Government of **Western Australia**
Department of **Treasury**

Improving Reserve Capacity pricing signals – alternative capacity pricing options

Consultation Paper

Department of Treasury | Public Utilities Office

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Executive summary

The Wholesale Electricity Market (WEM) in Western Australia facilitates the procurement of electricity for customers serviced by the South West Interconnected System (SWIS). The market design provides for the separate pricing of energy and capacity. Capacity is centrally procured by the Australian Energy Market Operator (AEMO) through the Reserve Capacity Mechanism, using an annual market-wide price set administratively by a formula in the Wholesale Electricity Market Rules (Market Rules).

In recent years, the Reserve Capacity Mechanism has procured more capacity than required to meet forecast peak demand. For instance, the excess over the Reserve Capacity Target for the 2016-17 capacity year reached 23 per cent. In the 2017-18 capacity year, the excess has reduced to just over 14 per cent. The market, and ultimately electricity consumers, pays for this excess.

Work undertaken through the electricity market reform program conducted by the previous Government identified that the fundamental problem with the Reserve Capacity Mechanism is the lack of price response to any surplus capacity – so that excess capacity is significantly overvalued. Conversely, when there is a looming shortage it is likely that capacity will be under-priced. This results from a pricing formula that delivers a shallow sloping capacity price curve, rather than a market discovered price from competitive offers.

Consequently, amendments were made to the Market Rules in 2016 to progressively sharpen the price response to achieve the supply-demand capacity balance. In addition, a different pricing arrangement was introduced in the Market Rules for the remuneration of demand side capacity resources. However, these measures were implemented as a temporary arrangement pending the introduction of a capacity auction. The previous Government's reform process determined the need for a competitive process for capacity procurement with a capacity auction being the preferred approach. The Public Utilities Office completed initial design work for implementing the capacity auction.

The workability of a capacity auction in a small market like the SWIS has been a key concern expressed by market participants since it was proposed. In response to these concerns, the Minister for Energy has asked the Public Utilities Office to review the Reserve Capacity Mechanism to determine if a move to a capacity auction remains an appropriate approach. The Public Utilities Office is to also consider whether some other alternative pricing arrangement will provide a better outcome in overcoming the lack of price responsiveness to achieving a supply-demand capacity balance.

The Minister for Energy has also stated that the Government will not introduce a capacity auction before 2021, pending advice from the Public Utilities Office from this review.

As part of its review, the Public Utilities Office is releasing this consultation paper. The purpose of this paper is to seek views on alternative approaches to a capacity auction that could be used to achieve a more responsive pricing of capacity resources.

This paper outlines two possible capacity pricing design alternatives, informed by an assessment of capacity market mechanisms in North America and the European Union.

The two capacity pricing options presented in this paper are as follows.

Option 1: Administered pricing

This approach would preserve but improve the existing administered capacity procurement arrangement administered by AEMO, with a revised pricing formula that more closely reflects the value of capacity at various levels of excess (or shortfall).

This pricing arrangement would need to deliver sufficient certainty for new capacity investment when needed by the market, but also encourage the removal of capacity at high levels of excess.

Option 2: Retailer led contracting with a bulletin board trading mechanism

This option would impose a requirement on each electricity retailer to contract sufficient capacity to meet its Individual Reserve Capacity Requirement (IRCR). Essentially, as is currently the case, there would be an obligation on Market Customers (i.e. retailers) to contribute to system reliability up to their respective share of peak load but with significant penalties for any breach of the obligation.

Under this approach, AEMO would establish the Capacity Requirement and the respective IRCR for each retailer, but there would be no centralised procurement of capacity or capacity pricing mechanism. Rather, capacity procurement and pricing would be deregulated. AEMO would, however, administer a voluntary trading platform, such as a bulletin (trading) board, to provide price transparency and facilitate contracting, and a means for parties to adjust their contractual positions closer to a capacity year.

Such an arrangement may require a back-stop mechanism for AEMO to procure capacity closer to a capacity year in situations where a retailer is found to be under-contracted relevant to its IRCR. This cost would be passed through to the relevant retailer plus a penalty.

This option would require additional regulation to provide contract liquidity and mitigate market power, particularly given Synergy's current dominant market position.

Other options

There may be other suitable options for the procurement and pricing of capacity in addition to those presented in this paper. A capacity auction design is not discussed in this paper given the previous design work undertaken by the Public Utilities Office.

