



Government of Western Australia
Department of Finance
Public Utilities Office

Reserve Capacity Auction – Final Design and Implementation

Department of Finance | Public Utilities Office
23 January 2017

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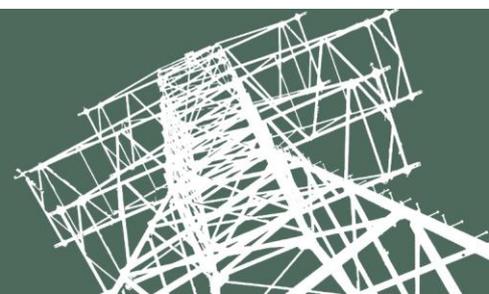


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Executive Summary

The Wholesale Electricity Market in Western Australia incorporates a Reserve Capacity Mechanism that seeks to ensure that the electricity system always has access to sufficient generation capacity to deliver reliable supply to the market.

On 31 May 2016, the Minister for Energy gazetted amendments to the Wholesale Electricity Market Rules that implemented a set of transitional reforms¹ pending implementation of a reserve capacity auction.

There is a need to ensure the reserve capacity auction is implemented before additional capacity is required to deliver adequate supply reliability.

Auction design

A December 2015 Position Paper, released by the Public Utilities Office, outlined a preliminary design for the reserve capacity auction. This current report confirms most of the elements of that design with the exception of two revisions as outlined below. This report also contains preliminary positions about settings for parameters that will need to be confirmed as part of the auction demand curve “calibration” process.²

The auction will have the following high-level design features.

- Auctions are held three years prior to the delivery year.
- Auctions comprise single round, closed bids.
- Auctions able to be cleared with a variable quantity (that is, with a “sloping demand curve”).
- Delivery period and price lock-in for a period of one year.

The first major change from the preliminary design is the proposed incorporation of a rebalancing auction to occur approximately 12 months before the beginning of each Reserve Capacity Year. This rebalancing auction will allow:

- capacity providers that have cleared in the base auction, but are not able to deliver in the capacity year, to trade out of their position; and
- the Australian Energy Market Operator (AEMO) to buy, or sell back, capacity from the market where there is a change in the demand forecast.

The rebalancing auction will be optional for all capacity providers that cleared in the base auction, as well as any other potential capacity providers that wish to offer capacity. The rebalancing auction will only be mandatory for capacity providers that know at the time they will not be able to fulfil their capacity obligations.

¹ The transition rules also included an obligation on the IMO (now AEMO) to develop an auction process should no auction rules exist in time or the 2021 capacity cycle.

² The process to calibrate the demand curve will aim to set the curve such that the variability in the quantity outcomes from each auction is within acceptable limits.

To ensure the rebalancing auction is used, and that it does not promote speculative offers into the base auction, there will be increased exposure to performance incentives for capacity that does not eventuate or does not perform well. This could include changes to the current refund regime caps (and potentially the refund floor) and/or increases to the amount of Reserve Capacity Security. A decision has not been made on the precise measures, pending consultation with industry (via the Reserve Capacity Mechanism Consultation Group).

The second change from the preliminary design is to allow the auction to clear at quantities less than the Reserve Capacity Target when the auction clearing price is above the Benchmark Reserve Capacity Price. This effectively allows the auction to under-procure relative to the Reserve Capacity Target when it is more efficient to increase the probability of lost load rather than buy additional capacity at a potentially much higher price.

Market power mitigation

The December 2015 Position Paper indicated that the auction design will need to incorporate a robust mechanism for mitigation of the potential use of market power in the capacity auction. This report details the market power mitigation regime proposed to be implemented, including restrictions on the sellers of capacity.

The Economic Regulation Authority will implement restrictions on sellers of capacity by determining a price threshold that all existing resources must offer below, unless the sellers demonstrate higher costs (known as supply-side mitigation). This level will be set at a level sufficient to cover the prices expected to be bid by at least 80 per cent of capacity in the market. Any existing participant wishing to make offers above this level will be able to apply to the Economic Regulation Authority for an exemption. This will require evidence as to the need to offer above this value. All new capacity providers will be exempt from restrictions on the maximum price that can be offered into the auction for the first year, but thereafter once cleared in the first auction will no longer be exempt in subsequent auctions.

Auction governance arrangements

This report outlines a framework for governance and administration of the auction, with AEMO being responsible for administration of the auction as well as training of market participants in preparation for the first auction.

The Economic Regulation Authority will be responsible for regulating the market and performing the functions associated with the market power mitigation regime.

A new, annual, rule change process would be introduced specifically to allow for timely changes to the auction process. This rule change process will be shorter than the current standard rule change process, but longer than the current fast track process. Given the capacity auction has clear yearly timelines, a capacity auction rule change process designed around these timelines will be helpful to ensure updated rules are in place for the next capacity auction cycle. The Rule Change Panel will have the option to progress proposals through either this new process, or the existing process for rule changes.

Implementation

The Public Utilities Office has commenced calibration of the demand curve. This involves simulating a range of candidate demand curves through probabilistic simulations in order to achieve the desired reliability outcomes. It is expected this work will take about six months to complete.

Concurrently, a method is being developed for accrediting capacity under a constrained network access model. The publication of a position paper on this matter is anticipated in the first half of 2017.

1. Introduction

The Western Australian Wholesale Electricity Market comprises a mechanism for procuring generation capacity and a separate energy market. The Reserve Capacity Mechanism seeks to ensure there are adequate capacity resources (including generation and demand side response) within the South West Interconnected System to meet reliability requirements.

Reform of the Reserve Capacity Mechanism has been a major element of the Electricity Market Review work program and will involve introducing a capacity auction to replace the current administrative process for procuring capacity.³ The annual auction will determine both the level of capacity procured and the price paid to capacity providers for each capacity year. The auction will occur three years ahead – meaning capacity providers cleared in the auction will be required to make that level of capacity available to the market three years hence.

On 31 May 2016, amendments to the Wholesale Electricity Market Rules were made by the Minister for Energy to introduce transitional arrangements. These new rules have changed the way in which the Reserve Capacity Mechanism operates pending the development of a final auction design. The transitional rules will apply up to the occurrence of the first capacity auction.

The first capacity auction will occur at the earlier of two triggers. The first trigger will be an AEMO forecast of a certain level of excess capacity (nominally five to six per cent) for a particular year – three years ahead. The second trigger is the first auction process must commence no later than 2021. This means that if, by 2021, the prescribed forecast level of excess capacity has not been reached, so as to trigger an auction, an auction would be conducted in 2021 to procure capacity for the 2024-25 Capacity Year.⁴

The Public Utilities Office is progressing development of the auction design with the intention that rules will be made by the end of 2017 to support the auction process. This report outlines the capacity auction design and a process and timeline for implementation of the auction.

Section 2 of this report provides further background including a summary outline of the deficiencies with the existing Reserve Capacity Mechanism and the rationale underpinning the introduction of a capacity auction as the basis for procurement of capacity. These matters were discussed at some length in the two previous papers referenced above. The reforms relating to the Reserve Capacity Mechanism that have been implemented to date are also outlined, including:

- changing the price for remuneration of capacity for the period up to the first auction by annual adjustment of the administered pricing formula to make it increasingly more value reflective;

³ See Position Paper on Reforms to the Reserve Capacity Mechanism, 3 December 2015, and Final Report: Reforms to the Reserve Capacity Mechanism, 7 April 2016

⁴ In June 2016, AEMO released the 2015 Electricity Statement of Opportunities which increased the forecasted Reserve Capacity Target for the next 10 years. If Synergy chooses to retire facilities in response to the Minister's direction to it to cease to operate 380 MW of capacity, and there is only modest investment in renewable generation in the short to medium term, the first auction will likely be able to be held before 2020

- providing for a capacity auction, following a period of transition, as the means of procuring the capacity requirement;
- changing the price payable to providers of Demand Side Management capacity during the transition period;
- harmonising the requirements of demand side management resources with other capacity types; and
- enhancing the incentives for making capacity available through a dynamic refund regime and tighter generator availability hurdles.

Section 3 of this paper describes the auction design addressing:

- the parameters relating to the auction design, including an auction demand curve;
- market power mitigation;
- auction governance and administration; and
- the implementation process and timeline.

The design includes the major element of the auction demand curve. An auction requires a capacity demand curve to reflect the price that AEMO will pay to acquire capacity to meet market requirements. The shape, slope and positioning of this demand curve requires that a trade-off decision be made between reliability and cost, and the setting of various demand curve parameters such as the price at which the auction should be capped; the level of excess capacity at which the capacity price should be zero; the basis for determining the (“reference”) price at which new capacity can be expected to enter the market; and the level of excess capacity at which a non-linear demand curve should change slope from steeper to less steep.

Other auction design elements separate from the demand curve include:

- whether the auction should be mandatory for all capacity resources;
- timing of the auction;
- the period for which capacity cleared in the auction is required to be delivered;
- the style of auction (for example, sealed bid, descending clock);
- a backstop procurement process in the event that the auction clears at a quantity below the requirement;
- the need for stronger incentives for capacity providers to make committed capacity available; and
- the need for a rebalancing auction prior to the delivery year to enable committed parties to adjust their positions.

Section 4 of this paper deals with the mitigation of the abuse of market power in the auction bidding process.

Capacity auctions can be particularly susceptible to price manipulation by providers that have market power. The value of a whole year’s capacity requirement is transacted in one capacity auction. The economic consequences for consumers of a capacity price that reflects monopoly rent can be profound – particularly given there is a market-wide price paid to all capacity providers.

Mitigation is particularly important because supply of capacity in the Wholesale Electricity Market is highly concentrated – currently the largest eight suppliers contribute 90 per cent of total supply by volume (with Synergy providing over 50 per cent with at least a further 20 per cent contributed from suppliers that have a contractual relationship with Synergy). Also, the threat of manipulation of the auction price is not limited to the supply side of the market. Buyers of capacity may also have an incentive to manipulate the price downward by subsidising the introduction of excess capacity.

Accordingly, there is a need to incorporate effective market power mitigation measures into the auction design, while being mindful that the measures should not be unnecessarily interventionist and complex, or limit participants in making commercially competitive auction bids. Implementation should also be transparent and the mitigation review should not expose the auction outcome to undue delay.

Virtually all capacity auctions worldwide have robust mitigation controls for exercise of market power. In developing this market power mitigation regime, the market power controls in overseas capacity markets were considered. The proposed arrangements are a fit for purpose approach for a small but highly concentrated Western Australian market.

Section 5 of this paper outlines how the auction is proposed to operate – specifically governance and administration of the auction process. An illustration of the main components of the auction process is provided – from determination of the Reserve Capacity Requirement for the capacity year minus three to auction clearance for that capacity year.

A high level framework for administering the auction is also detailed, including the main functions and tasks, and responsible entities. This framework will be further developed as part of the establishment of Market Rules for the capacity auction during 2017.

Section 6 of this paper outlines the process, including a preliminary timeline, for full implementation of the Reserve Capacity Mechanism reforms. Following a process of further consultation with industry stakeholders it is intended that the reforms will be given effect by changes to the Wholesale Electricity Market Rules at the end of 2017.

2. Background

AEMO is responsible for determining the capacity requirement for the Wholesale Electricity Market (called the Reserve Capacity Requirement), set relative to a one-in-ten year peak demand event forecast plus a margin for system support and reserve. The Market Operator also has responsibility to contract this level of capacity with accredited capacity providers at a Reserve Capacity Price, set administratively pursuant to a formula in the Wholesale Electricity Market Rules.

There is currently a substantial excess of capacity over the market requirement. For 2016-17, there is 23 per cent (1,061 MW) more capacity than is needed to meet the Reserve Capacity Requirement, largely due to actual demand growth in recent years being considerably below expectations.

In dynamic, well-functioning markets prices respond to the demand/supply balance and provide signals for adjustment. However, a major shortcoming of the current Reserve Capacity Mechanism is that the administered pricing arrangement has provided grossly inadequate signals to the capacity market to adjust to a more balanced state. Currently, the capacity price is \$120,199 per MW whereas the value of an additional megawatt of capacity to consumers is practically zero. Without the means for the market to self-correct consumers would continue to pay for this excess for no material benefit.

Transitional reforms have already been introduced to move the capacity market back into balance, prior to the introduction of an auction for reserve capacity. These reforms have introduced a progressively steeper “sloped” formula for determining the price to be paid for capacity. This steeper slope will ensure the price of capacity is progressively more responsive to oversupply of capacity. The reforms also provide for Demand Side Management to be paid a price more reflective of the value it gives to the market during the transition period.

The transitional reforms will not provide strong signals when new capacity is needed because the price is effectively capped at the price of new entry.⁵ Implementation of the auction is a necessary end point for these reforms.

The December 2015 Position Paper outlined many of the fundamental aspects of how variable quantity auctions work.⁶ In essence, a variable quantity auction:

- will clear at a quantity above the targeted quantity where it is cost effective to do so (that is, the auction will procure more capacity than the requirement if it is cheaper to do so);
- ensures the price paid for capacity is reflective of its value, which in turn will promote more economically efficient investment decisions by retailers;
- will reduce long-term costs for consumers, by incentivising efficient investments, rather than the inefficient investments encouraged by the Reserve Capacity Mechanism prior to the reforms; and

⁵ The price has actually been designed to be able to raise up to as much as 110 per cent of the cost of new entry, however this price is only able to be realised when the mechanism under-procures and is therefore unlikely to occur with sufficient regularity to offset the instances of costs being below the cost of new entry

⁶ https://www.finance.wa.gov.au/cms/uploadedFiles/Public_Utility_Office/Electricity_Market_Review/Position-Paper-on-Reforms-to-the-Reserve-Capacity-Mechanism.pdf

- should, on average, clear at the true cost of new entry discovered through competitive market mechanism, reducing the regulated nature of the Wholesale Electricity Market and increasing the ability of market fundamentals to set prices.

This report builds on the December 2015 Position Paper by setting out many of the parameters initially recommended in that paper and explaining any deviations from the initial model proposed.

The reserve capacity auction has been designed consistent with the reform objectives and principles as set out in the Position Paper.

Objectives

- Capacity market incentives and outcomes are conducive to a least cost, sustainable delivery of capacity and energy to customers.
- The Reserve Capacity Mechanism is to provide strong incentives to introduce capacity when there is a forecasted undersupply and strong incentives to remove capacity in times of oversupply.
- The Reserve Capacity Mechanism is to provide signals for the efficient retirement of plant.
- The Reserve Capacity Mechanism is to encourage the efficient utilisation of capacity.

