day, or even within a day, perhaps as a deliberate strategy to make life difficult for non-firm shippers, the pipeline will not know its non-STTM schedules in advance.

process and all transactions had to go through the STTM, there would be no need for the market variation process. But large players could still use the CfD/artificial bidding strategy to make the STTM risky for smaller players.

#### **2.4. The Market Operator Service (MOS)**

Of the six conclusions in the FER Executive summary (p. 1, and excerpted above), two relate to MOS. The first of these expresses concern that "the absence of bidding rules" for MOS may "result in high [MOS contract] prices that do not reflect underlying costs and potentially deter new entry." The second expresses concern about the two-day "mismatch between when ... MOS gas is allocated and when it is settled," and suggests that MOS providers large enough to influence market prices may find ways to take advantage of this two-day lag. Elsewhere, the FER suggests that potential MOS providers too small to bear MOS risks and to benefit from (or to protect themselves by) gaming the two-day lag may not offer MOS at all. (p. 21-22)

The emphasis on MOS in the FER's conclusions is understandable given the importance of MOS in the STTM, but seems to reflect the uncertainty about how MOS will operate more than any analysis demonstrating a real basis for the concerns expressed. This is not a criticism of the FER: it is very difficult/impossible to predict how or how well the MOS arrangements will work, or even to describe in detail how they are supposed to work. An outside analyst trying to understand the written descriptions of the MOS arrangements is almost sure to come away with more questions than answers.

A major part of the problem here is that the management of physical imbalances is a complex process that has always been, and in the STTM will continue to be, managed by pipelines using some mixture of computer models, operating rules and operator judgment that is a mystery to outsiders. MOS is perhaps the most extreme of those areas discussed in section 1.4 above, where the STTM is strongly affected by pipeline decisions and processes it knows little or nothing about. But there is no reason to think the pipelines cannot or will not continue operating the system reliably much as they always have, as long as the STTM provides sufficient incentives to MOS providers to make MOS gas available.

The FER says that providing MOS will be costly and risky, because the provider "incurs the cost of carrying the [inventory of MOS] gas" but is paid only when that gas is used. This may be true, but it is not a fundamental change from the current situation, in which providers of balancing gas are paid only when the gas is used; and if it is so hard for even a prospective MOS provider to estimate its costs, how would some administrative process determine that prices are "too high" or define "bidding rules" to fix the problem? It may also be the case, as the FER suggests, that MOS providers large enough to influence STTM gas prices will be able to take advantage of the two day lag between when MOS gas is used and when it is settled; but there are many such games a large-enough shipper/retailer can play that will have to be controlled by market monitoring and enforcement of market rules and general anti-competitiveness laws.

The FER suggests that smaller shippers/retailers will be discouraged from providing MOS by the inherent risks and by their inability to profit (or protect themselves) by gaming the two-day MOS settlement lag. This is a plausible hypothesis, but it was not strengthened by AEMO's recent tender for MOS contracts for the Market Trial, which received responses from both small and

large shipper/retailers. The FER's concerns about high prices and the lack of competition in MOS contracts may or may not be confirmed when AEMO tenders for real MOS contracts before the STTM begins live operation in June 2010. But over time potential MOS providers will learn more about the costs and risks; AEMO will adjust the MOS contracting arrangements if necessary; gaming strategies will be identified and controlled; additional players will get into the game; and things will settle down. Such start-up and teething problems are unavoidable in any new market, and are no reason to delay implementation of the STTM in its current form.

## 2.5. The STTM and Security of Gas Supply

One of the principal questions the NSW Government asked Frontier Economics to address was whether it would be prudent, once the STTM was operating, for NSW to end the Gas Continuity Scheme (GCS) that NSW had put in place in response to the gas supply crisis of June 2007. The FER's overall conclusion is that "there is significant risk in adopting the proposed design of the STTM in place of the existing NSW balancing arrangements and the NSW Gas Continuity Scheme" (Executive summary, p. 1, excerpted above, and Conclusions, p. 26). It is not clear how much of the "significant risk" cited by FER is specifically related to ending the NSW GCS as opposed to other features of the existing NSW arrangements, but the STTM Study finds that the STTM is a more-than-adequate replacement for the NSW GCS – a conclusion that is consistent with that of the Consultative Committee of the NSW GCS itself as expressed in the September 2009 Petersen Report.<sup>8</sup>

### 2.5.1. STTM "Contingency Gas" vs. the NSW GCS

The FER's comparison of the likely relative effectiveness of the NSW GCS and the STTM in assuring security of supply never mentions the STTM's contingency gas (CG) arrangements, which were specifically designed to do what the GCS would do, only better. The STTM CG provisions were still being developed when the FER was issued in June 2009, so the lack of any reference to them is understandable; but the result is that there is little basis in the FER for any conclusion regarding the relative effectiveness of NSW GCS and STTM CG in preventing events such as those that occurred in NSW in June 2007.

It is the judgment of the STTM Study that the STTM's CG provisions, even considered in isolation, are a more-than-adequate replacement for the GCS, and that when other STTM provisions are considered the STTM is clearly better than the GCS as a way to prevent involuntary curtailments. Both the NSW GCS and the STTM's CG designate an agent – AEMO for CG and the Gas Market Company for the GCS – to tender and pay for emergency gas supply and demand reduction contracts that would be used to prevent or at least reduce involuntary curtailments in a crisis. The main difference between the two systems in this regard is that the STTM does more to stimulate demand reductions than does the GCS (although recent changes in the GCS give more attention to the demand side).