The Public Utilities Office has not developed any of the pricing options to a level of detail suitable for implementation. The aim is to scope each approach to a level sufficient to facilitate meaningful discussion with stakeholders and enable an evaluation and comparison of the respective merits of each option before recommending an appropriate approach.

Next steps

This consultation paper invites stakeholder submissions on the above options and any additional options to improve reserve capacity pricing signals.

Submissions are requested by **2:00pm (WST) on 4 May 2018**.

The Public Utilities Office has also established a Stakeholder Reference Group to provide ongoing input to this review process and will provide regular presentations on the matters addressed in this paper to the Market Advisory Committee and the Electricity Consultative Forum.

Following further consideration of the capacity pricing options and ongoing engagement with stakeholders, the Public Utilities Office anticipates releasing its draft Recommendations Report in July 2018 for consultation. Once stakeholder feedback has been received, the Public Utilities Office will finalise its Recommendations Report to the Minister for Energy in September 2018.

1. Introduction

1.1 Background

1.1.1 Capacity markets – the reliability price trade-off

Electricity consumers require a reliable supply of electricity. Reliability is achieved when there is enough generation capacity connected to the system to meet electricity demand. Theoretically, in an economically pure market as demand rises and supply becomes scarce the price of electricity would rise until either demand drops, in response to the high prices, or supply is exhausted resulting in blackouts. However, in electricity markets worldwide there are obstacles to real-time rationing – there are limitations to real-time metering and billing, and frequent blackouts are disruptive, costly and economically undesirable.

To prevent blackouts, market operators set reliability targets, usually the amount of capacity needed to meet a system-wide level of peak demand. Energy market price caps are established to limit real-time price increases to prevent excessive price volatility. However, a price cap tends to create a "missing money" problem, since capacity providers may be unable to recover the difference between the price cap and the actual cost of supply. The fundamental purpose of a capacity pricing mechanism is to ensure the missing money can be recovered while achieving the reliability target.

Balancing reliability and cost is therefore a core design consideration for any capacity market. The success of a capacity mechanism lies in its ability to provide suitable and transparent capacity pricing. If the reliability/cost trade-off is not robust then the capacity mechanism could attract too much capacity (increasing costs to consumers); or, alternatively, not attract enough capacity, affecting the reliability of the electricity system.

In combination with an efficient capacity pricing arrangement, a capacity procurement mechanism requires suitable incentives for the availability of capacity. As capacity is paid ex ante to be available, regardless of its eventual utilisation, there is a risk that capacity resources may not be available when required. Well-functioning capacity markets therefore require strong incentives for capacity to be available consistent with the reliability requirement, usually in the form of capacity payment refund requirements or some other form of penalty.

1.1.2 The Reserve Capacity Mechanism

The WEM that operates within the SWIS is based on a capacity market design, comprising a Reserve Capacity Mechanism and a separate energy market.

The role of the Reserve Capacity Mechanism is to ensure adequate capacity resources are connected to the SWIS to meet electricity demand at all times. Over the longer-term, capacity payments generally seek to cover the fixed costs of a reference capacity resource - usually based on the estimated cost of an efficient new entrant – the technology of which is periodically reviewed. Like most capacity markets, the Reserve Capacity Mechanism seeks to procure capacity to meet a centrally determined annual system peak requirement as the capacity target.

AEMO administers the Reserve Capacity Mechanism setting an annual Reserve Capacity Target three years ahead using a transparent methodology. AEMO also runs annual capacity cycles to procure capacity to be available three years ahead (the capacity target for year T is procured by a capacity cycle in year T-3). This provides time for new capacity facilities to be built and commissioned.

A capacity resource is allocated a capacity credit for each megawatt of capacity based on the physical capability of the plant, which is effectively a revenue entitlement. In the case of demand side capacity resources, a verified capability to reduce peak demand is required.[1] The annual capacity cycle sets the capacity price for a megawatt of capacity in the relevant capacity year based on a formula prescribed in the Market Rules.

AEMO recoups the cost of capacity procurements from Market Customers[2], assigned a share of the capacity cost based on the proportional contribution of their load to peak demand[3] – the IRCR.

The Reserve Capacity Mechanism has procured capacity in excess of system requirements in recent years. In the 2016-17 capacity year, the excess over the Reserve Capacity Target for that year reached 23 per cent. The inability of the capacity mechanism to self-adjust demonstrates a serious deficiency with its design. Whilst the excess has reduced to 14.1 per cent for the 2017-18 capacity year, this is not the result of any self-correction within the Reserve Capacity Mechanism, but rather Government directed plant closures by Synergy and regulatory changes to the pricing of demand side capacity resources.