Principles

- The capacity price should reflect the marginal economic value of capacity.
- The Reserve Capacity Mechanism should not be overly susceptible to volatility but deliver clear and consistent medium term price signals.
- The Reserve Capacity Mechanism should not be susceptible to distortion by the exercise of market power.
- Changes to the Reserve Capacity Mechanism must be consistent with acceptable system security limits.

3. Auction Design Parameters

3.1 Background

The intention of reforms to the Reserve Capacity Mechanism is for an annual capacity auction to harness competition and investment to meet system reliability requirements for each capacity year at least cost. The high level design of the capacity auction for the Reserve Capacity Mechanism has been developed taking account of capacity auction designs in other markets, but also the rather unique features of the Western Australian Wholesale Electricity Market. Compared to other markets with capacity auctions, the Wholesale Electricity Market in the South West Interconnected System:

- is extremely small;
- has a high concentration of ownership of generation plant; and
- has a high level of bilateral contracting.

Like most other capacity auctions, the Wholesale Electricity Market will have a variable quantity design, meaning that a downward sloping auction demand curve must be developed identifying the prices at which the market operator will purchase various quantities of capacity. It is important that this demand curve reflects, to the best extent possible,⁷ the value of capacity to the market and incentivises new entry or exit by allowing prices to increase up to a market cap when capacity is needed and to fall to lower levels when there is an excess. The auction demand curve interacts with a capacity supply curve based on auction bids to set the clearing price.

There are many parameters that need to be established in defining this demand curve – the steepness of its slope, the market price cap, and a benchmark price at which new capacity is expected to enter the market.

Other elements to the auction design that are independent of the demand curve include:

- participation requirements;
- timelines for various steps in the auction;
- the delivery obligation on plant that is cleared in the auction;
- the style of the auction (for example, sealed bid or descending clock);
- the process for procurement of capacity in the event of a shortfall to requirements; and
- market power (discussed in section 5 of the report).

This report provides a final position on the auction design parameters that can be set at this time (Table 3.1) and are required to provide some direction to the detailed parameters of the demand curve.

⁷ Factors such as a need to minimise the potential for market power abuse and keep price volatility as low as possible may mean that the curve is not entirely value reflective

Settings of other parameters, mainly those associated with the auction demand curve, need to be further informed by detailed modelling and engagement with stakeholders to ensure the final auction design delivers on the objectives of the Reserve Capacity Mechanism reforms. The final settings for these parameters (Table 3.2) will be determined as part of the process to calibrate the auction demand curve, during the first half of 2017.

The parameters that have now been determined utilise settings that are essentially the same as proposed in the December 2015 Position Paper. The major exceptions relate to the reliability objective for the auction, the trigger of the backstop capacity procurement process and whether the auction design should incorporate a rebalancing auction prior to the delivery year. The revised position on these design matters is discussed in detail below.

This report also proposes some additional parameters not canvassed in the previous position papers.

Table 3.1: Auction Design Parameters – Final Settings

Auction parameter	Design	Rationale
Auction Timing		
Base auction ⁸	The length of time between capacity accreditation and capacity delivery will be three years (i.e. the auction will be a three-year ahead auction).	<p>The forward period of a capacity market is the time between the capacity auction when prices and resource commitments are determined, and the later delivery period when suppliers must actually fulfil those commitments</p> <p>The primary advantage of a three-year forward period is that many supply options, including demand response, capacity uprates, and some types of new generation builds can be implemented within a three year window. The forward period needs to be long enough to allow these resources to adjust their entry and exit decisions, which will stabilise capacity prices and reserve margins, even if some other resources have longer lead times. Specifically, a three-year forward period better matches the procurement timeframe to the development timeframe for new peaking generation resources. This enables supply to respond in a more orderly manner as needed, reducing boom-bust cycles.</p> <p>Further, by welcoming potential new entrants (and major retro-fits) into the auction, the three-year forward period expands the amount of supply that can compete. Increased participation and competition supports more economically efficient outcomes and reduces the ability of existing resources to exercise market power.</p>

⁸ See section 5.3.2 of the December 2015 Position Paper for more information

Auction parameter	Design	Rationale
Rebalancing auction ⁹	<p>A rebalancing auction will be held one year before the relevant Capacity Year.</p> <p>The rebalancing auction will be mandatory for capacity providers that have cleared in the base auction but subsequently find they will be unable to deliver during the following “hot season”.</p> <p>The rebalancing auction will be optional for all other capacity providers.</p> <p>AEMO will be able to buy and/or sell capacity into the rebalancing auction where changes to the load forecast have occurred and the price in the auction makes such a trade economically viable.</p>	See section 3.3 for details

⁹ The December 2015 Position Paper indicated that there would not be a rebalancing auction - see section 3.3 of this report for more information

Auction parameter	Design	Rationale
Delivery period		
Length of the delivery period ¹⁰	The capacity price will apply for one year for all capacity providers.	<p>The delivery period is the time between when a committed resource has to start delivering capacity and when its obligation terminates.</p> <p>A delivery period of a single year is consistent with the intent of the Reserve Capacity Mechanism and the auction to provide a market signal on the value of incremental capacity on a year to year basis. It is open to suppliers of capacity and electricity retailers to contract outside of the pricing mechanism of the auction to provide stability of capacity costs and revenues.</p> <p>US based capacity markets typically have a one-year commitment period, meaning that resources would usually enjoy only one year of guaranteed prices (all future revenues would be at risk).</p> <p>Many developers of generation facilities and financial entities regularly express concern that a one-year delivery period does not provide sufficient certainty for these investments, asserting that a longer commitment period is necessary. While developers express this sentiment in almost every market, practical experience has demonstrated otherwise.</p> <p>There are several reasons for this disconnect. One is a matter of timing versus market conditions: some US market participants claimed the market design was flawed when no new generation entered for several years. However, the real deterrent to additional capacity was not the delivery period but rather that new generation was neither needed nor economic while excess capacity was depressing prices.</p>

¹⁰ See section 5.3.3 of the December 2015 Position Paper for more information

<p>New entrant price lock-in¹¹</p>	<p>There will be no ability for a new entrant capacity supplier to apply and receive price certainty beyond the above delivery period (i.e. lock in a capacity price for multiple years).</p>	<p>A concern held by many developers and financial entities is that a one-year delivery period does not provide sufficient certainty to invest in new generating resources. They assert that a longer commitment period is needed or a multi-year price lock-in for new supply is required. The auction will be designed and the curve calibrated, to ensure, to the extent possible, that the auction will, on average, deliver a price equal to the cost of new entry. The economic efficiency of the Reserve Capacity Mechanism requires that the capacity auction price for a capacity year reflects the “spot price” for capacity for that capacity year. This would not be the case, if certain participants were able to lock in a capacity price over multiple capacity cycles. Market participants can continue to enter into bilateral contracts to hedge themselves from the spot price.</p> <p>ISO-NE has established a seven-year price lock in to reduce the risk that its market would not attract investment. ISO-NE understood this approach results in price discrimination that favours new generation over other resource types and thus limits competition and increases total system costs. However, ISO-NE believed a price lock-in option was a necessary safeguard given investors’ particular perception that the New England market was vulnerable to prolonged periods of depressed prices, with its history of state interventions (i.e. subsidised entry), compounded by low net load growth. Unsurprisingly, all new generators in that jurisdiction have opted for the price lock-in option.</p> <p>In other markets, however, investors have demonstrated a willingness to bear merchant risk without such long-term assurances. For example, the PJM market has recently attracted large quantities of merchant generation investment without providing any long-term commitments. PJM has attracted more than 12,000 MW of new merchant capacity.</p> <p>The ability of PJM to attract merchant investment without multi-year price guarantees does not mean that all markets can be similarly successful. A multi-year price guarantee would not overcome design flaws that artificially suppressed prices (such as too low a price cap) or regulatory environments that threaten to intervene in the market and undermine investment. Obviously the best solution to such problems would be to resolve the market design flaws and strengthen the regulatory commitment to a market based approach.</p>
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Auction parameter	Design	Rationale
Auction design		
Auction format ¹²	<p>The auction will be a single-round sealed bid auction.</p> <p>Market participants will be able to submit one offer into the auction. However the offer format will allow for “flexible offers – see “Other Auction Mechanics”, below, for further details.</p> <p>The auction will be run once with the price being set by the marginal unit. All capacity cheaper than the intersection of the marginal offer with the demand curve will be cleared (and therefore receive capacity credits). All offers above the intersection will not be cleared.</p>	<p>Both sealed bid and descending clock auction formats have been used successfully in capacity markets such as ISO-NE and PJM. No single auction style has been shown to offer compelling advantages in the context of auctions for capacity markets in the electricity industry. It appears the success of a particular auction format depends more on the specifics of its design, including market monitoring and mitigation provisions, than on the auction format.</p> <p>One of the main disadvantages of a multi-round, descending clock auction is the increased opportunity to exercise market power through signalling and tacit collusion among suppliers. Price discovery in multi-round auctions may help marginal suppliers decide what to bid by conveying information about other bidders’ expectations. Because multi-round auctions must reveal some information they are necessarily susceptible to bidders using that information to manipulate auction outcomes.</p> <p>The primary advantage of multi-round auctions, namely price discovery, does not apply in Western Australia as much as in larger, more competitive markets, because most capacity offers will be submitted by a limited group of suppliers that own many facilities (limiting the possibility of information exchange among suppliers).</p> <p>While sealed bid auctions reveal less information to support efficient, timely investment decisions, advantages include the protection of business information, mitigation against gaming potential, and price transparency benefits by revealing some information after the auction. Given the slight disadvantages and the greater complexity of a descending clock auction, a simple, single-round sealed bid auction format is proposed for the Wholesale Electricity Market.</p>

¹¹ See section 5.3.3 of the December 2015 Position Paper for more information

¹² See section 5.3.4 of the December 2015 Position Paper for more information

Auction parameter	Design	Rationale
Resource requirements		
Reference cost of new entry ¹³	<p>The reference price, the Benchmark Reserve Capacity Price, will continue to be an administratively determined estimate of the price at which efficient new entry can be expected to enter the market. It is this price that a competitive auction would be expected to deliver on average over time. The reference price is used to position the demand curve; however, auction bids will determine the capacity price.</p> <p>The auction will retain the existing estimate of new entrant marginal cost (based on gross cost).</p>	<p>The current benchmark reference capacity price considers only the gross costs of building a new generation plant – the Gross Cost of New Entry (CONE) estimate does not account for the fact that a new entrant may earn some revenues from participating in the energy and ancillary service markets, and will only need to earn the difference in the capacity market to fully recover its cost of capital. Therefore, a demand curve built around Gross CONE may over-compensate capacity resources and result in high prices relative to what is required to attract investment. Other markets therefore use estimates of Net CONE to determine the new entrant reference cost. Deriving these estimates can be a complex process.</p> <p>However, in the Wholesale Electricity Market because the marginal capacity provider at peak times is likely to only recover its short run costs the difference between Gross CONE and Net CONE is likely to be negligible.</p> <p>Using price data from the past two and a half years in the Wholesale Electricity Market, the Public Utilities Office has estimated that a new combustion turbine or reciprocating engine (RICE) would not have earned a large amount of energy revenues for 2014 – 2016 as compared to Gross CONE.</p> <p>The analysis has found that a new entrant combustion turbine would have made less than 10 per cent of its estimated going-forward fixed costs on the energy market. Therefore, it is considered there is no need to change from a Gross CONE to a Net CONE derived reference price.</p>

¹³ The reference cost of new entry was not explicitly discussed in the December 2015 Position Paper, however, it was implied that the current process would continue – see section 5.2.4 of the December 2015 Position Paper for more information.

Auction parameter	Design	Rationale
<p>Scope of participation in the base auction¹⁴</p>	<p>The auction will require mandatory participation by all existing capacity providers,¹⁵ including capacity covered by bilateral contracts.</p> <p>Participation by new entrant suppliers of unconfirmed capacity will be optional (i.e. new providers of capacity that have not cleared in the previous auction are not obliged to bid in an auction).</p>	<p>An all-in participation requirement is proposed for the Wholesale Electricity Market reserve capacity auction for three main reasons.</p> <ul style="list-style-type: none"> • User pays philosophy: If some customers face a variable requirement inside the auction and others face a fixed requirement outside the auction, the two sets of customers would likely procure different reserve margins. The mismatch would be inequitable for those customers with the variable auction requirement. This is because all customers are equally curtailable in the event of a capacity shortage and share any increased level of reliability procured through the auction. Hence, the set of customers outside of the auction would be “free riding” on those customers sponsoring the higher reserve margin through the auction process. • Maximise competition: A demand curve based on uncontracted capacity would be very steep, due to the current high level of bilateral contracting. With such a demand curve the prices would change dramatically for even a small unit entering or exiting, and price volatility would increase dramatically. This result would severely undermine the structural competitiveness of the reserve capacity auction. Alternatively, an all-in auction increases the structural competitiveness of the auction. • Market power mitigation: A steep demand curve, such as the one proposed for the Wholesale Electricity Market, is susceptible to the exercise of market power through the strategic withholding of capacity. The increase in competition that would result from mandatory participation in the auction decreases the ability of any one participant to strategically increase the price.

¹⁴ See section 5.3.1 of the December 2015 Position Paper for more information.

¹⁵ Here, “existing capacity provider” means capacity providers that have cleared in the previous auction.