One of the specific issues raised in the FER is that: "There is no financial or other incentive to remain in balance or to avoid curtailment outside the STTM hub provided by the STTM. Indeed,

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<sup>8</sup> See the *Report on the Impact of the Short Term Trading Market on the NSW Gas Supply Continuity Scheme*, September 2009 (the "Petersen Report").

depending on expected price outcomes, the STTM may encourage the diversion of gas from regional areas to the STTM hub, with implications for security of supply outside the STTM hub." (Executive summary, p. 1, excerpted above, and Conclusions, p. 26). The Consultative Committee of the NSW GCS considered this issue and concluded (Petersen Report, p. 2):

"... there was unanimous agreement of the Committee at its meeting on 21 August 2009 that the NSW areas outside the Hub were in fact no worse off than the Sydney Hub. It is true that the STTM prices may attract gas to the Hub, but if adequate pressures are maintained at the Hub it follows that higher gas pressures and supplies will be maintained in the upstream regional areas."

It is not possible to know with certainty how either the NSW GCS or the STTM CG would work in an actual crisis. But the similarity of their basic mechanisms, combined with the other features of the STTM that give market participants strong incentives not to be short at critical times – in particular, market and deviation prices that automatically increase to VoLL (\$400/GJ) if curtailments are necessary – lead the STTM Study to agree with the Petersen Report that that the STTM would perform at least as well as the NSW GCS.

The principal reason given in the FER for its conclusion that the GCS would be more effective than the STTM at preventing something like the July 07 event is that the GCS "includes a priority curtailment mechanism that ensures that shippers that are out of balance have their users curtailed first" (p. 23), while the STTM provides financial and commercial incentives to "make additional gas available during supply events, but does not place any obligation upon shippers or end users to do so." (p. 22) This would seem to put the authors of the FER in the camp that prefers administrative mechanisms and "obligations" as a way to prevent and respond to supply shortages. The STTM Study is in the other camp, which prefers market mechanisms that automatically produce very high prices that apply to everyone in the event of a supply shortage; commonsense suggests, and experience in VicGas and elsewhere demonstrate, that the existence of such price mechanisms strongly and effectively motivates advance planning and investment that reduce the risks of supply shortages and stimulates broad responses in real time if shortages materialize anyway.

### ***2.5.2. Would the STTM have prevented the '07 supply crisis in NSW?***

In the 09 December 2009 meeting with jurisdiction officials on the STTM Study, NSW officials were particularly concerned about security of supply. They referred repeatedly to the June 2007 event as something that must not be allowed to reoccur, and provided AEMO with a copy of the 14 August 2007 *Inquiry Report on Natural Gas Supply Load Shedding Event of 22 to 24 June 2007* (the Inquiry Report). Given this interest in the matter, it is worth reviewing the lead-up to the 22-24 June 2007 event (the '07 Event) and considering whether and how the STTM might have made a difference.

The most important facts about the '07 Event as stated in pages 21-22 of the Inquiry Report (but *NOT* confirmed independently by the STTM Study) are the following:

1. In early June 2007, pressure on the Moomba-to-Sydney Pipeline (MSP) began falling due to an imbalance between gas injections (mostly at Moomba) and gas withdrawals (mostly

at Sydney).<sup>9</sup> By 15 June, pressure had fallen close to operational limits and the MSP pipeline operator advised shippers, distribution network operators and the NSW DWE of this fact.

2. Given the imbalance notices from the pipeline operator, "under normal circumstances, the market via the shippers would be expected to respond to the growing cumulative imbalance in the pipeline by purchasing more gas." In this case, all shippers except one quickly purchased more gas and by the time curtailments were necessary had, or thought they had, "a positive imbalance in the network (as defined in the Gas Retail Market Balancing Rules)."
3. The one large shipper that decided not to purchase or schedule more gas did so because its demand forecasts indicated that it would be in balance over the next week or so. Unfortunately, these demand forecasts turned out to be wrong (for "the first time", they said), forcing this shipper to cancel spot sales, decrease supply to an affiliated electricity generator and request "voluntary restraint" by other large consumers.
4. Despite the last-minute gas purchases and voluntary curtailments, pipeline pressures continued falling and on 22 June the distribution network operators in Sydney and ACT began curtailing large consumers, including some customers of shippers who now had "a positive imbalance in the network".
5. By 24 June warmer weather and increased gas injections at Moomba had increased pipeline pressure enough that curtailments could be lifted and by 27 June the MSP was operating at normal pressures.

According to the Inquiry Report, the '07 Event cannot be attributed either to failures of physical infrastructure or to exceptionally high demand.<sup>10</sup> Furthermore, the Inquiry found no evidence that the '07 Event was due to anybody violating any laws, market rules or contract provisions.

Probably the most striking thing about the '07 Event as described by the Inquiry Report is how little some critical players did in advance to prevent it even though it took over two weeks for an obvious problem – falling pressure due to a growing imbalance between withdrawals and injections – to lead to actual curtailments. Of course, everybody involved had seen falling pressures before and these had never/rarely resulted in a crisis, so there was no reason to be greatly concerned in early June. But – according to the Inquiry Report – the MSP pipeline operator issued advisories only on 15 June when pipeline pressures had fallen close to operational limits, and even then at least one large shipper did not buy or schedule additional gas.

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<sup>9</sup> The other pipeline serving Sydney was operating at full pressure and capacity before, during and after the Event. The PO of the MSP was the APA Group (formerly the Australian Pipeline Trust).

<sup>10</sup> The Inquiry Report dismisses high demand as a cause of the Event on the grounds that the daily peak demand of 494 TJ during the Event in June 2007 was essentially the same as the daily peak demand of 492 TJ during 2005 and was well below the daily peak demand of about 550 TJ that was met in July 2007. Given the linepack capacity in the MSP, a more valid comparison would be to demand on peak weeks (or so), not just on peak days, and by this measure demand in early June 2007 may have been more extreme.

Some critical players seem not to have been much concerned about the consequences of an event that must have been at least conceivable a week or more before it actually occurred.