The electricity market reform program conducted by the previous Government, identified that the fundamental problem with the Reserve Capacity Mechanism is the lack of a price response to surplus capacity – so that excess capacity is significantly overvalued. Conversely, when there is a looming shortage, it is likely that capacity will be under-priced. This results from a pricing formula that delivers a shallow sloping capacity price curve, rather than a market discovered price from competitive offers.

1.1.3 2016 Market Rule changes

The previous electricity market reform program recommended the introduction of a capacity auction to replace the current administrative process for procuring capacity. An auction would provide competitive rivalry for determining the quantity and price of capacity.

Amendments to the Market Rules were made by the Minister for Energy on 31 May 2016 to implement new arrangements to improve the capacity supply-demand balance before the implementation of a capacity auction design, by incrementally changing the capacity price to better reflect the value of marginal capacity. This was achieved by adjustments to the capacity price formula to progressively steepen the capacity price curve. The Amending Rules also implemented a new arrangement for remunerating demand side capacity resources.

1 In the WEM capacity eligible for capacity credits is called certified capacity.
2 These are retailers or large loads.
3 Calculated over the period from 1 December through 31 March.

The Amending Rules introduced in 2016 were designed only as a transitional measure and are not suitable for the longer-term. In particular, the absence of a permanent solution may not provide sufficient certainty or adequate incentive for investment in new capacity when the market is in balance. As the estimated level of excess capacity for the 2018-19 capacity year is four per cent, there is an urgent need to determinate a sustainable model for the procurement and pricing of capacity.

1.2 Scope of this review

The previous Government's reform process determined the need for a competitive process for capacity procurement with a capacity auction being the preferred approach. The Public Utilities Office completed initial design work for implementing the capacity auction.

The workability of a capacity auction in a small market like the SWIS has been a key concern expressed by market participants since it was proposed. In response to these concerns, the Minister for Energy has asked the Public Utilities Office to review the Reserve Capacity Mechanism to determine if a move to a capacity auction remains an appropriate approach. The Public Utilities Office is to also consider whether some other alternative pricing arrangement will provide a better outcome in overcoming the lack of price responsiveness to achieving a supply-demand capacity balance.

The Minister for Energy has also stated that the Government will not introduce a capacity auction before 2021, pending advice from the Public Utilities Office from this review.

This review of a model for capacity procurement and pricing through the Reserve Capacity Mechanism is to be undertaken on the basis of existing Government policy settings for the WEM. Whilst the inter-relationship between different market elements, such as between industry structure and supply chain efficiency, is acknowledged; the Public Utilities Office is seeking to focus on which model of capacity procurement is best suited to and consistent with current public policy settings, including energy market reforms that are undergoing consultation or implementation.

On this basis, the matters outside of the scope of this review are as follows.

Structure of Synergy

The Reserve Capacity Mechanism will need to be fit for purpose given the current structure of Synergy – meaning that the new Reserve Capacity Market design agenda will need to consider problems such as market power and contract liquidity through implementation of suitable mitigation measures.

Fundamental WEM design

There is no intention to depart from having a specific mechanism, separate from the energy market, for procurement and pricing of all capacity resources. The Reserve Capacity Mechanism will also continue to maintain a single system wide price. Options for reforming the Reserve Capacity Mechanism need to be consistent with the fundamental design.

System security

The Public Utilities Office acknowledges the evidence of system stress in other electricity markets related to higher levels of intermittent energy supplies and, consequently, the need for a generation mix that continues to support the security and stability of the power system. With increasing penetration of renewable capacity resources, the generation fleet in the WEM will need to comprise resources to provide system inertia and rapid response energy supplies for system operation within acceptable technical limits.

The Public Utilities Office intends that it will remain the role of the ancillary services market to procure energy required for system security. Whether changes are needed to the ancillary services market design to ensure that, going forward, energy is available for system stability and support is a matter to be addressed as part of the broader market reform program including the design and implementation of a security-constrained market model, which will require a security-constrained co-optimised market for the dispatch of energy and ancillary services. The Public Utilities Office proposes to assess what types of ancillary services may be required in a security-constrained environment going forward and what changes, if any, must be made to the ancillary services market design to ensure this energy is available as required.

On this basis, the intention is that the capacity market will continue to procure reliability; i.e. the availability of capacity resources to meet peak demand. Capacity resources will be certified and allocated capacity credits based on their contribution to servicing peak load demand.