Auction parameter	Design	Rationale
Delivery and performance incentives/penalties		
Performance incentives ¹⁶	<p>The Reserve Capacity Mechanism and the auction will retain the two current performance incentives:</p> <ol style="list-style-type: none"> 1. Dynamic Refunds; and 2. Reserve Capacity Security. <p>However, the performance incentive levels will be reviewed following consultation with the sector (see section 3.3 for more detail).</p>	<p>Reserve Capacity Security:</p> <p>The current Wholesale Electricity Market Rules require any new facility or existing facilities undergoing major maintenance or upgrades, wishing to receive Certified Reserve Capacity, to submit a Reserve Capacity Security payment to the Market Operator. The payment is equal to 25 per cent of the Benchmark Reserve Capacity Price multiplied by the quantity of capacity offered.</p> <p>These Reserve Capacity Security payments are refunded once the facility has reached commercial operation status. If the market participant fails to reach commercial operation status, the deposit is forfeited.</p> <p>The current arrangements will be reviewed as part of the development of a rebalancing auction and enhanced performance incentives.</p> <p>Dynamic Refunds:</p> <p>A critical part of designing a performance incentive regime is to define the shortage periods during which the performance penalties apply. This subset of hours should be defined as those periods when the system is at risk of being short of supply. The Dynamic Refund Regime, introduced as part of the transitional capacity market reforms, imposes penalties during a subset of hours when reserves fall below a given threshold: moderate penalties when reserves fall below 1,500 MW and higher penalties when reserves fall below 750 MW.</p> <p>To be effective, capacity performance requirements must be large enough to discourage unreliable resources from participating in the market. PJM and ISO-NE have designed performance penalties such that when the system reaches the equilibrium reserve margin, a resource that cleared the market but does not run during any shortage hours is penalised.</p>

¹⁶ The effects of a capacity auction on this parameter were not discussed in the December 2015 Position Paper.

Auction parameter	Design	Rationale
		<p>The current Dynamic Refunds Regime requires capacity providers to pay a penalty of 0.25x the effective hourly capacity price when reserves exceed 1,500 MW, scaling linearly to 6x the half hourly capacity price when reserves fall to 750 MW or below. After reviewing market data from January 2014 through to March 2016, the Public Utilities Office considers these penalty factors are not sufficient to discourage unreliable or speculative supply from entering the market. The analysis suggests a capacity resource that cleared in a capacity auction but remained almost completely unavailable during the delivery year, would have only paid 26 per cent of its capacity revenue in penalties.</p> <p>The current arrangements will need to be reviewed as part of the development of a rebalancing auction.</p>
Cost allocation		
Cost allocation ¹⁷	<p>The Reserve Capacity Mechanism will retain the existing cost allocation method, based on Individual Reserve Capacity Requirement (IRCR).</p> <p>However, the concept of separating capacity charges into socialised Shared Reserve Capacity Costs (SRCC – relating to excess capacity charges which must be settled through AEMO) and Targeted Reserve Capacity Costs (TRCC – which may be addressed through bilateral contracting of capacity) is being reviewed.</p>	<p>The Wholesale Electricity Market Rules currently allocate the costs of procuring capacity to load through the IRCR process. The IRCR process allocates reserve capacity requirements based on each load's contribution to peak demand during the previous summer's three highest demand trading intervals on each of the four trading days with the highest maximum demand. The current approach to allocating costs to load has been retained for the auction construct, as it is generally consistent with arrangements used by other electricity systems with capacity markets.</p>

Auction parameters that will be set during the calibration process are outlined in Table 3.2 below.

¹⁷ This parameter was not discussed in the December 2015 Position Paper.

Table 3.2: Auction Parameters to be set during calibration phase

Auction parameter	Design	Rationale
Optimisation Objective ¹⁸	The auction will clear bids that intersect the auction demand curve based on the concept of maximising social welfare.	<p>One complication the auction clearing algorithm must account for is the inherent lumpiness of capacity resources. The auction will clear at the point of intersection of the auction demand curve and the market supply curve (comprising the aggregated bids of capacity providers into the auction). With the indivisibility of lumpy offers, it is unlikely that the total quantity of offers will perfectly fall upon the demand curve. Selecting the last unit may overshoot the quantity at the supply-demand intersection point. If so, there is the option to clear the whole offer, clear none of it, or skip that offer and clearing the next unit if it is smaller. In each case, a rule is needed for setting the auction clearing price.</p> <p>Appendix A in this paper outlines the theory underlying the concept of maximising social welfare.</p>
Other auction mechanics ¹⁹	<p>Other practical auction arrangements such as offer formats structure and tie break rules.</p> <p>The auction will allow for flexible offers – the exact nature of these flexible bids is still be finalised.</p>	<p>The design is to allow auction participants the ability to make “flexible bids” providing, at a minimum, the ability to have multiple tranches and a “minimum acceptable” quantity such that, if the participant clears less than the minimum quantity, it will not clear in the auction. These flexible bids will alleviate many of the matters associated with the lumpy nature of capacity auction bids</p> <p>Other auction parameters such as “tie break” rules will be developed in consultation with the sector in 2017. Decisions on these parameters will be made by analysing the effects of each choice on the calibration results – the outcomes that best meet the reform objectives and principles (see section 2) will be selected.</p>

¹⁸ This parameter was not discussed in the December 2015 Position Paper

¹⁹ This parameter was not discussed in the December 2015 Position Paper

Price cap ²⁰	<p>The maximum possible price for the capacity auction is not yet finalised - it is expected to be approximately 1.5~1.6 times the Benchmark Reserve Capacity Price.</p>	<p>One of the most important determinants of how a capacity market demand curve will perform is the price cap. In general, the price cap should be high enough to provide sufficiently strong signals for investment when the reserve margin becomes tight.</p> <p>How high should the price cap be? One consideration is that the price should be allowed to rise substantially above average levels when supply is scarce. Higher prices may avoid shortfalls and market interventions if they attract required incremental supply. A very high cap may therefore be desirable, although some limiting of the cap may protect against the exercise of market power (and excessive volatility). The risk of market power being exercised may in any case be partially mitigated by a three year forward market that requires existing suppliers to compete with new entrants, limiting the clearing price to the price at which new entrants are willing to enter.</p> <p>Another consideration is that, for the demand curves to achieve certain reserve margin targets on average, the price cap should be high enough to allow for occasional high price outcomes that can offset low prices during surplus market conditions. Only then can investors earn a sufficient return on average. Accordingly, the price cap is usually set at a multiple of the long run marginal cost.</p> <p>However, to ensure that the auction price is capable of maintaining a long run average price equal to the long run marginal cost of a new entrant facility, the exact value of the cap may vary slightly as part of the calibration phase of the auction design.</p> <p>Further, the price should reach the cap when planned reserve margins fall to the lowest acceptable level, so that market signals are maximised and all in-market opportunities for capacity procurement have been exhausted before resorting to back-stop measures. Therefore, the price cap will be set near the reserve capacity floor (see section 3.2 for more information regarding the “floor”). The specifics of this placement will be an outworking of the calibration process.</p>
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Auction parameter	Design	Rationale
Backstop procurement procedures ²¹	<p>In the event the capacity auction fails to procure sufficient capacity to meet system requirements, a process is required to procure the shortfall.</p> <p>The auction will be designed to ensure the backstop procurement process is relied upon as little as possible (taking into account the reform objectives and design principles outlined in section 2).</p>	<p>The design of the auction will occasionally under-procure relative to the reserve capacity floor. Therefore, there is a need for a robust and efficient supplementary reserve capacity process. However, the process must be designed so as to not affect the price outcomes of the reserve capacity auction for future periods. This is to ensure that market participants that participate in the auction are not disadvantaged by the out-of-market process – such a situation would undermine price outcomes and therefore reduce market efficiencies by introducing uncertainty and risk premiums.</p> <p>To avoid these detrimental outcomes the supplementary reserve capacity procurement process will be structured such that:</p> <ul style="list-style-type: none"> • Supplementary capacity procured should aim to not depress future capacity auction prices. • There will be restrictions/requirements relating to participation in the supplementary reserve capacity process to avoid participants withholding capacity from the auction and placing upwards pressure on the auction price in order to gain more favourable terms in a supplementary procurement. • The Market Operator will calculate and define the requirements for any supplementary reserve capacity to ensure an efficient and tailored product can be procured.
Demand curve		
Underlying reliability objective and demand curve design objective ²²	These objectives refer to the target level/s of capacity that the auction is required to deliver. This is linked to the frequency of occurrence of a backstop procurement to acquire any shortfall of capacity up to the capacity target.	See Section 3.2 below

²⁰ See section 5.2.5 of the December 2015 Position Paper for more information

²¹ See section 5.3.5 of the December 2015 Position Paper for more information

Auction parameter	Design	Rationale
Demand curve shape ²³	<p>The demand curve shape will:</p> <ul style="list-style-type: none"> • be a convex demand curve with one inflection point; • have a minimum acceptable quantity (i.e. the reserve capacity floor) at the price cap; and • have a zero crossing point, where, if capacity is procured above this level of excess the capacity price will be zero. 	<p>An auction with a variable resource requirement (i.e. an auction with a downward sloping demand curve) can be calibrated to achieve reliability and price outcomes within a certain range. There are three different auction demand curve shapes used in international jurisdictions:</p> <ul style="list-style-type: none"> • Steep Linear Curve • Gradual Linear Curve; and • Convex Curve <p>In evaluating these three options, one major consideration is the consequences of a steep slope in such a small market as the Wholesale Electricity Market, where the entry or exit of one plant dramatically changes the reserve margin and could move prices a large part of the way from the price cap to the floor if the curve is too steep. Prices could be highly volatile, which could be undesirable for both customers and capacity suppliers; indeed, such volatility could deter entry of an efficient scale plant that would depress its own price for years. This effectively rules out Option 1 (a steep linear curve). NYISO has recognised the need for less steep curves in its smallest Long Island and New York City zones (which are still about twice the size of the capacity market in Western Australia).</p> <p>A convex shape that is steeper at low reliability values and less steep at high reliability values is favoured (similar to a new curve recently adopted by PJM). The flatter part of the convex curve provides the price stability benefits of a non-steep straight-line curve, without making the entire curve so flat that quantity uncertainty exceeds acceptable deviations from the Reserve Capacity Target. The steeper part of the curve expresses a greater willingness to pay for capacity as the marginal reliability value of capacity increases.</p>

²² The position outlined in section 3.2 proposes a revised design for this aspect of the auction; see that section for more information.

²³ See sections 5.2.1 to 5.2.4 of the December 2015 Position Paper for more information

Auction parameter	Design	Rationale
		<p>Such a curve would keep the prices from falling too low following entry of capacity but would also let prices rise toward the cap (when the market is in short supply), before the reserve margin becomes intolerably low.</p> <p>A convex curve has the advantage of setting price more nearly proportional to the marginal reliability value of capacity than a linear demand curve. A convex curve allows for a rational trade-off between the need to aggressively procure capacity when the system is short (steep slope), versus reducing price volatility when the system is not short of supply (flatter slope).</p>

3.2 Reliability Objective

Each capacity auction will seek to procure the quantity of capacity determined by AEMO to be required to meet an incidence of peak demand plus an optimal reserve margin; that is, the Reserve Capacity Target.

A downward sloping demand curve for the auction means that, over a period of time, a variable quantity of capacity will be procured. This is because, unlike a conventional auction, a sloped demand curve allows the quantity to vary depending on the auction clearing price. The process to calibrate the demand curve will aim to set the curve such that variability in the quantity outcomes from each auction is within acceptable limits.

If the auction under-procures relative to the reliability target in any one year there will be a need for the Market Operator to conduct a backstop or supplementary procurement outside of the auction mechanism to ensure there is sufficient capacity on the system to meet the forecast peak demand requirements. The approach detailed in the Position Paper was that the backstop process would be triggered in the same manner as in the current design, that is, whenever less capacity is procured than the Reserve Capacity Target. However, if the auction was to be designed so as to, on average, procure the Reserve Capacity Target; then the backstop process would be triggered, on average, once every two years.

Relying on a supplementary procurement process of this frequency is undesirable as such backstop procurements can undermine market performance. New entrants or owners of plant proposed for retirement may withhold capacity from the auction in order to obtain more favourable terms through the backstop mechanism, particularly if they believe that competitors are scarce. Additionally, any higher payments or long-term contractual undertakings made to backstop-procured resources amount to subsidies that other resources do not receive. This can artificially depress future market prices if it lowers the subsidised resources' net costs of offering in future auctions. For these reasons, the Public Utilities Office considers that reliance on the backstop procurement process should be limited.²⁴

Less frequent backstop procurements would require the auction, on average, to procure more capacity than the Reserve Capacity Target, meaning that the auction demand curve would be shifted to the right increasing capacity costs. The proposed approach detailed in the Position Paper suggested the tension between reliability and price would be addressed by designing the auction to fail to procure enough capacity to meet the Planning Criterion 25 per cent of the time, and therefore trigger the backstop process about once in every four years.

The Public Utilities Office has further considered this matter and adopted a revised approach as detailed below.

²⁴ This concept is further explained in Appendix B.

Derivation of the Reserve Capacity Target

The Reserve Capacity Target includes a margin derived by trading off the cost of unserved energy against that of procuring capacity to serve the energy requirement – that is, the reserve margin is the “optimal” amount of capacity required for the South West Interconnected System (currently 7.6 per cent).

This optimal margin is based on an assumption that new capacity will come at a cost equal to the Benchmark Reserve Capacity Price (that is, the expected cost of efficient new entrant capacity). If the price of the additional capacity is higher than the Benchmark Reserve Capacity Price, then the optimal amount of capacity is reduced (because it is “cheaper” to have more unserved energy than to buy more capacity).

Revised Approach to Reliability Objective for the Auction

A fundamental theory underpinning capacity auctions is they will, in the long run, clear at an average price equal to the cost of the marginal supplier. In the Wholesale Electricity Market this cost is assumed to be equal to the Benchmark Reserve Capacity Price. On average the auction will clear at a price equal to this benchmark and occasionally at a higher price – the indicative proposal is for the auction to be capped at 1.6 times the Benchmark Reserve Capacity Price.