There are two ways the STTM will reduce the risks and mitigate the effects of something like the '07 Event. The first and most important is to provide powerful incentives for critical players to act sooner and more decisively. By 16 June 2007, when the MSP pipeline operator issued its first warnings, spot gas prices were probably very high, say \$10/GJ or even \$40/GJ. But would the large shipper who declined to purchase more gas at that time have done so if it had known that any shortfall on 22-24 June would cost \$400/GJ, just because its demand forecasts said it could *probably* get through the week without more gas? Going back a few months or years earlier, would that shipper have decided not to buy more long-term contract gas if it had known that without such contract gas it might later face the choice of paying spot prices as high as \$10-40/GJ or risking paying \$400/GJ for its shortfall? It is impossible to say for sure, of course; but experience in VicGas and elsewhere strongly suggests that the risk of automatic exposure to VoLL-level prices strongly and effectively motivates actions that reduce the probability and consequences of even very unlikely events.

The second way the STTM could prevent at least the most serious effects of something like the '07 Event is to stimulate emergency gas supplies and demand reductions if a shortage actually materializes in the form of very low pressures in the distribution network. That is what the STTM's CG provisions are all about. There is no guarantee that either STTM CG or the NSW GCS would fully eliminate the need for involuntary curtailments under such conditions, but neither is there any reason to think that STTM CG would be any less effective than the GCS in reducing them.

In summary, the STTM Study, like every other study that has seriously looked at the issue and taken all relevant provisions of the STTM into account, concludes that the STTM, with its CG provisions, is an adequate or more-than-adequate replacement for the NSW GCS.

### 3. POTENTIAL MARKET POWER IN THE STTM

This section discusses the potential for market power to be exercised in the STTM, which is one of the principal concerns of the Frontier Economics Report (FER) and the subject of task 3 in the SoW for the STTM Study. The primary objective here is not to assess how important market power will be in the STTM given the structural and other features of the gas market over which the STTM has no control, but to identify any features of the STTM design itself that might exacerbate market power given these other factors, and to suggest any mitigating measures that should be considered.

The specific issues discussed in section 2 above all have market power implications that were not elaborated there. This section 3 discusses market power issues in general, then describes a quantitative analysis of the most important market power raised by the FER – what is called here (but not in the FER) the "over-bidding/bumping" (OBB) strategy – and concludes with a section outlining a suggested approach to monitoring and dealing with market power in the STTM.

#### 3.1. The General Issue of Market Power

##### *3.1.1. Some concepts and definitions*

Supply-side or sellers' market power is exercised by withholding supply from a market to increase the market price. Demand-side or buyers' market power is exercised by withholding demand from a market to decrease the market price. The discussion here refers mostly to sellers' market power, but the same analysis and conclusions apply to buyers' market power.

It makes no real difference whether the withholding of supply is "physical" or "economic", i.e., whether the quantity offered is decreased or the offer price is increased. Either way, the amount that clears in the market falls and the market-clearing price rises.

Market power can be exercised individually by a large-enough market player, or collectively by a group of players who, while nominally competitors, find it profitable to cooperate to influence prices. Analysis of cooperative market power strategies can be very complex and is never conclusive, and the required cooperation does not usually last long given the incentives each member of the group has to cheat on the deal. For these reasons, the focus here is on the potential for a single entity to have effective market power – although, as a logical matter, such a "single entity" could be a group of closely cooperating entities.

A large supplier can withhold enough to increase the price and still be selling enough at the higher price to offset the lost profits on the withheld quantity, thereby increasing its total profit. Even a not-very-large supplier may be able to withhold enough supply to increase the price, but may then be selling too little at the higher price to offset its lost profits on the withheld quantity, making the net result a decline in profits; such a seller may be said to have market power, but its market power is ineffective in increasing its profits and hence is unlikely to be exercised. Only a supplier whose profits increase when it withholds to drive up prices is said to have effective market power, i.e., market power it has an economic incentive to exercise.

The distinction between ineffective and effective market power is important in general and for the analysis of the OBB strategy in particular. Because even a relatively small seller can have

some effect on market prices by withholding supply, it is never possible to eliminate market power entirely. But a seller must usually be larger than some critical size – which, of course, depends on the specific market being considered – to have *effective* market power. If some features of the market design affect the critical size enough, those design features may be said to determine whether market power is effective or ineffective in that market.

### ***3.1.2. The effects of contracts and regulation***

A seller is more likely to have effective market power the larger its sales are as a fraction of the total sales in the market, because a larger seller will have more left to sell after it has withheld enough to increase prices. But no matter how large a seller is, if it ultimately sells enough of its product at fixed contract or regulated prices it has little short-run incentive to increase prices in short-term markets. For example, consider a large shipper/retailer that typically sells, say, 90 percent of the product sold into an upstream market, but also buys, directly or through an affiliate, comparable quantities of spot gas at the hub to serve its contract or regulated customers there. This shipper/retailer gains little or nothing in the short run by withholding supplies to increase spot market prices, because what it gains by selling at a higher price it loses by buying at a higher price; in fact, if it withholds too much supply from the spot market it may become a net purchaser at the high prices it has created. The measure of size that matters for market power purposes is a seller's *net* sales at market prices as a fraction of total sales in that market.

Although contracts and regulation can reduce a large seller's short-run payoff from withholding in the spot market, in the long run contract and even regulated prices are influenced by expectations about future spot prices. Even a seller that sells most of its product at contract/regulated prices might gain in the long run from driving up spot prices if this increases by enough the contract and regulated prices the seller can negotiate in the future. Such a strategy is more likely to work if a large retailer buys from an affiliated (and unregulated, when the retailer itself is regulated) upstream supplier, because then upstream withholding will increase the retailer's apparent gas purchase costs and hence the prices it can negotiate with its customers or regulators.