Reserve Capacity Price will continue to recover gross fixed costs (including fixed variable costs) of the marginal new entrant

The Benchmark Reserve Capacity Price is based on the stand-alone fixed costs incurred by a benchmark new entrant plant for being available. This differs from other capacity markets which compensate only "missing money" from the energy market; so the capacity payment in these jurisdictions is net of forecast energy revenues – referred to as Net Cost of New Entry (CONE). The Public Utilities Office does not consider adoption of a Net CONE for the Reserve Capacity Mechanism is warranted. Given that the Reserve Capacity Price will continue to be based on gross new entrant costs, there will be no need to change the basis of setting the energy market price caps.

Constrained network design

Generator network access will move to a constrained design with security-constrained dispatch. The Public Utilities Office has separately released a series of consultation papers outlining how the capacity and energy markets are proposed to operate in a constrained access environment. It is intended that the certification of capacity for the 2022 capacity year is to be undertaken under the new arrangements.

It will be important that adoption of the new model for procurement and pricing of capacity does not compromise implementation of the constrained network access arrangements.

Methodology for forecasting the Reserve Capacity Target

This review process excludes consideration of the methodology used by AEMO to determine the Reserve Capacity Target. AEMO sets this target for each capacity year within its annual Electricity Statement of Opportunities Report. The Market Rules provides for periodic review of the Planning Criterion and the process by which AEMO forecasts SWIS peak demand.

Performance incentives/penalties

The Market Rules contain two performance incentives: dynamic refunds and reserve capacity security payments. A well-functioning capacity market requires a performance regime that is effective in discouraging unreliable capacity resources from participating in the market. There will be a need to review the effectiveness of the current performance incentives in the Market Rules as part of the implementation of the preferred procurement and pricing model. Hence, this matter will not be addressed as part of this review process.

Demand side capacity

Demand side capacity providers must continue to be able to participate in the Reserve Capacity Mechanism arrangements. Demand side capacity is a valuable participant in most capacity markets world-wide. It has many unique characteristics that generation capacity cannot easily or cheaply replicate; being scalable, with short lead times to develop and be readily able to enter and exit the capacity market.

1.3 Making a submission

The Public Utilities Office invites written submissions on this consultation paper. Submissions must be provided to the Department of Treasury, Public Utilities Office, by **2.00 pm (WST) on 4 May 2018**.

Electronic submissions are preferred and should be emailed to PUOSubmissions@treasury.wa.gov.au.

Alternatively, submissions can be sent to:

Attn: Matthew Martin
Director, Wholesale Energy Markets
Public Utilities Office
Department of Treasury
Locked Bag 11
Cloisters Square WA 6850

In the interests of transparency and to promote informed discussion, submissions will be made publicly available unless the submitter requests otherwise. Accordingly, stakeholders should clearly specify if information they provide is confidential, and, where possible should separate confidential information from non-confidential information.

Any claim for confidentiality should be clearly noted on the front page of the submission and the relevant sections of the submission should be marked confidential, so the remainder of the document can be made publicly available. Where a submitter claims confidentiality over only part of a submission, it would be appreciated if a complete version and redacted version of the submission could be provided.

Persons making any claim for confidentiality should familiarise themselves with the provisions of the *Freedom of Information Act 1992 (WA)*, which imposes obligations on the Department of Treasury in respect to the release of documents.

Submissions will be made available for public review on the Department of Treasury's website at www.treasury.wa.gov.au.

Contact information, other than the submitter's name and organisation (where applicable) will not be published.

All enquiries may be directed to:

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(08) 6551 4640
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2. Procurement models in Europe and North America

To assist in identifying options to improve reserve capacity pricing signals, the Public Utilities Office has reviewed approaches to capacity pricing in electricity markets in the European Union countries and North America. A summary of the models adopted for capacity procurement in the various electricity markets in these jurisdictions is provided in 0. This review only included those markets that are deregulated, as distinct from those jurisdictions where there is still a totally centralised approach to electricity provision, which is the case in some parts of the United States.

Five approaches to procurement and pricing of capacity through a mechanism separate to the energy market have been identified. A high-level description of these models is provided below.

2.1 Strategic reserves

This approach remunerates specific generation plant to be available to meet supply shortfalls at times of peak demand. Such plant normally includes older and more conventional facilities that can be incentivised to delay retirement. These stand-by facilities are normally excluded from participation in the energy market and are called upon only when a particular trigger is met – such as a looming brownout and/or an energy price threshold. This reserve plant is only contracted for a short–term – with contract duration periods between one and three years.