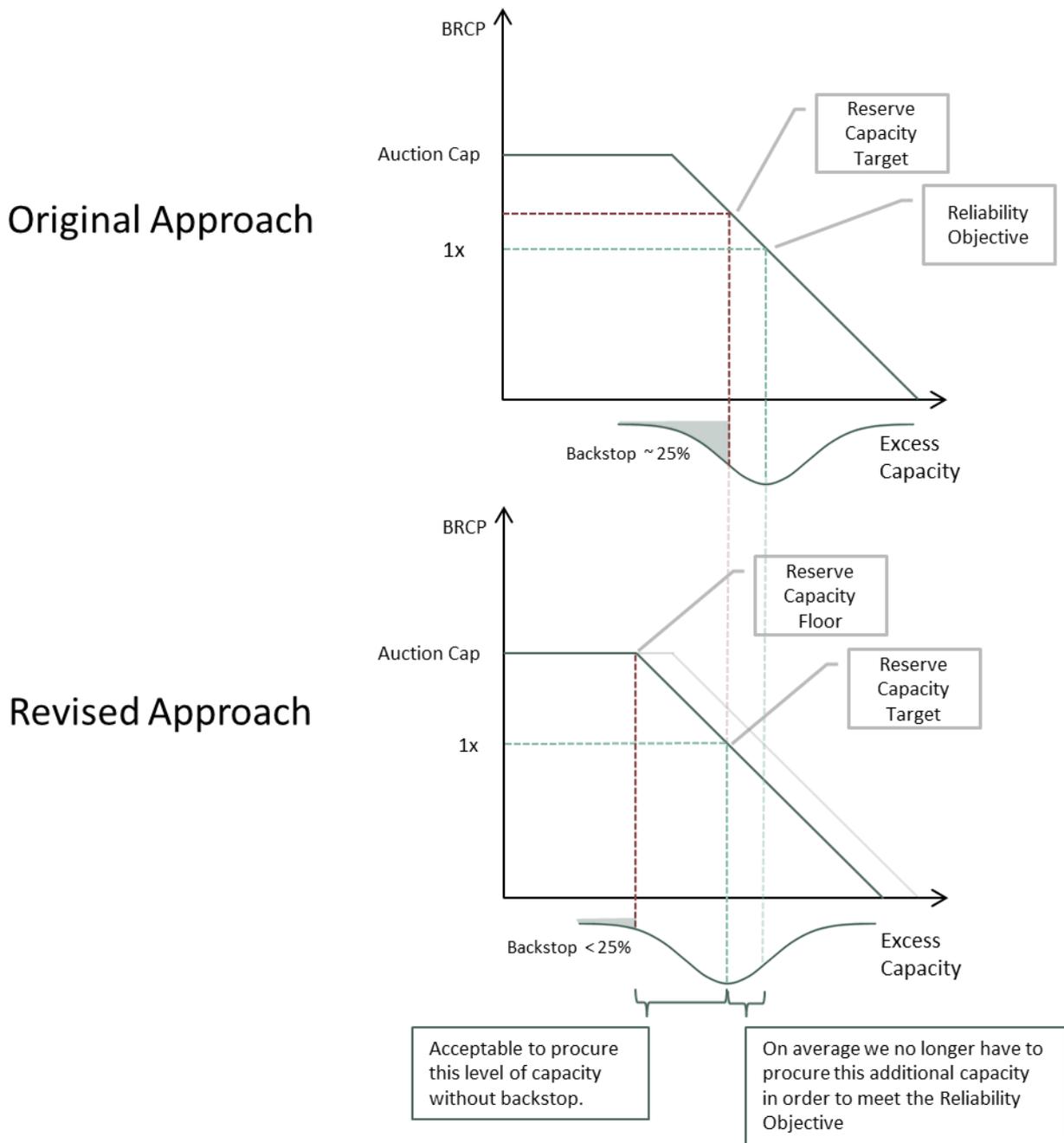
The revised approach to the reliability objective centres on the concept that, at this higher price, the optimum level of capacity decreases – effectively, it is economically more efficient to increase lost load than purchase more capacity.

This is consistent with the Market Operator’s current approach to deriving the Reserve Capacity Target whereby AEMO calculates the “optimum” amount of capacity assuming the cost of capacity equates to the Benchmark Reserve Capacity Price.²⁵ If AEMO assumed a higher capacity price the required reserve margin to optimise the requirement would be lower. This lower value is proposed to be the reserve capacity floor and will be calculated as the “optimum” amount of capacity assuming a price equal to the auction cap. Therefore, when auction prices are greater than the Benchmark Reserve Capacity Price, the auction will be allowed to clear at quantities less than the Reserve Capacity Target, but above the reserve capacity floor.

This approach is illustrated in Figure 3.1 below and is compared to the approach originally proposed in the December 2015 Position Paper.

²⁵ The optimum amount of capacity where an additional megawatt of capacity at the Benchmark Reserve Capacity Price would not reduce the value of lost load

Figure 3.1: Revised Approach to Auction Reliability Objective



Under the revised approach the Reliability Objective would be implemented as follows:

- The auction will be designed so that the Reserve Capacity Target (the optimum level of capacity) is associated with a price equal to, or near,²⁶ the Benchmark Reserve Capacity Price. This should ensure that, on average, the auction clears at the Reserve Capacity Target.

²⁶ Locking in the curve to be centred exactly on the Benchmark Reserve Capacity Price is not proposed at this stage. During calibration it may be found that such centring still results in an unacceptable number of instances where the auction under-procures and triggers a supplementary capacity process. In such circumstances, trading off slightly higher costs associated with the auction clearing, on average, above the optimal level to ensure less auction failures may better meet the reform objectives and principles

- A “reserve capacity floor” will be set at a level of capacity below the Reserve Capacity Target based on the reserve capacity price cap (indicatively set at 1.6 times the Benchmark Reserve Capacity Price).
- The auction will be allowed to clear at a level below the Reserve Capacity Target, but above, or equal to, the reserve capacity floor before triggering the backstop reserve capacity procurement process. This would enable the auction to under-procure relative to the Reserve Capacity Target when it is cost-effective to do so.

Recognising that a lower reserve margin is acceptable under high-priced conditions is consistent with capacity markets in other jurisdictions and consistent with the Market Operator’s existing approach. PJM and ISO-NE aim to meet their traditional planning reserve margin in most years and/or on average over many years, but they define a lower reserve margin as their absolute minimum acceptable.

The improvements of this revised approach compared to that proposed in the Position Paper are as follows.

- The capacity auction on average will procure an amount of capacity closer to the Reserve Capacity Target, in comparison with the previous approach where the demand curve was moved to the right resulting in the auction procuring on average more than the capacity target quantity. The new approach will result in a lower overall cost of capacity, due to a lower volume of excess capacity year to year.
- The new approach places more reliance on the capacity auction since under procurement would occur far less often than under the previous approach (one in every four years).

3.3 Rebalancing Auction

3.3.1 Rebalancing Auction in a Capacity Market

A rebalancing auction allows capacity providers that cleared in a base auction the opportunity to adjust their capacity position prior to the commencement of the delivery obligation.²⁷ For example, if a generator cleared in the base auction, but its project was subsequently delayed, a rebalancing auction would provide a mechanism for that facility to trade out of part, or all, of its delivery obligation. This ensures the capacity auction continues to meet the reliability objectives by replacing the non-performing capacity.

Rebalancing auctions can also be designed to allow the market operator to buy more capacity if forecasts increase, thereby allowing a second chance of procuring capacity through an auction before needing to revert to the backstop process.

Delivery of a value-reflective capacity price means the auction will markedly increase price responsiveness relative to the current Reserve Capacity Mechanism arrangements, meaning that the consequences of a resource cleared in the auction (three years ahead) not ultimately delivering that capacity are amplified. For example, if a new capacity provider does not deliver, or a generating facility suffers a catastrophic failure and cannot deliver, all other capacity providers are exposed to a suppressed price relative to the value they are providing. Consumers are also paying for capacity that is not contributing to the reliability requirement. Hence, the consequences of non-delivery could be substantial.

²⁷ A rebalancing auction should not be confused with a backstop procurement process. The backstop procurement process is used only when the reliability objective is not achieved

In the Position Paper the need for a rebalancing auction was discounted on the basis that it would add a level of complexity that is unwarranted at this time. The paper also acknowledged that the revised Reserve Capacity Mechanism performance penalty regime (for example, reserve capacity security and the refund regime) would cap the refund exposure for a facility to one year's capacity payment. As such, there would not be sufficient incentives for providers to participate in a rebalancing auction.

On further consideration, there is potential for market failure if the auction design does not ensure capacity paid for in the base auction is delivered in the delivery year. A rebalancing auction is also considered to be a useful mechanism to enable market participants to adjust their capacity positions in light of changed circumstances subsequent to the base auction.

A rebalancing auction has two important benefits:

- Enabling Trading Among Capacity Suppliers: In the base auctions, some suppliers commitments to providing capacity resources and other suppliers are unsuccessful (offering above the clearing price). After the base auction, conditions change, and it is possible some successful suppliers may find that the timeline for their project has extended or that their costs have increased, while unsuccessful suppliers could find that costs fall. Other suppliers who could not make a three-year forward commitment to enter the market may continue to seek opportunities to trade capacity, such as Demand Side Management providers.

A rebalancing auction permits both successful and unsuccessful suppliers to trade out their positions.

- Accommodating Changes in Load Forecasts: In the base auction, the Market Operator purchases sufficient capacity to meet its three-year forward demand forecast plus the required margin, subject to the shape of the demand curve. If the demand forecast changes, a rebalancing auction would allow the Market Operator to sell back "surplus" capacity if forecast demand falls, or purchase additional capacity to meet increases in forecast demand. In both cases, the quantity sold or purchased is governed by the shape of the demand curve (as used in the base auction). In the absence of a rebalancing auction, the Market Operator may end up paying for unneeded capacity, or forego an opportunity to obtain additional capacity to meet an unexpected increase in demand.

The Public Utilities Office now proposes to include a rebalancing auction into the auction design.

3.3.2 Rebalancing Auction Operation

It is proposed that the rebalancing auction will accommodate two transaction types:

Type 1: Capacity purchases by suppliers who have committed to a forward capacity supply obligation (that is, they have been cleared in a base auction) but will not be available to supply their obliged capacity. These suppliers who know they will be unable to provide capacity in the delivery year will need to buy replacement capacity from other suppliers with incremental supply that did not clear or was not offered in the base auction (that is, be obligated to participate in the rebalancing auction).²⁸

Unless the risk to the participant of not participating in the rebalancing auction is substantial, they may choose to be “optimistic” about their chances of providing capacity and risk not participating. Strong incentives for a provider that is cleared in the base auction, but subsequently not able to meet the delivery commitment to participate in the rebalancing auction, are required (as discussed below).

For Type 1 transactions, only those parties who participate to the rebalancing auction are exposed to the rebalancing price.

Type 2: Capacity purchases and sales by AEMO (on behalf of all load) when the load forecast changes or if supply availability changes. AEMO would need a mechanism to be able to buy capacity if it subsequently becomes short of capacity, or to re-sell capacity when it turns out to be long (surplus capacity). This would expose retailers and any suppliers that have cleared in the base auction to the rebalancing auction price, with this effect being limited to the quantity that clears in the rebalancing auction.

The proposed approach is to hold a single rebalancing auction one year before the delivery year, consistent with Ireland’s proposed market design. The PJM and ISO-NE hold multiple reconfiguration auctions – two years, one year, and immediately before the delivery year. Due to the small size of the South West Interconnected System, the complexity of holding three rebalancing auctions is not warranted.

3.3.3 Incentivising Participation in the Rebalancing Auction

Resources cleared in a capacity auction effectively enter into a contract with AEMO to make a resource available three years hence. This parallels commodity markets where participants make forward delivery commitments to be met by either making physical delivery or trading out of a position before the delivery time. All forward exchanges have very powerful delivery mechanisms, such as ongoing credit postings to meet changes in the forward price.

If resources cleared in the base auction were paid immediately after the auction cleared with no later mechanism to enforce delivery, the auction would be a failure: “phantom” resources with no intention of actual delivery could participate on an equal footing with “genuine” resources. These phantom resources would crowd out genuine resources that have a much higher probability of being delivered (since the phantom resources presumably have lower costs) and could result in the auction clearing insufficient “genuine” capacity, threatening supply reliability and market stability.

²⁸ This will likely be a civil penalty provision. The Public Utilities Office is also investigating whether director duties can be leveraged to increase the reliability of this mechanism

Imposing sharp penalties on suppliers who do not deliver their contracted supply is one way to discourage phantom resources. However, the existing penalty mechanisms do not appear to be sufficient to:

- discourage phantom resources because existing penalties do not exceed a resource's maximum annual capacity payment; and
- incentivise a supplier that cleared in the base auction but does not expect to be available to use the rebalancing auction to replace itself.

The current Reserve Capacity Mechanism arrangements incorporate two broad performance incentives to ensure capacity is delivered as contracted. For real-time delivery, the reserve capacity refund regime ensures capacity is charged a penalty for non-performance directly related to the quantity of capacity in the market at that time (Dynamic Refunds). Secondly, to ensure commitments to bring new capacity to market are adhered to, new capacity providers are required to lodge a security deposit with AEMO (Reserve Capacity Security). The bond is forfeited if a facility does not meet certain performance standards.

Under current arrangements, in 2015, if there had been no excess capacity, but a similar volume of outages (proportionally a much larger outage share of total capacity), a participant would have repaid only 50 per cent of annual capacity payments if its facility was unavailable for the whole year.²⁹

The Public Utilities Office is concerned about the potential for speculative offers into the base auction allowing parties to “arbitrage”. Leaving Reserve Capacity Mechanism performance incentives at current levels following establishment of a rebalancing auction, would mean that a capacity supply obligation in the base auction will carry asymmetric risk/reward – if the rebalancing price is lower than the base auction capacity price then a resource that could not deliver could simply sell its forward obligation for a profit. However, if a rebalancing capacity price was to be higher than the base auction price, such a resource could opt not to buy out of its position, not perform and lose only the base price capacity payment through the Capacity Refund mechanism.

The resource would effectively have a free option to “put back” (or “get out of”) its capacity obligation at the base auction clearing price. This asymmetric risk/reward may encourage participation by resources that expect not to be able to deliver and, more fundamentally, could lead to participants setting the level of their offers in a way that ignores their knowledge about their ability to deliver, an inefficient result.

To avoid a market distortion of this nature, enhanced performance incentives are required.

3.3.4 Performance Incentives

The Public Utilities Office considers that a resource cleared in a base auction, and that is likely to be unable to deliver, should be exposed to the one-year ahead rebalancing auction price. If no supply is available, the supplier would pay the auction price cap. If the supplier is not exposed to penalties for non-delivery that are at least as great as the auction price cap, they will not be incentivised to participate in the rebalancing auction. As a reference, in PJM the performance incentives are capped at the auction cap in that market.

²⁹ Dynamic capacity refunds introduced as part of the Reserve Capacity Mechanism transition reforms

While in theory an “efficient” penalty amount would be related to the cost imposed on the system by non-delivery, in practice it is very complicated to assess these potential costs.

Increased penalties may escalate offers in the auctions, which could result in making clearing prices higher. However, capacity providers with a low risk of non-delivery will not expect to pay penalties with any substantial probability, and will therefore not need to materially increase their bid prices for capacity offers. In contrast, owners of unreliable resources will see a substantial exposure to paying a penalty, and therefore need to escalate their offer prices.