### ***3.1.3. Forward markets, spot markets and arbitrage between them***

Given the inherent uncertainty about supply and demand, in a typical commodity market most of the volume is traded under contract – although not necessarily contracts with very long terms or truly fixed prices.<sup>11</sup> This does not mean that spot prices or market power in the spot market are not important, because (as just discussed) expected future spot prices will affect forward contract prices, so a supplier capable of increasing spot prices (or making them more volatile/risky) may be able to get higher prices for its forward contracts by doing so. But it does mean that the interplay, including arbitrage, between the spot and forward markets is important.

When a large seller withholds supplies from the spot market to increase prices there and then prices its forward contracts to reflect those "too high" spot prices, it is also withholding in the

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<sup>11</sup> Very-long-term contracts typically contain market reopener or indexing provisions to keep contract prices from getting too far out of line with market conditions – a situation that could make one of the parties unwilling or unable to honour the contract with adverse consequences for the other.

forward market; in fact, it does not matter whether the withholding starts in the forward or in the spot market. Once the seller has sold its forward contracts at the "too high" prices resulting from withholding, it can earn incremental profits by selling in the spot market the supplies it withheld in the forward market. Such dumping into the spot market will depress the price there, but not necessarily much below what the seller would have received in the forward market if it had not withheld there. If this opportunity to double-dip in the forward and spot market arises only once, the seller can probably get away with it; but if the seller tries it very often in a repeated game the buyers will soon realize that cheaper supplies will be available in the spot market and reduce their purchases of the more expensive forward contracts.

In a typical network market, there is a (say) day-ahead market followed by a near-real-time market or ex post pricing process, and both markets/pricing processes operate every day. If a large supplier in such a market tries a strategy of withholding in the day-ahead market to drive up prices there and then selling the withheld quantities at lower prices in the real-time/ex post market, buyers will quickly learn to shift their purchases from the over-priced day-ahead market to the now-cheaper real time/ex post market – and back again if the large seller changes its strategy and tries to get higher prices in the real-time/ex post market.<sup>12</sup> It will not take long for the markets to reach an equilibrium in which the prices are expected to differ on average by no more than a premium reflecting the differences (if any) in risks between the two markets. At that point the large seller can still exercise market power by withholding, but it must do so in both markets; it cannot double-dip to get a higher-than-competitive price in one market and something near the competitive price in the other.

Withholding would be more profitable, or profitable for a smaller seller, if a seller could get away with the double-dipping strategy of withholding in the day-ahead market and then selling the withheld supplies in the real-time/ex post market. The ability of buyers to move or arbitrage between the day-ahead and the real-time/ex post markets can significantly reduce the effectiveness of market power. If the ability to move/arbitrage between markets increases the minimum size a seller needs in order to have effective market power, elimination of that ability may make market power effective when it otherwise would not be. This conclusion is directly relevant to the OBB strategy in the STTM, as discussed next.

### **3.2. The Over-Bidding/Bumping (OBB) Strategy**

The FER is particularly concerned about a market strategy that is called here (but not in the FER) the "over-bidding/bumping" (OBB) strategy. This section summarises the FER's description of the OBB strategy, describes a modelling analysis of it done as part of the STTM Study and gives a commonsense interpretation of those results. The conclusion is that the OBB strategy is, as the FER indicates, in concept a potentially serious problem for the STTM, and for reasons having to do with the basic STTM design itself. In practice, however, the OBB strategy should not be hard to control, as long as AEMO and the AER know what to look for and how to respond when they see it – issues addressed in section 4 below.

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<sup>12</sup> In fact, pure arbitragers/speculators may emerge to sell day-ahead forward contracts and then satisfy those contracts by buying commodity in the real-time/*ex post* market.

### ***3.2.1. The OBB Strategy as Defined in the FER***

The FER describes the OBB strategy as follows: "Shippers with firm haulage contracts can bid high prices [in the day-ahead STTM market] because even if these shippers are not dispatched ex ante they can simply nominate capacity on the pipeline and displace [bump] other shippers that have only 'as available' haulage contracts." The gas delivered to the hub as a result of this strategy does not have a STTM schedule, and hence is treated as a long deviation that is paid a deviation price less than the full day-ahead STTM price. But "the deviation charges will be influenced by the same factors that influence ex ante prices: that is, bids and offers. So, ... by bidding a high price in the ex ante market, the shipper will also have an impact on the deviation payment that it receives." (p. 14)

The FER does not claim to know whether the OBB strategy would in fact be profitable, because this "is ultimately an empirical question. With detailed information about the structure of the STTM, the price limits in the STTM and the deviation payments and charges in the STTM, it would be possible to model the likely bidding behaviour of shippers to assess the likelihood of strategic behaviour." (p. 14-15) Such modelling was beyond the scope of the FER, but is called for (if it is necessary to resolve an issue, which it is in this case) by the SoW of the STTM Study.

### ***3.2.2. The STTM Model***

Given the plausibility of the OBB strategy as described in the FER and the difficulty of understanding how all the quantitative pieces fit together, the STTM Study built a quantitative STTM Model to analyse the OBB strategy. The principal features of the STTM Model and typical values of its principal parameters used in the analysis are summarized below:

- A hub with an uncontrollable demand of 130-190 TJ/day is served by two pipelines, PL<sub>A</sub> and PL<sub>B</sub>, each with delivery capacity of 100 TJ/day.
- Gas on PL<sub>A</sub> is supplied by a combination of many competitive shippers and a large firm shipper (LFS) that controls 40-80 percent of the gas and capacity on PL<sub>A</sub>.
- Gas on PL<sub>B</sub> is supplied by many competitive shippers; the supply curve on PL<sub>B</sub> can be interpreted to represent both actual gas on PL<sub>B</sub> and demand reductions at the hub.
- The day-ahead STTM clears each day by minimizing the as-bid cost of gas needed to meet hub demand subject to the daily capacity of each pipeline; this determines the ex ante hub gas price, the capacity prices on each pipeline and STTM schedules.
- The large firm shipper "LFS" on PL<sub>A</sub> implements the OBB strategy by offering all its gas at its actual marginal costs increased by an "over-bid percentage" OBP, and then scheduling a quantity of gas (up to its firm capacity on PL<sub>A</sub>) of non-STTM gas with the pipeline; when this gas is delivered to the hub without a STTM schedule, it is a long deviation.
- The long deviation price in the STTM Model is the lesser of the ex-post imbalance price computed as discussed below and 90 percent of the ex ante gas price (a minor simplification of the real STTM that has no effect on the results).