The level of strategic reserve is normally determined by regulation. To be efficient it is important that there is market transparency in the methodology for determination of the stand-by requirement and the payments made to stand-by facilities - the capacity price can be set by a tender or by some administrative mechanism. There is an issue around which market segment should meet the stand-by cost – allocation across the market or rather only retailers short on energy supplies and whether this assessment is ex-post or ex-ante. Because this capacity is very costly, there will be an incentive for loads to avoid exposure by engaging in or contracting a demand side response or by investing in new capacity.

Strategic reserves can be effective in addressing a shortfall problem but have a tendency for market distortion by reducing the price signal for new, efficient, capacity entry. This is the case even if reserves are introduced as a temporary measure. They are also potentially "inequitable" because only selected facilities can be eligible for a capacity payment.

This model can be retrofitted to an energy only market as a safeguard to energy supply shortfalls or to provide ancillary service system support. However, this approach is inconsistent with the Reserve Capacity Mechanism design where there is a separate capacity market with a system wide capacity price.

2.2 Capacity payments/Administered capacity payment

The Reserve Capacity Mechanism in the WEM is based on a capacity payment approach (albeit a variation thereof).

In a capacity payment model, all generators are paid a specific price for availability over and above their energy market revenues.

Because of different cost structures of various technologies these payments can vary depending on the type of technology. In the Reserve Capacity Mechanism capacity providers in the WEM receive the same capacity payment, with the exception of demand side resources.

The capacity payment model normally imposes availability obligations on accredited facilities and a penalty regime for non-compliance. The scheme is funded by consumers through their retail suppliers.

From a supply side perspective, a capacity payment is a more equitable model than strategic reserve payments in that remuneration for availability is paid to all capacity providers, based on the same price, and there are no exclusions from energy market participation. However, capacity payment models also pose risks. These risks include:

- Payments (by definition) are set by regulation and are not market discovered.
- Price signals do not reflect the level of supply-demand balance and the market is slow to self-correct.
- Penalty payments can be weak and consumers are then required to fund capacity that is unreliable.
- As capacity prices are not used to ration the level of procured capacity, there is a tendency towards excess above the reliability requirement.

2.3 Capacity obligations

A pure capacity obligations model imposes an obligation on each electricity load to ensure that it has contracted (and/or has self–supply of) sufficient capacity (including demand side resources) to meet estimated future peak demand requirements plus a regulated margin. There is normally an independent vetting and penalty regime for non-compliance. This model relies on bilateral contracts for the delivery of capacity and to set prices paid to capacity providers.

This approach to the procurement and pricing of capacity is decentralised.

France has recently adopted a quantity based capacity obligation model, comprising a decentralised capacity market - a capacity requirement is set by the national grid company and capacity guarantees are imposed on electricity retailers to have in place sufficient capacity resources to meet the peak load characteristics of their customers. This obligation is set four years out from the delivery year. The mechanics include:

- Capacity providers must have capacity certified to receive capacity certificates. These certificates are issued three years out for existing generators but planned new entrants and demand side resources can request certificates up to two months out from the delivery year. Capacity providers commit to be available during the peak demand period.
- In order to fulfil their obligation retailers need to have capacity they own certified and/or purchase capacity guarantees from providers or other suppliers.
- Certificates can be traded bilaterally or can be purchased by periodic auctions.

- The RTE (see below) undertakes estimates of capacity consumption requirements and forecast requirements. Retailers must estimate their own peak demand requirements and are heavily penalised if ultimately a post-period audit identifies that they did not hold sufficient certificates to cover actual demand.[4] Certificates can be traded up to two years after the delivery period. As retailers are notified of any imbalance before this, presumably they can trade out of their obligation before a penalty is imposed.
- The scheme is technology neutral. Additionally, due to concerns about extreme winter peaks, France has introduced temporary capacity payment measures specifically to attract a demand side response.
- Measures are being introduced to prevent market power, such as withholding, and to increase liquidity in certificate auctions.
- While certificates are awarded for only one delivery year, new entrant capacity can obtain certificates for a seven year duration, provided it can demonstrate it is more competitive than existing facilities.
- Governance:
  - Re'seau de Transport d'Electricite' (RTE) is the global manager of the mechanism; proposes market rules and undertakes compliance.
  - The French Regulatory Commission of Energy (CRE) – supervises operation of the market including financial transactions, approves market rules as proposed by RTE, sets the level of enforcement penalties, and substantiates information on obligations and certificate transactions.
- Capacity guarantees can be traded:
  - By bilateral agreement on a quantity and price - the parties then send notification to the RTE which registers the transaction.
  - Through a "regulated market" whereby a specific trading platform centralises sale and purchase offers.[5]