This would likely be a desirable outcome as increased offer prices for resources with lower reliability will mean they have a reduced probability of clearing in the auction. Nevertheless, the penalty must be high enough to avoid market failure by non-delivery, but not overly high so as to unduly increase the capacity price.

The Public Utilities Office will assess the specific levels of the penalty regime in light of the following objectives/principles:

- performance incentives need to be reflective of the market value of the capacity that has not been delivered;
- capacity cleared in the base auction should either deliver in the relevant capacity year or is incentivised to purchase replacement capacity from the rebalancing auction;
- increases in performance incentives should not disproportionately affect energy providers relative to capacity providers (for example, it may be possible to increase the maximum refund factor at times of system stress but lower the refund factor floor to zero, or near zero, at times of system surplus); and
- ensure, where possible, that costs to capacity providers are kept as low as possible (for example, reserve capacity security should only be held for capacity providers that have a reasonable likelihood of non-delivery).

4. Market Power Mitigation Regime

4.1 Background

This section of the report outlines the market power mitigation component of the capacity auction design. The need for market power controls in the capacity auction is discussed followed by details of the options available to mitigate supplier-side and buyer-side market power. The different mitigation techniques are categorised as either stringent or flexible, and also as either administratively complex or administratively simple.

The fit-for-purpose approach to be adopted in the Wholesale Electricity Market is detailed with the supporting rationale for its implementation. The selected market power regime draws on the mitigation techniques used for capacity auctions in other jurisdictions which are also discussed.

In a perfectly competitive capacity auction, all resources would offer their available capacity at their incremental cost of providing that capacity; that is, at their avoidable fixed costs not likely to be covered by net revenues in the energy and ancillary services markets. Competitive suppliers would offer this way because offering at lower prices would risk clearing at a below-cost price, and offering at higher prices would risk not clearing when profitable.

Auction clearing prices would reflect the cost of the marginal resource, such that all other cleared resources would have lower costs, and uncleared resources higher costs. The auction would thus procure enough capacity to meet demand using only the set of resources with the lowest cost-based offers. This is economically efficient, both in a static sense, and in a dynamic sense by rewarding suppliers that find ways to produce capacity at continually reducing costs.

In an uncompetitive auction, however, suppliers would have an incentive to offer above (or below) their actual costs to influence prices. Such an auction may not select the least-cost set of resources and prices would differ from the competitive market outcome.

Capacity markets are structurally uncompetitive due to the large upfront capital cost, the lumpy nature of investment as well as the underlying characteristics of the broader electricity market in which they operate. This means that capacity markets can be susceptible to the exercise of market power. In their simplest form, capacity auctions procure a fixed quantity of supply required to meet a reliability requirement. The demand curve is vertical and highly inelastic. The supply may also be highly inelastic, particularly if the auction is held close to the delivery year when suppliers have already made their investment decisions and cannot readily bring additional resources online.

Inelastic demand combined with inelastic supply provides the perfect conditions for even small market participants to exercise market power (unless there is a large amount of excess supply, a condition which is unlikely to persist). Withholding a fraction of a supply portfolio could drive the price to the cap and benefit the rest of the portfolio. The economic consequences for consumers can be profound, since a whole year's worth of capacity is transacted in a single auction.

Well-conceived capacity market design can reduce susceptibility to the exercise of market power. A gradually downward sloping demand curve (as is contemplated for the Wholesale Electricity Market) is more elastic and moderates the relationship between changes in quantity and price. Nevertheless, such an auction demand curve is still fairly steep and marked price movements can result from small deviations in supply.

The use of forward auctions can also moderate the ability to exercise market power. As is proposed for the capacity auction design, both PJM and ISO New England hold base auctions three years forward to increase the amount of potential new supply that can compete. However, while this arrangement will ameliorate market power, it is not in itself a sufficient control measure. This is because the forward period excludes active participation in price setting by new entry that is economic but only feasible to build under longer timeframes. Further, the threat of new entry also only disciplines the market to offer below the competitive cost of new entry; it does not force a competitively low price when the market has excess capacity and new entry is not economic or credible.

For these reasons, a rigorous market power mitigation regime is featured in all capacity auctions. US capacity markets are extensively mitigated and there is comprehensive regulation in the UK and Ireland markets. There is little debate in these capacity markets about the need for mitigation, only about the specific applicability.

The US markets also recognise the threat of market manipulation is not limited to the supply side of the market. The buyer side of the market has incentive to manipulate prices downward by subsidising excess, uneconomic capacity to enter the auction as a price taker. For example, a large retailer may have an incentive and ability to subsidise new entry to suppress the auction price. Several US State authorities have considered such schemes on behalf of their constituents, and the Federal Energy Regulatory Commission has imposed buyer-side mitigation rules to prevent such action.

Buyer side market power mitigation rules are seen in the US capacity markets as being critical for maintaining market efficiency and supporting investment. Without such rules, investors see risks that future prices could be depressed below the competitive levels consistent with fundamentals.

A robust market power mitigation regime is an important component of the capacity auction design in Western Australia. The Western Australian capacity market design will have features that reduce the risk of manipulation, including a downward-sloping demand curve and forward auctions. However, market supply is particularly concentrated, with the largest eight suppliers making up 90 per cent of total supply, and Synergy alone representing over 50 per cent share of total supply (with at least a further 20 per cent contributed from suppliers that have a contractual relationship with Synergy).

4.2 Supply-side Market Power

A market participant is considered “net-long” if its physical ownership and contracts position the entity to sell more capacity into the auction than it purchases, such that the participant benefits from increased auction clearing prices. In contrast, loads and any other market participants with net-short positions are harmed by inflated prices.

Market participants with net-long positions have an incentive to increase prices by:

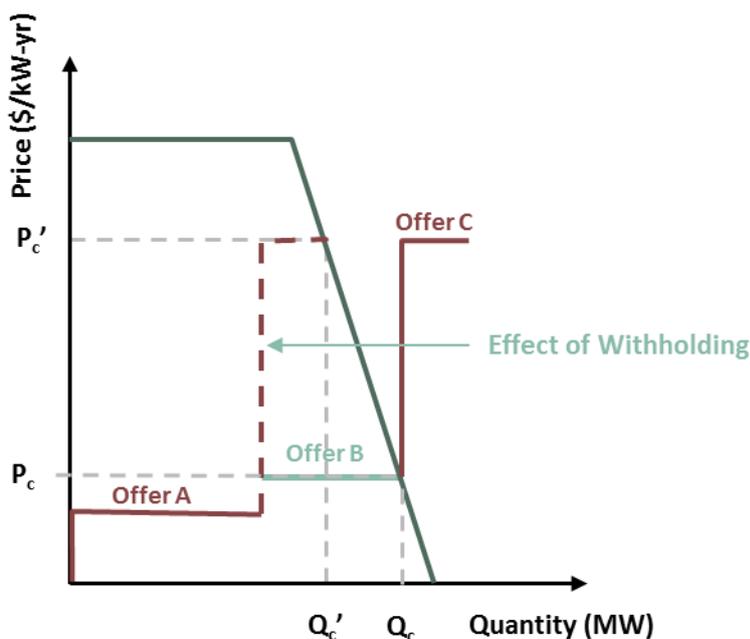
- **physical withholding:** constraining the amount of capacity that is offered to the market; and/or
- **economic withholding:** offering capacity at prices above the true cost of the resource.

4.2.1 Physical Withholding

“Physical withholding” benefits participants that have a net-long position if the reduction in revenues from the withheld resource is more than offset by increased revenues to the supplier’s other resources or contracts long to the price.

Figure 4.1 illustrates the effect of physical withholding on the market. In the example, Offer B is withheld from the market by uneconomically retiring or mothballing a unit, shifting the supply curve to the left. As a consequence, Offer C clears the market at a lower total quantity (Q_c') and a higher price (P_c'). This withholding would benefit a market participant that submitted both Offer A and Offer B, as the increased price received by Offer A more than offsets the reduction in revenues caused by Offer B not being accepted.

Figure 4.1 Effect of Physical Withholding



Physical withholding can take several forms:

- **Withholding an operationally capable resource from the capacity auction:** suppliers could try to keep a resource operationally capable to participate in energy and ancillary services markets but exclude it from the capacity auction to inflate capacity prices.
- **Strategic mothballing of existing resources:** suppliers could attempt to temporarily mothball an economic resource for a short-term increase to capacity prices. Furthermore, suppliers may try to maximise the effect by strategically timing announcements of mothball decisions to give little forewarning to other market participants before an auction.
- **Strategically retiring existing resources:** suppliers may attempt to permanently retire a resource to increase capacity prices, similar to the uneconomic mothballing of a resource. Unlike mothball decisions, however, manipulating prices by deciding to irreversibly retire an asset carries natural disincentives.

To prevent physical withholding, many markets impose a “must offer” requirement on all existing generation resources. The Reserve Capacity Mechanism auction design will require that all existing capacity providers offer all capacity resources into the auction. Must offer obligations, however, do not remove the risk of economic withholding.

There could be valid reasons for withholding capacity from a market, such as taking capacity offline temporarily for a major overhaul or permanently retiring an uneconomic resource that would need prohibitively costly retrofits to comply with new environmental or other performance regulations. These cases may be addressed through individual reviews to ensure the competitive economic legitimacy of such decisions.

4.2.2 Economic Withholding

“Economic withholding” refers to offering capacity into the market at an inflated, high price so that most, but not all, of the capacity will clear. Figure 4.2 illustrates two ways where economic withholding can distort market outcomes. In both examples, Offer B is offered at an inflated price, increasing the market-clearing price and distorting market outcomes. In Example 1, Offer B is the marginal offer and clears at a higher price (albeit with a small overhang such that not all of the capacity clears).

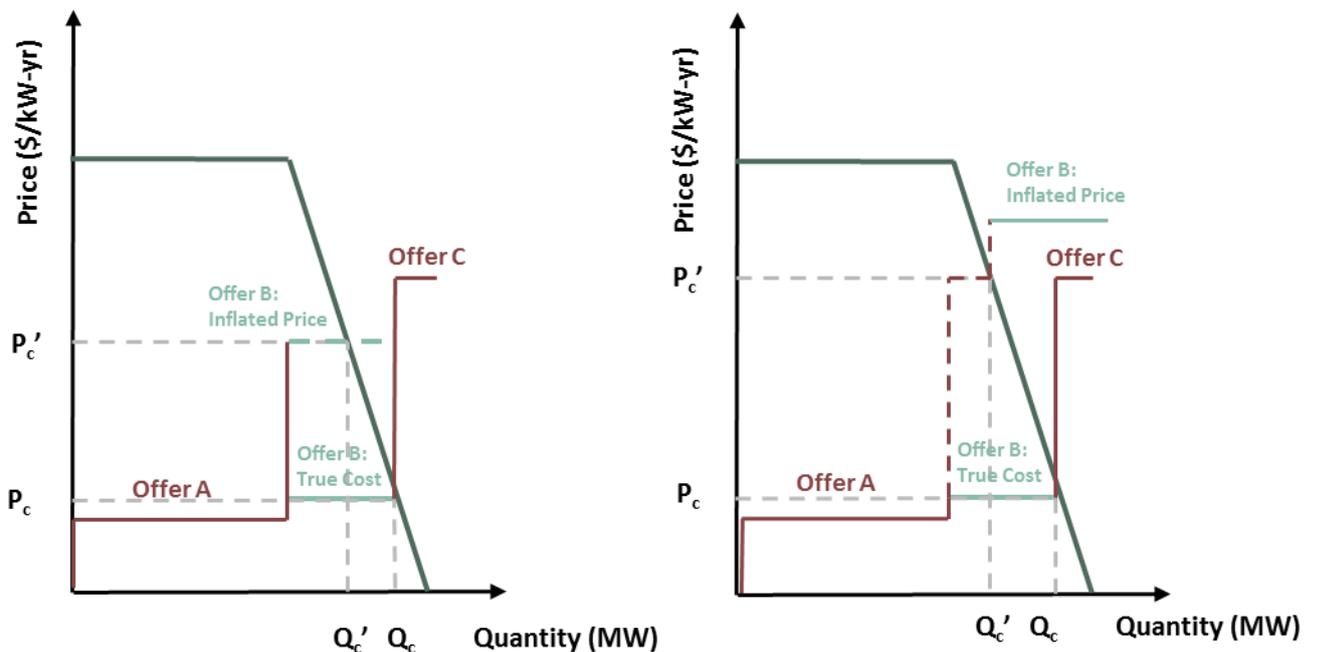
Both Offers A and B receive a higher market-clearing price P_c' , and the total quantity procured falls slightly to Q_c' . The resource owner associated with Offer A is clearly better off. The owner of the resource associated with Offer B also benefits if the lost profits from the capacity not cleared ($Q_c - Q_c'$) are less than the additional profits made from the capacity that clears at the higher price.

In Example 2, Offer B offers at an even higher inflated cost. As a consequence, Offer B does not clear, but Offers A and C clear at Offer C’s price, P_c' . This would be unprofitable for the owner of the resource associated with Offer B, but the participant could benefit from this situation if it also owned the resource belonging to submitted Offer A.

Figure 4.2: Effect of Economic Withholding

Example 1: Offer B Clears at Higher Price

Example 2: Offer B Does Not Clear

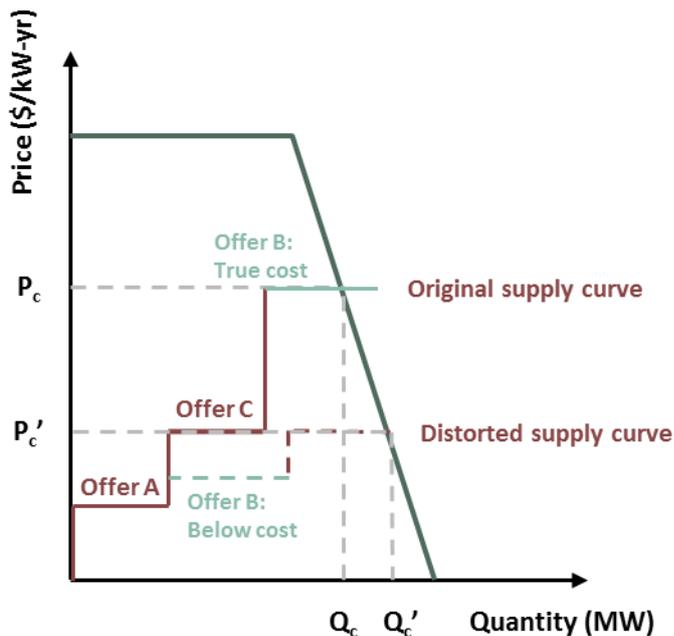


4.3 Buyer-side Market Power

Buyer-side market manipulation refers to efforts by market participants to artificially suppress capacity market prices by offering supply at below cost. Market participants with net-short positions have an incentive to suppress prices.