- LFS chooses the quantity of non-STTM or deviation gas to maximize its profit on that gas given OBP (i.e., given its day-ahead withholding) and given the long deviation price it will be paid for that gas by the STTM.

### ***3.2.3. The principal results of the STTM Model***

The outputs of the STTM Model indicate how LFS' daily profit (and other variables, such as day-ahead STTM prices, capacity prices, deviation prices, and bumping) vary with the over-bid percentage OBP given hub demand, LFS' share of gas supply and share of capacity on PL<sub>A</sub>, the STTM's deviation penalty, and other parameters in the STTM Model. Possible changes in the STTM design, such as addition of an ex post price and redefinition of the STTM's day-ahead capacity product as "firm for the day", can be and have been modelled (approximately).

Analysis of the results of the STTM Model using different values for the market structure parameters but leaving the STTM design itself unchanged leads to the following principal conclusions:

- The OBB strategy is always highly profitable in the short run, in the sense that by using that strategy LFS can increase its total profits for the day well above what they would be if LFS acted "competitively" in the day-ahead STTM (i.e., offered its gas at its marginal cost) or even if LFS used whatever market power it has to maximize its profits in the day-ahead STTM.
- LFS does not have to be very large to profit in the short run by using the OBB strategy; in fact, even if LFS is too small to have effective market power in the day-ahead STTM, LFS can increase its profits substantially by using the OBB strategy, i.e., the OBB strategy can make ineffective market power effective.
- Firm capacity affects the profitability of the OBB when the pipeline is congested, but the strategy is highly profitable even if pipeline capacity is so large that firm capacity rights are irrelevant; in fact, when the pipeline is congested LFS' best strategy can involve *negative* withholding, i.e., selling gas at a loss in the day-ahead STTM in order to increase the ex ante value of its firm capacity.

The principal qualification to these conclusions is that the STTM Model considers only a single day, so it does not capture the intraday effects of MOS. There may be significant interactions between the OBB strategy and MOS, because the large deviations used in OBB will presumably go into MOS and then be sold into the STTM two days later. Thus, the OBB strategy interacts with the potential for gaming the two-day lag in MOS settlement that is also of concern to the FER. Modelling all such interactions and strategies is beyond the scope of the STTM Project (and is probably impossible or at least inconclusive for anyone).

### ***3.2.4. The common-sense explanation for the profitability of OBB***

Development of and analysis with the STTM Model was useful and instructive, but like any good economic model its results – even if they were not anticipated – are easy to explain once they are properly analysed and interpreted. It is not difficult to understand and explain why the

OBB strategy in the STTM is so profitable under almost all conditions even for a not-very-large shipper/retailer.

The OBB strategy would not be profitable if the STTM paid nothing for long deviations, so the explanation for its profitability must be that the STTM's long deviation price is "too high" in some sense. The STTM Model accurately represents the way the long deviation price is determined in the real STTM – as the lesser of an "ex post imbalance price" and 90 percent of the ex ante STTM price. The ex post imbalance price represents what the day-ahead STTM price would have been if the net market long had been known in advance, and is calculated by rerunning the day-ahead STTM pricing model with all bids and capacities unchanged but hub demand decreased by the net market long deviation. This is a reasonable estimate of how much the long deviation is worth to the system as an economic matter, and hence what it should be paid – if the objective is to pay what the gas is worth as an economic matter.<sup>13</sup> But because of operational concerns of pipeline and network operators, the STTM penalizes all deviations (above 5 percent of the ex ante STTM schedule), even those that are beneficial in purely economic terms; this penalty is represented in the STTM Model by assuming that the long deviation price is the lesser of the ex post imbalance price and 90 percent of the day-ahead STTM price.<sup>14</sup>

The ex post imbalance price is a reasonable estimate of the economic value of deviations, but it was never designed to discourage strategic behaviour and will certainly not deter the OBB strategy. If LFS withholds some quantity of gas, call it Q, from the day-ahead STTM in order to increase the day-ahead price, it is always at least approximately optimal under the OBB for LFS to schedule that same amount Q as a long deviation. But when Q is withheld day-ahead, scheduled as a long deviation and then put back into the market-clearing model to calculate the ex post imbalance price (and everybody else maintains their STTM schedules), the ex post imbalance price is exactly what the ex ante price would have been if Q had not been withheld in the day-ahead STTM. If the non-STTM gas creates congestion in real time, some non-firm shippers will be bumped and as a result will be short in the STTM; this reduces the net market long and produces an ex post imbalance price that is even higher than what the ex ante price would have been if LFS had never withheld anything.

When the ex post imbalance price exceeds 90 percent of the ex ante STTM price, the deviation price is reduced to 90 percent of the ex ante price. This makes the OBB strategy somewhat less

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<sup>13</sup> If the long deviation is upstream of the pipeline constraint, as LFS' additional supply is in the OBB, it should be put into the STTM pricing model as an increase in zero-priced supply upstream, not a decrease in demand at the hub, to capture the effect the net long would have had on the pipeline constraint. This approach could be used to determine an ex post capacity price – and was used in the STTM Model to analyze how the OBB strategy would be affected if the STTM used such an ex post price to make capacity firm-for-the-day as discussed in section 2.2 above.