One problem with this model is that if a capacity shortfall occurs, the brownouts from the loss of supply cannot be isolated to the retailer that is under-contracted and so electricity users covered by contracts can still suffer outages. Also, there is a risk that retailers will under-contract, particularly if the penalties are weak. The success of this model requires an effective penalty regime and a liquid market for certificate exchange.

2.4 Reliability options

This is a relatively new design approach, whereby the system operator enters into call options contracts with capacity providers, entitling the operator to dispatch the relevant capacity resource based on a pre-set trigger. The trigger is normally the energy market price reaching a prescribed threshold and/or a scarcity threat.

[4] Both retailers and capacity providers are subject to severe penalties for shortfalls in meeting their respective obligations - up to €120,000/MW per annum.

[5] This appears to be administered by RTE - the market rules specify implementation requirements.

The level of contracting is determined by the market operator - normally based on an estimate of forward peak load plus a margin.

This approach effectively places an options market on top of the energy market. Once a prescribed energy market price is reached – the strike price – the market operator calls on the option contract. The generator then has to produce energy and pay any difference between the strike price and the energy price to the market operator. If a generator was not producing at that time, then it is exposed to paying the high energy price to the operator, hence an incentive to be available.

The reliability options model seems to be a variation of a strategic reserve approach, except that a capacity resource holding an options contract can participate in the energy market. This approach does not appear to fit well with the Reserve Capacity Mechanism which aims to fully compensate availability through a separate capacity payment not linked to the energy price.

2.5 Capacity market auction

Under this model, the market operator sets a reliability target and undertakes a competitive auction for the provision of capacity to meet this target. The market determines both the price and the quantity of capacity supplied.

Providers that are cleared in the auction are paid the clearing price for available capacity, with these costs being passed on to electricity loads/retailers and ultimately end users. This capacity market sits alongside, but is separate to, the energy market.

Market demand is reflected in a capacity demand curve, established based on the incremental value of reliability to users and, as such, providing price signals for the timely and efficient addition or retirement of capacity.

The capacity supply curve is established by a merit order of price/quantity offers from capacity providers. The intersection of the regulated demand curve and the aggregated industry supply curve then sets the auction clearance price.

Providers that are cleared in the auction are contracted to the market operator to be available and must pay a penalty if they are not. This design is often called a “variable quantity auction” because there is no guarantee on the level of capacity offered by the market in the auction. The design accordingly requires some backstop mechanism whereby the operator can procure any capacity deficiency. This design is prominent in North American electricity markets and has also been adopted in the United Kingdom.

2.6 Common features of European and North American designs

Despite the varying designs there are some common themes in the European Union and North American market approaches to capacity remuneration. These are discussed below.

Market Discovery of the Capacity Price

All of the major recent capacity market reforms rely on a competitive procurement process for price determination. Evidence from international markets suggests that competitive bidding for capacity is clearly the preferred best practice approach. This is the case regardless of the market design.

Germany (strategic reserve), the United Kingdom (capacity auction), France (decentralised reliability obligation) and Italy and Ireland (reliability options) have all implemented competitive processes for capacity procurement. In the North American markets reviewed, all capacity is subject to a market discovered price.

No equivalent to current Reserve Capacity Mechanism design

The Western Australian Reserve Capacity Mechanism appears as a rather unique hybrid design, given that it has a reliability obligation together with a centralised procurement based on an administered pricing curve. Also, it allows the market operator to contract for all capacity that is certified regardless of the level of market excess. There is no equivalent to this approach in the European Union and North American markets reviewed.

However, the Western Australian capacity market is also very small in comparison to all these international markets.

New investment price certainty

One notable feature of the various models (including capacity auctions) is that some markets incorporate some form of price lock-in, but only for new entrants. New capacity (cleared in an auction) can be awarded capacity contracts (at the auction clearance price) for up to 15 years in the United Kingdom, 10 years in Ireland and three years in Italy. In the French reliability obligation model, capacity certificates can be granted for up to seven years for new entrants under certain conditions, but this guarantees quantity and not price, which is decentralised.

No price floors

None of the markets reviewed appear to incorporate capacity price floors.