Net-short participants, typically retailers, procure more capacity credits than they sell through physical and financial positions. Capacity suppliers that have net-long positions are harmed by buyer side manipulation.

Figure 4.3: Effect of Suppressing Offers below the Competitive Level



Price suppression by retailers or governments (for example, through subsidisation of new entrants) undermines investor confidence and threatens the market's ability to attract and retain supply. While all US capacity markets have rigorous mitigation regimes, the UK and Ireland markets have decided not to implement buyer-side mitigation rules. In Ireland, the decision not to implement a price floor to mitigate buyer-side manipulation was justified by claiming such a floor could increase prices, and that any such manipulation would be subject to wider anti-manipulation rules and competition law provisions.

Although mitigation is important, over-mitigating buyer-side manipulation also carries risks. Mitigation must recognise that the majority of capacity resources are built for reasons other than price suppression.

4.4 Market Power Mitigation Design Objectives

Good market design, including that for a market power mitigation mechanism, must be premised on clear objectives. The primary objective of capacity-related market power mitigation is to promote the efficient outcomes that a perfectly competitive market would achieve, by *ensuring that suppliers offer their capacity at cost*, as they would in a competitive market.

Achieving this objective is complicated because the market monitor or regulator lacks perfect information. The market monitor particularly lacks clarity as to each supplier's actual costs of providing capacity. Even with access to this information the monitor would face challenging questions such as:

- Which costs are fixed and which are variable (and covered by energy payments)?
- Which fixed costs are avoidable by not providing capacity?
- What capital expenditures will be needed and how are they best amortised over the remaining life of the equipment?
- How much net revenue is expected to be earned in energy and ancillary services markets or elsewhere, reducing the cost recovery needed from the capacity market?
- What risks/penalties does the supplier face by taking on a capacity supply obligation?
- What is the market participant's net capacity position (which affects the incentives of the market participant)?

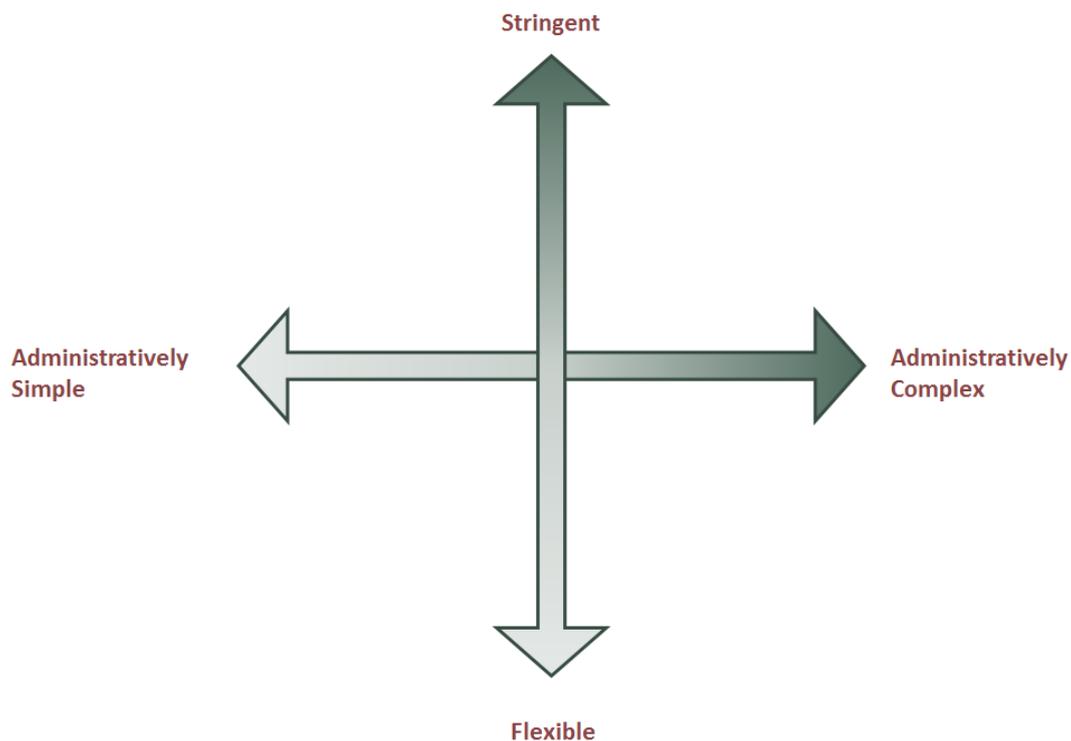
With these information challenges, market power mitigation is prone to imprecision and can never perfectly replicate a competitive market outcome. Realistically, a market power control regime should therefore be designed to:

- incentivise and promote cost-effective market outcomes;
- limit the risk of under-mitigating;
- limit the risk of over-mitigating; and
- avoid creating excessive administrative burdens or non-transparent process.

As there are tensions between each of these objectives, a trade-off is required in selecting the preferred approach. In respect of this trade-off, any potential mitigation regime essentially belongs in one of four quadrants (see Figure 4.4).

1. Stringent and administratively simple.
2. Stringent and administratively complex (heavy handed).
3. Flexible and administratively simple (light handed).
4. Flexible and administratively complex.

Figure 4.4: Market power mitigation regime quadrants



The discussion below applies this quadrant approach to prospective design options.

Under-mitigating can clearly result in economic inefficiencies and distorted pricing outcomes. Over-mitigating can impose risks on suppliers by forcing offers that do not reflect actual costs, or by exposing them to future market prices set by other resources that are over-mitigated. Excessive administrative burdens are also a hazard, although capacity markets involve infrequent transactions to monitor, compared to energy markets.

A capacity market power mitigation regime should therefore be tuned to strike a balance. The regime should not be so aggressive as to create unnecessary administrative overlay on the market and risk substantial over-mitigation, nor should it be so weak as to substantially under-mitigate and thereby undermine market confidence and compromise price outcomes for electricity consumers. Over time, the initial tuning can be adjusted as the capacity market matures, in response to any abnormal, or lack of abnormal, behaviour.

4.5 International Review

International jurisdictions with capacity auctions apply market power mitigation before the auction occurs, a practice referred to as ex-ante mitigation. Unlike the energy market in the Wholesale Electricity Market, where mitigation is applied ex-post, it is critical that capacity market mitigation be largely conducted before the auction is held (that is, ex-ante).

As auctions are conducted annually and capacity markets are structurally uncompetitive, the financial implications from a single auction are manifest, and manipulation can cause irreversible outcomes such as resource construction decisions³⁰.

³⁰ Due to the concentration of the majority of capacity amongst a small group of market participants

The annual auction process timeline provides the opportunity for control measures to be established in the lead-up to the auction, giving participants some certainty and limiting undue delay to the auction clearance process (against the alternative of detailed and time consuming ex-post investigation of offers).

Research on market power control regimes in overseas capacity markets has identified three common steps to the design of ex-ante controls.

1. **Determination of the participants deemed to have market power (Exemption and Assessment Test).** Mitigation efforts should only focus on the market participants with the ability and incentive to exercise market power. A test is often used to determine the participants that have market power with the type of assessment varying across jurisdictions. Furthermore, certain resource types may be automatically exempt from mitigation. (Most jurisdictions exempt new entrants from supply-side mitigation and existing resources from buyer-side mitigation).
2. **Establishment of the offer thresholds for triggering mitigation (Threshold Test).** Mitigation should be limited to resources that are deemed likely to make offers that deviate from competitive levels. Triggers for mitigation may include offer caps for supply-side mitigation and offer floors for buyer-side mitigation. How loosely or tightly to set mitigation triggers is a matter of market design, trading off the risks of under- versus over-mitigation.
3. **Establishment of a process for reviewing and mitigating offers.** Market participants should have a clear understanding of how offers that trigger mitigation will be treated. In some capacity markets, suppliers are given an option to have a “flagged” facility offer/s mitigated to a generic offer cap (or floor for buyer side mitigation), or to engage with the regulator to establish a specific cost-based offer cap for their unit. This is discussed further below.

Table 4.1 summarises the market power mitigation approaches in overseas capacity markets.

Table 4.1: Characteristics of Market Power Mitigation Approaches in International Capacity Markets

	PJM	ISO-NE	NYISO	UK	Ireland
Supply-Side Mitigation					
Must-offer obligations	Yes, for capacity and energy markets, unless the supplier can prove that a unit is physically or contractually unable to supply	Yes, for both the capacity and energy markets, unless the supplier submits a de-list (retirement) bid	Pivotal suppliers must offer into the capacity and energy markets. Proposals to derate, retire, or remove capacity are reviewed if NYISO finds they may affect clearing prices	Most units must obtain approval to opt out of the market	Yes, unless the unit applies for retirement; intermittent generators are not exempt from market power mitigation rules, but are not required to participate

	PJM	ISO-NE	NYISO	UK	Ireland
Triggers for market power mitigation	Three Pivotal Supplier test	Pivotal Supplier Test	Pivotal Supplier Test	No trigger, offers are always mitigated	No trigger, offers are always mitigated
Exemptions	Demand-side resources, new resources	New resources		Demand-side resources, new resources	Demand-side resources, new resources
Use of no-look thresholds below which offers are automatically accepted?	Yes. Previously based on estimated avoidable costs for various technology types (now, with Capacity Performance in place, it is 85% of Net CONE ³¹ for all existing supply)	Yes. For mitigation of de-list bids, termed the “Dynamic De-List Bid Threshold”	Yes. Based on the higher of the projected clearing price or the unit’s going-forward costs	Yes, existing units must bid below a cap of ~50% Net CONE	Yes, existing resources must offer below the Price-taker offer cap
Mitigated to no-look threshold or unit-specific cost estimate?	Either. Suppliers may apply for an alternative cap based on either opportunity cost or unit-specific avoidable costs.	Mitigated to calculated cost-based offer	Either. Suppliers may attempt to show that going forward costs or opportunity costs are higher than those used by the market monitor.	Either. Existing offers above cap mitigated to the cap of ~50% Net CONE, but can apply to instead be subject to unit specific cap.	Mitigated to unit-specific cost estimate at discretion of system operator.

³¹ Net CONE is the Net Cost of New Entry for a capacity resource and is calculated as the money required by a proponent from the capacity market to make the project viable after netting off expected revenues in the energy and ancillary services markets

	PJM	ISO-NE	NYISO	UK	Ireland
Additional penalties for withholding			Suppliers face an ex-post deficiency penalty charge (greater than 100% of capacity auction revenues) for failure to offer their full available capacity		
Buyer-Side Mitigation					
Established mitigation process?	Yes	Yes	Yes	No	No
Exemptions	All existing resources except uprated or repowered facilities; merchants and utilities with a balanced load and generation base. PJM is discussing ways to apply market power mitigation to existing resources that are subsidised	All existing resources; renewable resources up to 200 MW per year ³²	All existing resources, merchants, and Special Case Resources (including Demand Response). NYISO may exempt other resources based on forecast capacity prices and Net CONE		

³² New England stakeholders are currently discussing modifications as part of its process to incorporate clean energy policies into market rules

	PJM	ISO-NE	NYISO	UK	Ireland
Mitigated offer prices	Mitigated to 100% of the estimated Net CONE by technology type, adjusted for the specifics of each resource	Mitigated to 100% of the estimated Net CONE by technology type, adjusted for the specifics of each resource (using a published capital budgeting model)	Mitigated to the lesser of 75% of the Mitigation Net CONE or the Unit Net CONE for the facility's first delivery year		

These overseas regimes are further discussed below.

4.5.1 Exemption and Assessment Test

There are two broad techniques used in other jurisdictions for assessing when a supplier should be subject to potential mitigation:

1. **UK and Irish Approach:** the UK and Irish markets categorise capacity providers into one of two categories - either a “price-taker” or a “price-maker”. Price-takers comprise all existing facilities, as they are effectively deemed to have market power and therefore subject to potential offer mitigation. Price-makers are exempt from offer caps and are allowed to bid anywhere up to the market cap.
2. **US Approach:** only participants with the *ability* to alter the capacity price are subject to potential mitigation. This ability is determined for each capacity resource by a “pivotal supplier test”, which assesses whether the auction could clear without that supplier’s participation.

Both the UK and US markets have exemptions from mitigation that generally apply to new facilities and demand side management.

- **New facilities:** because, prior to commitment, new capacity resources do not have a must offer obligation and can elect not to enter the market, it is not suitable for the new entrant to be forced to build below a particular price. Also, mitigating new entrants would reduce the reason for having a market price cap.
- **Demand side management:** these facilities are usually exempt from mitigation because determining a price cap for demand side programs is highly challenging. Such resources are often offered into the auction on promises to contract with loads and do not have reliably discoverable costs against which to calculate a cap.

4.5.3 Offer Thresholds

For those suppliers deemed subject to mitigation, the UK and US jurisdictions only mitigate those offers exceeding a threshold price. Approaches differ in setting the thresholds and whether or not they vary by technology. Such thresholds are referred to as “no-look” thresholds, as resources offered below the threshold are not reviewed by the regulator. Resources offered above the threshold are subject to offer caps (usually either a generic or facility specific cap).

Both the new UK and Ireland markets have adopted a single offer threshold for all facilities. The UK market has set an offer threshold based on the expected price that 80 per cent of market capacity resources require to recover avoidable costs (net of expected energy and ancillary services revenue). Such a threshold (compared to the US approach outlined below) means a reduced need for regulator intervention with participant offers, but runs the risk of resulting in prices exceeding value reflective levels if market power is abused. A single offer threshold also has the risk of becoming a soft floor in the auction.

In contrast, the New York market (and PJM until recently) involves different thresholds for different technology types (calculated by the market monitor)³³. For example, there are thresholds specific to each of coal generators, combined cycle generators and open cycle gas turbines. This approach aims to achieve more cost-reflective mitigation at different points along the price/offer curve. However, it also requires the market monitor to determine net expected revenues in energy and ancillary services markets or elsewhere.³⁴

4.5.4 Process for Reviewing and Adjusting Offers

Once a specific resource has been flagged for mitigation, with an offer above the relevant threshold, the regulator must review and possibly mitigate the offer. This is typically done in one of two ways.