<sup>14</sup> In the real STTM, the 90% factor applies for individual deviations greater than 10% of the STTM schedule, but becomes 95% for deviations between 5% and 10% of the STTM schedule and 100% for deviations less than 5% of STTM schedules. The OBB strategy typically involves deviations greater than 10% of the STTM schedule, so the 90% factor always applies on the margin. The higher deviation prices paid for the first 10% deviation increase the profitability of the OBB strategy.

profitable, but not enough to make much difference to any shipper/retailer large enough to have even a relatively small effect on the ex ante price. For example, suppose LFS is large enough that by withholding 50 percent of its supply in the ex ante STTM it can increase the ex ante price by 5 percent. This is probably not enough conventional market power to be *effective* in the sense discussed in section 3.1 above,<sup>15</sup> but it is enough market power to make the OBB strategy (almost) profitable. If by withholding 50 percent of its supply in the ex ante STTM LFS increases the ex ante price 5 percent above its competitive level, the long deviation price will be  $90\% \times 1.05 \approx 95\%$  of the competitive ex ante price; LFS will sell half its supply at 5 percent more than the competitive ex ante price and half at 5 percent less than that price, getting the competitive price on average. If LFS has any more market power than the small amount assumed in this example, the OBB strategy is profitable.

### ***3.2.5. Is OBB a STTM-specific problem, and if so, why?***

It is not uncommon for suppliers to sell forward contracts at high prices and then try to make incremental profits by selling in later, shorter-term markets at lower prices. But in a repeated game, buyers quickly learn what sellers are doing and develop counterstrategies, until a workable equilibrium is reached. In an ordinary market, and even in the typical modern network market, the ability of buyers to move or arbitrage between the ex ante and ex post markets prevents the double-dipping that makes the OBB strategy so profitable in the STTM.

The problem here is that the STTM is not a normal commodity market or even a typical network market, because of the unusual-to-unique design features discussed in section 1.4 above – features that are prime culprits in making the OBB strategy more effective in the STTM than analogous strategies are in other network markets. The first of these STTM features is that there is no near-real-time market or economic ex post pricing process, so buyers cannot shift their purchases to the ex post "deviation market" where LFS sells its withheld gas. This prevents the arbitrage between the forward and ex post markets that in other markets (as described in section 3.1.3 above) makes it hard for a seller to increase prices in one market without decreasing them much in the other. Settling all deviations at the ex post imbalance price would make a big difference to the OBB strategy.

The second unusual/unique feature of the STTM design that contributes to the profitability of the OBB strategy is the non-firm nature of the STTM's day-ahead capacity product: LFS can sell its capacity in the day-ahead STTM, and then (in effect) buy it back at the ex ante price simply by scheduling with the pipeline. The STTM Model was used to analyse cases in which the pipeline is congested in the ex ante STTM if LFS does not withhold supplies there, but not when LFS withholds say, Q GJ, as part of the OBB strategy. In this case, when LFS uses the OBB strategy the ex ante capacity price is zero, so LFS can schedule its withheld gas as a long deviation at no cost to itself, even though doing so causes congestion to reappear and some non-firm shippers to be bumped. If LFS had to pay an ex post capacity price reflecting the value of capacity after it

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<sup>15</sup> If LFS is making a margin greater than 5 percent at the competitive price and can only increase the market price 5 percent by withholding half its supply, it does not have effective market power. If LFS is not making a margin of at least 5 percent selling at the competitive price it is not likely to be in business for long.

schedules its withheld gas, the OBB strategy would be significantly less profitable and LFS' market power could be significantly less effective even with the OBB strategy.

### ***3.2.6. How could the STTM control the OBB strategy?***

There are at least four things the STTM itself could do to control the OBB strategy. Two of the four are good ideas as economic concepts, but would need to be done together and would require major changes in the STTM design, systems and even philosophy. One of the four would be easy but a bad idea in its simplest form, but is worth considering in more complex forms. And one of the four is relatively easy, a good idea and needs to be done anyway.

- **Use Ex Post Prices to Settle All Deviations and Make Capacity Firm-for-the-Day:** Even though ex post pricing it is not a real option for the STTM at this time, it is included here because lack of ex post pricing is a principal cause of the OBB strategy's extreme profitability as well as of other potential problems in the STTM. Most modern network markets settle all deviations (at least up to some size) at the same price, sometimes determined with something like a near-real-time market and sometimes calculated much as the STTM's ex post imbalance price is. And most of them have a capacity product that is firm-for-the-day, at least in the sense that they do not let a shipper whose offer did not clear in the ex ante market bump somebody whose offer did clear. Such changes are not feasible at this point in the STTM's evolution, but should be – and may have to be – considered at some point in the future.
- **Decrease the Deviation Price for Large Long Deviations:** A low enough long deviation price would certainly make the OBB strategy unprofitable. It would be easy as a rules and systems matter to decrease the 90 percent factor in the STTM's "lesser of" formula for deviation prices to 80 percent, 50 percent, 20 percent or even zero, but this is not recommended because such large deviation penalties would make life even more difficult for small market participants and exacerbate the problems caused by the lack of ex post pricing. A more complex alternative would be to reduce payments to – i.e., increase the penalties on – long deviations that are large enough to make the OBB strategy pay and usually have no legitimate purpose, with some appeal/review process to deal with the occasional large deviations that are beneficial. It is easier to change settlement rules than to change basic market design features and processes, but until there is more evidence that the OBB strategy is a real problem even this change is not warranted (even if it were feasible at this point in the process).
- **Monitor the Market and Enforce "Good Faith Bidding" and General Laws:** Using the OBB strategy to any significant extent would result in a pattern of large long deviations that should be easy to detect and probably are – or at least should be – violations of STTM market rules and/or general competition law. Suggestions regarding the definition and enforcement of such rules and laws are presented in section 4 below.