Technology neutral

Virtually all of the markets reviewed are technology neutral, although varying forms of capacity are rated differently on availability benchmarks.

Capacity prices below new entrant costs

Capacity prices across jurisdictions should be compared with caution. Year-on-year prices also need to be considered against the supply-demand balance and other market dynamics that influence price – so that a price, whether it be high or low, is meaningful only in the context of individual market circumstances.

Notwithstanding this, there is a strong recent trend in those markets where capacity is sourced by a competitive process for the capacity price to be below the estimated price required by the marginal new entrant. This is demonstratively the case in North American markets. There are various reasons for this, including: the regulatory estimate of the new entrant price is too high; the estimate is based on the incorrect benchmark technology; lower demand forecasts; a very low United States gas price that is driving increased supply; energy efficiency and increasing penetration of renewable resources.

The United Kingdom capacity auction has also delivered clearing prices much lower than expectations - the recent prices are considered below the new entry price for batteries and some other new renewable technologies. New entrant generation has made only a small contribution to the capacity target, with most capacity being provided by existing facilities.

Whilst very low capacity prices can mask other issues, the evidence from the established capacity markets reviewed is that they are delivering reliability targets at capacity prices below the regulated cost of new entry.[6]

[6] Some markets are in transition from an energy-only to a capacity market – Ireland, Italy, Alberta and Ontario.

3. Alternative capacity pricing options

The Public Utilities Office is seeking industry views on possible alternative pricing options for the Western Australian Reserve Capacity Mechanism.

Capacity auctions are the predominant procurement model for capacity markets in Europe and North America. The international success of these capacity auction mechanisms is evidence that they are clearly best practice in capacity market design. A capacity auction remains as a clear option for the WEM. However, the workability of such a procurement model within the small size of the electricity market in the SWIS with a dominant market participant requires further evaluation, including the consideration of implementation costs.

Specifically, a capacity auction would require formulation of a capacity demand curve that reflects (at least partly) the value customers place on the reliability of electricity supply. The shape of this curve should mitigate price volatility without overly distorting price signals. There is also an argument that an auction design should provide a level of revenue certainty to support new investment (e.g. through some form of price lock-in).

This consultation process with industry will not further develop a capacity auction design given the previous design work undertaken by the Public Utilities Office. Rather, the Public Utilities Office will work with industry participants to define and develop the alternative capacity pricing options to enable a comparative assessment and recommended approach.

The Public Utilities Office has identified two potential alternative options to a capacity auction arrangement:

- **Option 1**: Administered pricing; or
- **Option 2**: Retailer-led contracting obligation.

These two options are discussed below.

3.1 Option 1: Administered pricing

This option would maintain the centralised procurement of capacity with the continued determination of an annual Reserve Capacity Target and allocation of capacity credits to certified facilities and an Individual Reserve Capacity Requirement to Market Customers.[7]

Under this option the capacity price would continue to be set administratively pursuant to a price curve (formula) within the Market Rules. The Benchmark Reserve Capacity Price (BRCP), based on the forecast cost of the marginal new entrant would also continue to underpin the capacity price. This pricing formula would increase or discount the BRCP as the levels of excess varies, much the same as the existing arrangement. However, the existing pricing formula has a constant slope for all levels of excess.

[7] The capacity credit allocation process would be modified to accommodate adoption of a constrained network access model which is the subject of a separate consultation paper. It is proposed that this modified arrangement will introduce Priority Capacity Rights. These initiatives will not however, of themselves, influence the capacity pricing mechanism.

Recent experience in the WEM suggests this constant slope does not provide adequate signals for market adjustment to the capacity supply-demand balance. The focus of this option will, therefore, be on what changes are necessary to the price curve to provide better signals for capacity entry and exit.

The Public Utilities Office suggests that the price curve can be compartmentalised into three sections. Firstly, the curve gradient should be steep at low levels of capacity excess. This would provide for a strong ramp up in price to incentivise investment in new capacity when system reliability requires more capacity. This could also mean that the Maximum Reserve Capacity Price (i.e. the cap) may need to increase above its existing level of 1.1 times the BRCP.

The second section of the price curve would cover moderate levels of excess and the downward gradient could therefore be relatively flatter. This would add some stability and certainty to the capacity price when the market is in reasonable balance across a range of capacity credit supply to capacity target ratios. It would also mitigate price volatility by reducing the potential for the exercise of market power within this range.