1. Offers are mitigated to the no-look threshold price.
2. Offers above the no-look threshold price are mitigated separately to an individual cost-based offer, based on cost data provided by the resource owner and cost calculations performed by the regulator or an independent party.

All the jurisdictions reviewed also allow a facility operator to *choose* to provide data to the regulator in order to negotiate a facility specific mitigation offer level. This arrangement requires criteria to be used by the regulator to assess requests.

Where a participant deemed to have market power does not choose to provide data to the regulator, and the relevant facility offer is above the relevant threshold, the offer is mitigated to the threshold by the regulator or market operator prior to the auction clearing.

³³ PJM recently changed the “product” provided through the capacity auction from the traditional capacity product to a bundled product that is mostly a forward sale of capacity and energy at scarcity pricing. Therefore, the price offered by all participants is more generic. For this and other reasons PJM has now moved to a single no-look threshold for all existing facilities

³⁴ Because these revenues reduce the cost-recovery needed from the capacity market

4.7 Reserve Capacity Mechanism – Supply Side Market Power Regime

The various mitigation techniques have been categorised as per the classifications outlined in Section 4.4 to illustrate the inherent trade-offs required in determining a suitable regime for the Wholesale Electricity Market. The shaded entries in the tables below are the mitigation elements the Public Utilities Office has adopted, and reflects that the best approach represents a hybrid of measures adopted elsewhere.

The supply-side market power control process is also illustrated in a flowchart at Figure 4.5.

Table 4.2: Possible approaches to market power mitigation – Stringent versus flexible techniques

Stringent Techniques	Flexible techniques
All existing generation capacity must offer into the auction	The capacity auction is optional for all capacity providers
All offers from existing generation capacity resources are subject to mitigation measures	Only participants with ability and incentive to alter the capacity price are subject to mitigation measures
Technology specific no-look thresholds	Single no-look threshold for all technology types
Do not allow resources to apply for unit specific threshold	Allow resources to apply for unit specific threshold
If mitigation is required, offer prices mitigated to technology specific thresholds (unless there is a unit specific threshold in place)	If mitigation is required, offer prices mitigated to no-look threshold (unless there is a unit specific threshold in place)

Table 4.4.1: Possible approaches to market power mitigation – Administrative ease

Administratively simple	Administratively complex
All offers from existing generation capacity resources are subject to mitigation measures	Only participants with ability and incentive to alter the capacity price are subject to mitigation measures
Single no-look threshold for all technology types	Technology specific no-look thresholds
Do not allow resources to apply for unit specific threshold	Allow resources to apply for unit specific threshold
If mitigation is required, offer prices mitigated to no-look threshold (unless there is a unit specific threshold in place)	If mitigation is required, offer prices mitigated to technology specific thresholds (unless there is a unit specific threshold in place)

The primary feature of the supplier side mitigation regime is the adoption of a single no-look threshold for all existing resources to allow for limited regulatory intervention.

Further, to avoid the potential for resources to be forced to bid below actual avoidable costs and allow efficient signalling for entry and exit of facilities, the auction design will allow resources to apply for exemption from the generic “no-look threshold” by seeking approval of a facility specific offer cap.

The no-look threshold would be set at a level that is:

- high enough that offer's from most existing resources fall below the threshold price, and are not mitigated, and can therefore not unduly affect the market price; and
- low enough that some existing resources (for example, resources with high fixed avoidable costs), and all new resources (including very cheap new resources), are above the threshold, so that the market can signal efficient exit and entry.

Determination of the initial level of the no-look threshold will be challenging and likely to be less reliable without access to auction offer data. The threshold should therefore be periodically reviewed and refined with increased access to cost information as auctions are conducted.

The market rules will need to provide some guidance to the regulator regarding the determination of the no-look threshold and the calculation of unit-specific caps.

The rationale for the supply-side market power mitigation approach has been based on the following considerations.

- The risk that manipulation of auction outcomes could reduce the confidence of market participants and have a major effect on capacity prices – this consideration has influenced the recommendation for a more conservative market power mitigation design.
- Concentration of capacity in the market would result in the majority of market participants failing any pivotal supplier tests. Hence, a pivotal supplier test for the capacity auction in Western Australia is essentially redundant and would add unnecessary complexity.
- Lumpiness of the capacity market and the small size of the market mean that most participants would have the ability to influence the capacity price.
- Over time, the mitigation measures can be adjusted if they are found to be too stringent.

Demand Side Management capacity is generally exempt from mitigation in other markets for the following reasons.

- It is very difficult to determine a technology or facility specific cap for Demand Side Management capacity and so the risk of over-mitigation is unfairly large compared to other capacity providers.
- Loads that comprise demand side programs are almost always net-short on capacity, with no incentive to increase the capacity price.

Given low load growth forecasted in the Wholesale Electricity Market over the medium term, it is likely that Demand Side Management capacity resources will often be the marginal supplier in this market. It is also possible that aggregators or large Demand Side Management capacity providers could have an incentive to withhold resources.

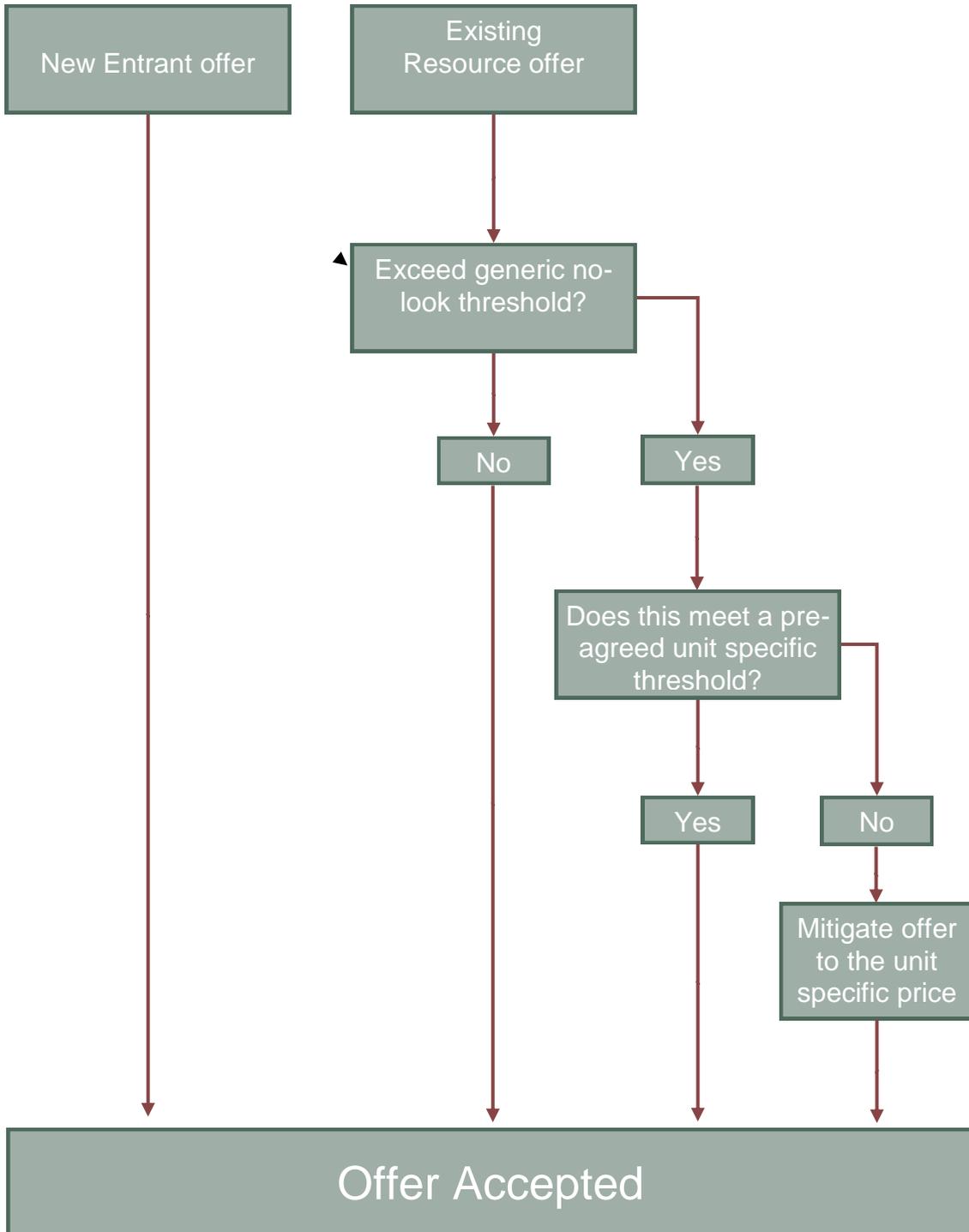
A more stringent approach to the mitigation of potential market power exercised by Demand Side Management resources in the Wholesale Electricity Market is therefore likely to be required (as compared with the practice in other larger capacity markets). The intention is that the potential for Demand Side Programmes to artificially raise the capacity price above competitive levels should be further assessed and will likely require development of specific mitigation measures.

There are challenges to establishing a workable mitigation regime for Demand Side Programs³⁵ and the Public Utilities Office has not yet determined a specific approach in this regard. This matter will be discussed with the Reserve Capacity Mechanism Consultation Group during 2017 prior to determination of an approach.

³⁵ As referred to in the Wholesale Electricity Market rules

Figure 4.5: Reserve Capacity Auction Supply-side mitigation flow-chart

Supply-side Mitigation Process



4.8 Reserve Capacity Mechanism – Buyer-side Market Power Regime

To avoid over regulation stifling the competitive forces within the capacity auction the Western Australian capacity auction will not implement buyer-side mitigation. This effectively means all new entrant capacity is free to offer into the capacity auction at a price of their discretion.

It is considered it would be exceptional for a supplier to enter the capacity auction with the intent to manipulate capacity prices lower. Additionally, as outlined in section 5 of this paper, the Economic Regulation Authority is required to monitor and report on each annual auction process in addition to its existing report on the performance of the Wholesale Electricity Market generally. During this review the regulator would naturally assess if a facility is attempting to manipulate the capacity price. In the unlikely event this review identifies a future requirement for a buyer-side market power regime the capacity auction rule change process (see section 5.2) will allow the introduction of necessary measures in time for the subsequent capacity auction following the review.

5. Auction Governance and Process

5.1 Background

This section outlines the high level administrative and governance framework for the capacity auction, and the roles and functions that have been allocated to particular market entities.

Governance and administration of a capacity auction can be grouped into three high-level functions:

- establishing capacity market rules and subsequently modifying those rules;
- conducting the auction each year; and
- monitoring auction outcomes.

While the Wholesale Electricity Market Rules currently provide for a capacity auction to be undertaken, there are no provisions in the rules regarding the administration and governance of an auction process. Hence, the auction design needs to comprise an administration and governance regime.

AEMO is considered best suited to hold responsibility for conducting the auction, with the Economic Regulation Authority having responsibility for regulatory oversight (including monitoring and compliance).

5.2 Establishing and Modifying Capacity Auction Market Rules

Market rules serve as the foundation for any capacity mechanism. The Public Utilities Office must develop the initial capacity auction related market rules (to be contained within the Wholesale Electricity Market Rules), to be implemented through the proper regulatory and administrative processes.

The rules will need to cover all aspects of the implementation and management of the capacity market/auction.

- **Resource Qualification:** What will be the performance and prudential requirements for existing and new resources that wish to participate in the capacity market?
- **Offer Requirements:** What information must participating resources provide as part of their capacity auction offer? When must offers be submitted?
- **Auction Parameters:** What parameters must be established before each annual auction?³⁶ How and when will this information be released to market participants and the public prior to the auction being held?
- **Auction Operations:** Which entity should conduct the auction, including receiving offers, clearing the market, and publishing auction results? What is the timing of the process?
- **Data Publication:** Which organisations should be responsible for publishing and archiving auction results and other relevant information? What information is to be made public?
- **Market Monitoring:** Which entity/entities should be responsible for monitoring the capacity market, including monitoring of and reporting on the auction process?

³⁶ The initial auction parameters will be set in the Wholesale Electricity Market Rules.

A design question is whether capacity market related rule-making should follow the existing mechanisms for all Wholesale Electricity Market Rule changes or, rather, be subject to its own process. Using the same general rule-making process can provide advantages by reducing regulatory complexity. In PJM, changes to the capacity market rules are handled in the same manner as changes to any other market rules.

However, in the relatively new UK market, the capacity market rule-making process has a discrete process and timeline. Responsibility for managing the UK capacity related rule amendment process rests solely with OFGEM, whereas other rule amendments involve multiple organisations.³⁷

Timing of the UK capacity market rule-making process is also distinct from other rule processes. OFGEM only considers rule change proposals between September and January, and releases final rule changes prior to the subsequent auction (usually conducted at the end of each year). In contrast, other rule-making processes can occur at any time and take multiple years.

The Public Utilities Office considers the UK approach has merit, at least for initial auctions in ensuring timely rule changes affecting capacity auctions. It is considered that, at least initially, a process for changes to the reserve capacity auction Market Rules should be implemented to allow for such changes to follow a schedule that accommodates the need for timely rule changes likely to occur from experience of the auction process. Given the capacity auction has clear yearly timelines a capacity auction rule change process designed around these timelines will be helpful to ensure updated rules are in place for the next capacity auction cycle.

While a fast-track rule change process already exists in the Wholesale Electricity Market Rules, it operates over a nine-week timeline³⁸ with a single round of public consultation and does not provide adequate time for what could be complex or contentious rule change proposals. As the capacity auction would be an annual process, taking between six and nine months, the standard rule change process would be inadequate to implement changes between cycles.

The proposed capacity auction rule change process would be a distinct arrangement enshrined in the Wholesale Electricity Market Rules including a strict, annual, schedule for submissions and reports to be published with alignment to the overall auction process (allowing changes to be implemented for the next auction). Adherence to a strict annual schedule will also allow stakeholders to be prepared for the auction rule change process and minimise the need for lengthy consultation periods.

The Rule Change Panel will retain responsibility for the approval of rule changes with discretion to utilise the standard rule change process if it considers that such a process would benefit the proposed change.