### ***3.2.7. How important will OBB be in the STTM?***

There are two principal reasons to think that the OBB strategy may not be a serious problem in practice: (1) most shippers will ultimately sell most of their gas at contract and/or regulated prices and hence have little to gain in the short run by manipulating day-ahead and deviation

prices; and (2) using the OBB strategy requires running large deviations that should be easy to detect (at least with information about pipeline scheduling) and, if done often enough, would presumably violate the STTM's good-faith bidding obligation and perhaps general legal prohibitions against market manipulation, as discussed in section 4.3 below.

On the other hand, there are two principal reasons to think the OBB strategy may be a problem in practice: (1) the OBB strategy does not produce the kinds of price spikes that trigger public outrage and regulatory investigations in network markets – a five-to-ten percent increase in the day-ahead price could be highly profitable; and (2) OBB can be profitable for moderate sized shippers/retailers, not just large, high-profile entities that might be dissuaded from using OBB by fear that the Managing Director will be summoned to the premier's office or a parliamentary inquiry. Smaller entities that are unlikely to attract much attention and are willing to risk a lot of political heat to make a few million extra dollars might find it profitable to use the OBB strategy, at least occasionally.

In summary, it is not possible to say at this time how important the OBB strategy will be in practice. AEMO and the AER will have to monitor market behaviour carefully and be prepared to take action if the OBB strategy looks to be a problem. The next section makes some specific suggestions in this regard.

## **4. CONTROLLING MARKET POWER AND STRATEGIC BEHAVIOUR**

One purpose of the STTM Study as defined in the Terms of Reference provided by the Standing Committee of Officials is "to identify any specific issues of potential market dominance and recommend whether any additional mitigation measures are required, and whether there are any issues that should be monitored on an ongoing basis following the commencement of the market." Much of the discussion of specific issues in previous sections is relevant to this purpose. This section summarizes and expands on that discussion and outlines an overall approach to monitoring and controlling market power and strategic behaviour in the STTM.

The analysis here divides market power/strategic behaviour into three categories: (1) Conventional market power exercised by a dominant seller by withholding or overpricing supply to increase prices; (2) strategic behaviour designed to make life more difficult for existing or potential competitors; and (3) the specific combination of withholding and strategic behaviour called here the over-bidding/bumping (OBB) strategy. The OBB strategy is given its own category because it is not really either of the other two, is caused or at least exacerbated by specific features of the STTM design, and is potentially the most important market power issue for the STTM.

### **4.1. Conventional Market Power and Price Regulation**

The FER says in several places that "the absence of bidding rules" in the STTM gives market participants "a significant degree of freedom to determine the price at which" they bid gas into the STTM or offer MOS contracts to AEMO. The FER also cites with apparent approval the bidding rules used in the Western Australia electricity market that require generators to offer their full capacity at an administratively-defined "SRMC". All this suggests a serious concern about the potential to exercise conventional market power in the STTM, i.e., to increase prices (for a seller) by withholding or overpricing supply to the market, and a presumption in favour of detailed bidding rules to control such behaviour.

There are legitimate reasons to be concerned about conventional market power in the STTM, given the current dominance of some players at some of the STTM hubs. But if the current gas markets are dominated by a few large players, that dominance is not caused by the STTM and the STTM cannot be expected to control it – although introducing the more open STTM should begin eroding that dominance by encouraging smaller and new competitors. The fact that dominant players might exercise market power if they are allowed to do so is no reason not to introduce more open and efficient market arrangements. But neither is the mere introduction of a market process a sufficient reason to eliminate the existing contractual and formal or informal regulatory arrangements that now control dominant players.

An open market process such as the STTM is a necessary conditions for a competitive market, but it is not a sufficient condition; a competitive market structure is also necessary. The potentially dominant players in the STTM are in most cases large shippers/retailers who supply most of the domestic and commercial customers in a metropolitan at regulated prices. If and when these large entities are broken up into smaller entities or lose much of their market share to competitors, the regulatory controls on them can and should be loosened – a prospect that may encourage them to spin off competitors or otherwise surrender some of their market share

voluntarily. But until the actual market structure is consistent with workable competition, regulatory constraints should remain.

Thus, the FER's suggestion that some form of regulation may be needed to control dominant players in the STTM is fully justified. But the FER's implicit endorsement of STTM "bidding rules" as an appropriate form of regulation is not justified. As discussed in section 2.1 above, detailed bidding rules would be a nightmare in the STTM; and, as discussed in section 3.1 above, even a very large shipper/retailer has no reason to exercise market power in the spot market if it sells most of its product at contract or regulated prices that are independent of spot market prices. Taken together, these propositions define what is needed to control dominant shippers/retailers in the STTM: the same kind of price regulation to which most of them are subject now.

#### **4.2. Strategic Behaviour and Market Monitoring**

The second type of market power of potential concern for the STTM is strategic behaviour intended to make life difficult for smaller and new competitors. Large – but not necessarily only the largest – incumbent shippers/retailers might be able to use market strategies that increase costs and risks enough for smaller and potential competitors to discourage them from entering or staying in the business. Unlike conventional market power, which is not worth exercising unless it increases the immediate profits of the exerciser, strategies intended to damage competitors may reduce profits in the short run for those using them; but if the losses are even higher for smaller competitors this may be a price worth paying to keep them out of the game. Also unlike conventional market power, which is self-limiting in the sense that aggressive use of it increases opportunities for competitors, strategic behaviour that discourages competitors can be self-sustaining.

The FER mentions several examples of such potentially anticompetitive strategic behaviour. In one such strategy, large, diversified shippers/traders would, in effect, do business primarily with themselves or each other via bilateral contracts (or vertical integration) rather than through the STTM's day-ahead market, making trading there so thin that the market prices become unreliable as indicators of underlying economic reality. If done enough, this strategy could deprive all traders of the benefits of an efficient balancing market, but the effects would be much more serious for the smaller, less-diversified shippers/traders for whom balancing trades in both gas and capacity are proportionally more important. This strategy is not caused by anything specific in the STTM design; it could be implemented either by using bilateral contracts and the STTM's market variance process to trade outside the STTM or by using financial contracts and zero/VoLL bidding inside the STTM, and has analogues in almost any market. It is of special concern to the STTM "only" because making short-term trading ineffective is attacking the very *raison d'etre* of the STTM – which is, after all, a short-term trading market.

Another, related example of strategic behaviour that firm shippers could use to damage their non-firm competitors would be to schedule non-STTM deliveries after the pipeline sets the daily STTM capacity bids and offers are submitted to the day-ahead STTM, with the deliberate intention of bumping non-firm shippers who have STTM schedules; this strategy would also make it difficult/impossible for the pipeline to set a meaningful daily STTM capacity, because the pipeline would never know in advance how to allocate its actual capacity (if it even knows what that is) between STTM and non-STTM deliveries. Given the non-firm nature of the

STTM's capacity product, such bumping may be a common occurrence as a result of normal, non-strategic commercial activity. This would make it difficult to know when bumping is the result of a deliberate strategy – but would also mean that there is little need to bump non-firm shippers as a deliberate strategy because normal commercial activity would be making STTM capacity worthless anyway.

A final example of strategic behaviour that might, intentionally or otherwise, damage competitors, could be gaming the two-day lag in MOS settlements. As discussed previously, there may be games that can and will be played here, but it is not possible to know in advance just what they are or what their effects would be.

There are many other possible strategies that incumbent market players could use to make life difficult for smaller or new competitors. The only way to identify and control such behaviour is to establish an effective market monitor as discussed in section 2.1 above. Such a monitor would establish measures of market performance, investigate allegations of proscribe behaviour, submit period reports, identify emerging problems, and refer to the appropriate authority – whether it be AEMO, AER or some other state or Commonwealth entity – matters that might merit further investigation and perhaps enforcement action. The appropriate form and role of market monitoring for the STTM are political/institutional issues beyond the scope of this STTM Report.

#### **4.3. The OBB Strategy and Good-Faith Bidding**

The OBB strategy is included here as a separate category because it is neither conventional market power nor strategic behaviour intended to damage competitors, because it is potentially very profitable at least for some shippers/retailers under some conditions, and because it is largely caused, or at least made more profitable, by some specific features of the STTM design. These aspects of the OBB strategy are discussed at length in the section 3.2 above and will not be repeated here.

The analysis in section 3.2 above identified features of the STTM design that make the OBB strategy a potential problem in principle, but concluded that it is not at all clear at this time just how serious the problem will be in practice. There may be, in fact, simple ways to control the strategy, particularly the STTM's good-faith bidding requirement.

The STTM has a "good-faith bidding" rule that requires bids to the STTM to reflect what the bidder really expects to do on the day. A shipper/retailers using the OBB strategy enough to matter will have frequent and large long deviations, which will be apparent from its settlement accounts. There can be good reasons for large deviations, but these reasons should be apparent to any reasonable observer. Thus, it should be relatively easy for the STTM to define what the good-faith bidding rule means and how it will be enforced, and establish a procedure for policing and enforcing it.

In defining the good-faith bidding rule, AEMO should, as far as practical, extend it to include good faith projections of future bids, or at least of STTM quantities. In particular, shippers should be required to indicate several days in advance how much gas they intend to deliver through the STTM and how much they intend to deliver outside the STTM using the market schedule variation process, to prevent the kind of sudden changes in behaviour that can be used

to increase costs and risks for smaller shippers/retailers and that make it difficult for pipelines to decide how much of their capacity to allocate between STTM and non-STTM gas prior to the day-ahead STTM each day.

#### 4.4. Conclusions

The discussion above suggests the following three-part strategy for controlling market power in the STTM:

- **Continue Price Regulation of Dominant Market Participants:** The mere existence of the kind of market process needed to support competition should not be mistaken for the existence of competition itself. Market participants large enough to exercise conventional market power by withholding or overpricing their supplies should continue to be subject to the kinds of regulatory constraints that now exist. In most cases, this will involve limits on the prices at which dominant firms sell their product, not direct constraints on STTM bids (except when necessary to control uneconomic strategic behaviour, as discussed below).
- **Establish an Effective Market Monitor:** There are potential games that larger (not necessarily just the *largest*) participants might be able to play in the STTM. Some of these may be little more than the kind of competitive behaviour that is expected (and often beneficial) in any market, but others may take advantage of specific features of the structure or design of the STTM to create unnecessary and uneconomic costs for customers and risks for competitors. Identifying such potential games, determining when they are causing real harm and designing effective remedies will require careful monitoring and analysis of market behaviour and performance. Experience in other markets suggests that it may be desirable to establish a dedicated market monitor to perform these functions and to provide information and referrals to AEMO, AER and/or other appropriate governing and regulatory bodies when problems are found. The detailed functions and institutional form of the market monitor are matters beyond the scope of the STTM Study.
- **Be Prepared to Make Changes If and As Necessary:** Some of the potential opportunities to exercise market power, and particularly to behave strategically, in the STTM are due to specific features of the STTM. AEMO and the STTM's governing processes must be prepared to determine if and when some feature of the STTM is causing serious problems and to change market procedures, rules or even design when this is the best solution.