³⁷ In the UK, two sets of rules, the Connection and Use of System Code (CUSC) and the Balancing and Settlement Code (BSC), rely on OFGEM, a panel to initially consider the rule amendment proposal, a workgroup to assess the effects and potential cost of the change, and a code administrator to facilitate the process and ensure all arguments are heard.

³⁸ See clause 2.6 of the Wholesale Electricity Market Rules.

Parties seeking rule change proposals to be included in the reserve capacity rule change process would need to submit such proposals by a specified time of the year. Any stakeholder would be able to submit a rule change – including AEMO as the auction operator and the Economic Regulation Authority as auction monitor.

The Rule Change Panel will be empowered to determine whether to accept or reject proposals for the reserve capacity rule change process. Proposals determined by the Panel not to be urgent would be progressed under the normal rule change process.

The reserve capacity rule change process will provide for two rounds of public consultation on proposals – firstly on the initial proposal and secondly on the draft determination by the Rule Change Panel. A review of the effectiveness of the reserve capacity rule change process will be conducted within the first five years of operation.

5.3 Managing the Annual Auction Process

AEMO currently has responsibility for administering the Reserve Capacity Mechanism arrangements, including responsibility for the conduct of a capacity auction. Detailed rules must be developed regarding conduct of the auction process.

Establishing a robust auction process with firm deadlines is critical for market success. Operation of the capacity auction can be categorised into five high-level tasks.

1. Providing auction training and outreach to participants.
2. Establishing and publishing auction parameters.
3. Resource qualification.
4. Conducting the auction.
5. Publishing the auction results.

A process for each of these tasks will be codified in the capacity auction rules.

Training and Market Outreach

Training and outreach to market participants is essential for success of the capacity auction. AEMO should provide in-person and online training resources on the capacity auction rules and theory/principles underpinning these arrangements, including ongoing training to inform participants of any changes to rules and auction parameters. Without available training, a lack of knowledge could present a barrier to entry for new participants that wish to enter the market. Both PJM and the UK have well-established processes for training and market outreach.

In particular, AEMO will have responsibility for implementation of training and outreach in advance of the first capacity auction. The experiences of other markets has shown that such training can pay dividends, as many stakeholders are not familiar with capacity auctions and therefore require training on how they should interact with the capacity auction process (that is, bid structure, bid data format, timelines, etc). This is a core role for a market operator and AEMO is experienced in stakeholder education processes given its role in the implementation of reform and system changes in the National Electricity Market and Wholesale Electricity Market.

Establishing Auction Parameters

As part of the annual auction process, the Market Operator or another body must establish and publish the auction parameters that define the shape of the demand curve and the target level of quantity to procure.

Initial auction parameters will be established following the demand curve calibration, and the capacity auction rules will list those parameters that AEMO will be required to calculate and publish before the commencement of each auction. AEMO will be required to follow a procedure in establishing these parameters, much like the current Benchmark Reserve Capacity Price process.³⁹ The parameters and associated procedures will be reviewed periodically.

Resource Capacity Certification

Resource capacity certification, also known as resource qualification, for existing and new resources is necessary so that the Market Operator can be confident that resources receiving capacity supply obligations can provide the capacity they claim to be able to supply. Resource qualification consists of both technical components, such as achieving construction milestones; and financial components, such as prudential requirements in the form of refundable deposits. The specifics may vary by resource type.

The Public Utilities Office will examine AEMO's current resource qualification procedures (during the market rules design phase of this project) and assess whether they are compatible with the needs of a forward capacity market. As outlined in section 3, physical delivery and prudential requirements will be upgraded to deter resources that have accepted a capacity supply obligation from not delivering.

Operating the Auction

Operating the auction consists of receiving offers from market participants and clearing the auction. Market participants must be provided with a standard set of required information in order to participate in the market. At a high level, each offer must include a price (\$ per MW per year) and quantity (MW).

Rules will outline how long participants will have to submit offers, how offers will be submitted and how long the system operator will have to clear the auction and conduct any necessary market power mitigation action.

AEMO currently operates all web-based portals for the energy and capacity markets, and should be able to leverage these systems for the purposes of the capacity auction.

Publishing and Archiving of Market Materials

Transparent and routine publication of market rules, auction parameters, and auction results is critical to a well-functioning market. The results from the capacity auction should be posted in a timely fashion, and results from previous auctions should be archived. Necessary safeguards must be established so that confidential and business sensitive information, such as resource offers, is not publicly available. Such information should only be publicly released if aggregated and smoothed.

³⁹ See Market Rule 4.16 and the Market Procedure: Maximum Reserve Capacity Price: <https://www.erawa.com.au/cproot/14362/2/Market%20Procedure%20-%20Maximum%20Reserve%20Capacity%20Price.pdf>

However, it is important that information such as auction parameters and aggregated auction results is made public to improve transparency, and attract and support new entrants.

The auction rules will need to outline what information will be kept confidential and what will be made public, considering that business sensitive information can often be backed out of public data if such data is not carefully aggregated, anonymous and smoothed.

5.4 Auction Regulation, Monitoring and Compliance

Since the commencement of the Wholesale Electricity Market in 2006, the Economic Regulation Authority has had responsibility for regulatory oversight of both the capacity and energy markets, including:

- monitoring market participant behavior;
- undertaking various approval processes requested by AEMO;
- conducting reviews required by the Wholesale Electricity Market Rules, including an annual report to the Minister for Energy on the effectiveness of the Wholesale Electricity Market; and
- certain compliance and enforcement activities.

Compliance and enforcement functions were transferred to the Economic Regulation Authority on 1 July 2016 from the Independent Market Operator. This new function requires the Economic Regulation Authority to monitor participant compliance with the Wholesale Electricity Market Rules, investigate potential breaches of the Market Rules and take enforcement action where appropriate. Enforcement action can include applying to the Electricity Review Board for fines or other orders.

The Wholesale Electricity Market Rules also require AEMO to demonstrate to the Economic Regulation Authority that it is maintaining compliance with the Market Rules and Market Procedures.

Implementation of a capacity auction will impose particular supplementary regulatory functions on the Authority, including market power mitigation as outlined in section 4. Primarily these supplementary functions will be:

- establishing the no-look threshold for offers into the capacity auction;
- setting unit-specific caps for offers into the auction;
- monitoring and mitigation of auction offers and bids; and
- oversight of and reporting on the competitiveness of the capacity market.

The capacity auction rules will need to specify these additional functions and any particular requirements of and guidance to the Economic Regulation Authority, including timelines, in undertaking these functions.

The Authority's annual report to the Minister on market effectiveness currently includes an assessment of any specific events, behaviors or matters that have influenced the effectiveness of the Wholesale Electricity Market and also any recommended measures to increase the effectiveness of the market in meeting the Wholesale Electricity Market Objectives.

It is envisaged that as part of its capacity market oversight and reporting function the Economic Regulation Authority will release a public report on the outcome and the effectiveness of each annual auction – separately from the Minister’s report and the publication of auction results by AEMO. This report should include assessment of the integrity of the auction process, specifically the web-based information portal and the auction clearing algorithm and associated mechanisms.

The Authority may engage an independent audit specialist to provide this integrity report. The report will assess the competitiveness of the auction and provide comment on possible improvements to enhance efficient outcomes.

6. Auction Implementation Process and Consultation

6.1 Implementation Plan

The Public Utilities Office has commenced the calibration of the demand curve. This involves simulating a range of candidate demand curves through probabilistic simulations in order to achieve the desired reliability outcomes. It is expected this work will take about six months to complete.

Concurrently with the calibration of the demand curve, the Public Utilities Office will commence drafting market rules for a capacity auction. It is during the drafting of the rule provisions where practical detailed consideration of the administration of a capacity auction is to be progressed. For example, the manner with which market participants submit their auction bids and the mechanism for price clearing or market settlement is to be designed at this point.

The sub-tasks for the drafting and implementation of the rule provisions are:

- drafting Instructions;
- drafting of the new rule provisions;
- public consultation on the draft rule provisions;
- creation of a final version of the Market Rules including necessary transitional provisions; and
- formal rule change process or ministerial repeal and replace.

Drafting of the market rules will require consultation with industry, throughout the year, and will include a formal consultation on the final wording of the rules (third quarter of 2017), prior to implementation. At present, the target date for implementation of the new capacity auction rules is 31 December 2017.

6.2 Feedback and Consultation

The Public Utilities Office intends to progress implementation of the auction in 2017 based on the design outlined in this Final Report. There will be further consultation with the sector on matters that are still to be finalised (as identified in this report), including the accreditation of capacity under a constrained network access model. This consultation will initially occur through the continuing involvement of the Reserve Capacity Mechanism Consultation Group throughout 2017.

The Public Utilities Office is therefore not seeking any specific feedback on this report. However, feedback is welcomed on any substantial omissions to the auction design or on any element of the design that market participants consider to be fundamentally flawed.

Appendix A Optimisation Objective

One complication the auction clearing algorithm must account for is the inherent lumpiness of capacity resources. This is particularly the case for many traditional resources that cannot be built or retained in arbitrarily small sizes. Other resource types, such as demand response, reciprocating engines, wind farms, and solar PV, can be added in smaller, incremental quantities. This adjustability of capacity resources is recognised in PJM auction arrangements that allow resources to bid up to 10 price/quantity pairs. ISO-NE allows resources to provide up to five price/quantity pairs. However, the inevitability of necessarily lumpy offers still remains a problem for the auction clearance.

The auction will clear at the point of intersection of the auction demand curve and the market supply curve, comprising the aggregated bids of capacity providers into the auction. With the indivisibility of lumpy offers, it is unlikely that the total quantity of offers will perfectly fall upon the demand curve. Selecting the last unit may overshoot the quantity at the supply-demand intersection point. If so, there is the option to clear the whole offer, clear none of it, or skip that offer and clearing the next unit if it is smaller. In each case, a rule is needed for setting the auction clearing price.

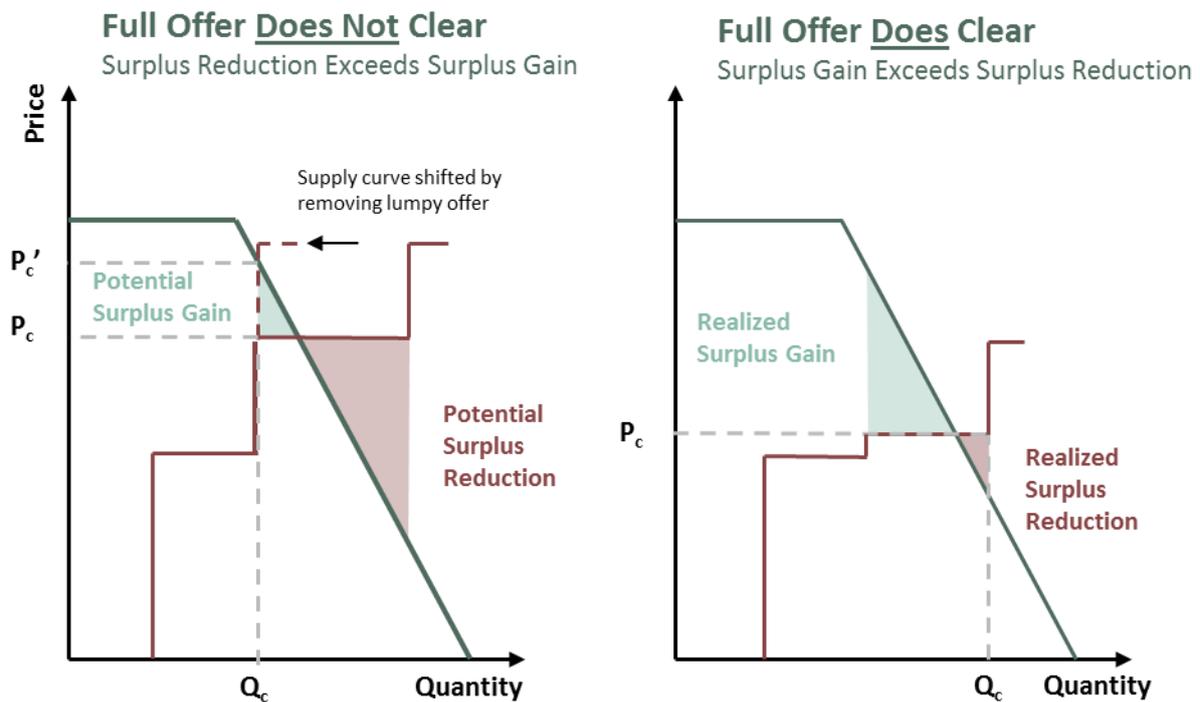
It is proposing to allow auction participants the ability to make “flexible bids” that will provide, at a minimum, the ability to have multiple tranches and a “minimum acceptable” quantity such that, if the participant clears less than the minimum quantity, it will not clear in the auction. These flexible bids will alleviate many of the matters associated with the lumpy nature of capacity auction bids. However, there will still be times where a bid will intersect the demand curve and so a mechanism for a solution is still required.

The solution to the problem of lumpy offers should be based on an evaluation of the social surplus that each of the above options provides. “Social surplus” should be consistent with the traditional welfare economics definition, in this case using the demand curve as if it were a true demand curve representing marginal economic value.

Figure B1 below illustrates this approach. In the left figure, the potential surplus gain of accepting the offer is less than the potential surplus reduction and, therefore, the offer does not clear. In this case, the price is set by intersection of supply and demand curves (P_c' and Q_c), after removing the lumpy offer in question. The market could potentially clear at a higher priced but smaller quantity offer resulting in a net surplus gain.

The uncleared lumpy offer is not paid the clearing price; all cleared offers receive this price. In the figure on the right, the realised surplus gain of accepting the offer is greater than the realised surplus reduction and therefore the offer clears. In this case, the offer in question sets the price P_c and is paid for its quantity in full. All other cleared offers also receive the clearing price.

Figure A.1: Lumpy Offer Welfare Maximisation



In the left example, price is set by intersection of supply and demand curves (P_c' and Q_c), after removing the offer in question. In the right example, price is set by the offer in question (P_c) and quantity is set by the offer's full cleared quantity, Q_c .

With an optimisation objective set to maximise social welfare, the capacity auction will clear at a point where the surplus gain exceeds the surplus reduction.

Another complication can arise if two identical offers are received from market participants, but only one offer clears. This unlikely event can be resolved by establishing priority rules. For example, in ISO-NE, the offer with the higher queue priority and/or the lower market share will qualify.