The third section would cover levels of capacity excess which are relatively high. The price signal here should be to discourage new capacity and perhaps induce retirements, meaning that the capacity price drops quickly in this section of the price curve.

Theoretically, a price curve of this nature should also bear some relationship to the value of capacity to electricity users. A price curve that is based on a benchmark new entrant cost inherently accounts for the efficient cost of supply. But the price curve should also be influenced by the value that customers place on the contribution that capacity makes to system reliability. This value is, in turn, directly related to the probability of loss of load – a value that is high at low levels of excess and then decreases incrementally as the level of excess increases, reaching a point where the value of a marginal (additional) unit of capacity is near zero.

3.2 Option 2: Retailer led contracting with a bulletin board trading mechanism

This option would maintain the centralised setting of the Reserve Capacity Target and the allocation of capacity credits to capacity facilities and IRCR to Market Customers. However, the approach is a material change to the Reserve Capacity Mechanism and would decentralise the capacity price. Capacity providers and Market Customers would trade capacity certificates either bilaterally or by way of some form of trade facilitation mechanism. This could be via a bulletin board mechanism, similar to the gas market, and/or a more formalised trading mechanism, such as a securities exchange.

This option has been considered by the Public Utilities Office at a conceptual level. It could be a simplified form of the capacity obligation scheme recently adopted in France. The fundamental question is whether there is industry support for deregulation of the capacity price. The workability of this option would depend on establishing a meaningful penalty regime for non-compliance.

Additionally there would be need for a back-stop procurement process to cover shortfalls that became apparent closer to the capacity year. The cost of this capacity would be expensive, and would be recovered from those Market Customers that have insufficient cover. This cost and the level of the penalty would influence and most likely set a cap on the capacity price.

The capacity obligation scheme in France also involves multiple auctions each year. The French Regulatory Commission of Energy (CRE) announces a reference price for certificates at the beginning of each year which is the average of the prior year auction prices. Such an auction based pricing mechanism would be similar to a capacity auction mechanism (Option 3). The Public Utilities Office is not proposing that Option 2 would involve a capacity auction; rather a decentralised capacity price supported by a bulletin board trading ararngement.

In order to provide support for market liquidity, consideration would need to be given to mandating a requirement for Synergy to provide standard contracts for a specified volume of purchased and sold capacity resources.

3.3 Evaluation of proposed or alternative pricing options

In making submissions on the proposed or alternative capacity pricing options, stakeholders are invited to consider the following matters.

1. How the pricing approach would provide value for the consumer?
2. How the pricing approach would replicate a competitive price for capacity?
3. How the pricing approach would operate in scarcity and surplus capacity situations?
4. How would the pricing model attract capacity when additional capacity is required and discourage capacity when capacity is not required?
5. How would demand side capacity resources participate under the pricing approach? How should these resources be priced?
6. What would be the advantages and disadvantages of the pricing approach compared to the current Reserve Capacity Mechanism pricing arrangements?

In relation to Option 2, the Public Utilities Office invites comments on the following additional matters.

7. Would this pricing approach provide sufficient transparency regarding the capacity price?
8. Would this pricing approach promote sufficient market liquidity to support new retail entry?

Appendix A: Capacity markets world view

The Public Utilities Office has investigated energy market structures in North America and the European Union. The purpose of this research was to identify mechanisms for the procurement and pricing of capacity that might be applicable to the Reserve Capacity Mechanism. The review also sought to identify recent design changes and current performance issues associated with particular market designs. The research focussed only on deregulated energy markets with formal energy and/or capacity markets administered by an independent market operator or regional transmission organisation. The tables below identify the location of those markets considered and the type of market design.

There is a greater range of capacity payment approaches in Europe compared to North America where capacity auctions dominate. The European Commission has adopted an energy–only design as the target model for electricity delivery across Member States. However, in recent years various jurisdictions have moved to establish separate capacity markets – notably the United Kingdom and France – reflecting a world-wide transition to the separate remuneration of capacity resources.

North American electricity markets

The North American markets considered are: PJM, NYISO, ISO-NE, Electricity Reliability Council of Texas (ERCOT), Midcontinent ISO (MISO), Southwest Power Pool (SPP), California ISO, the Ontario Electricity Market and the Alberta Electric System Operator. These markets reflect both capacity and energy-only designs, as well as hybrid approaches. In the United States, all electricity market designs must be approved by the Federal Energy Regulatory Commission (FERC). Figure A.1 below provides a map of these market jurisdictions.

Figure A.1: North American Electricity Markets

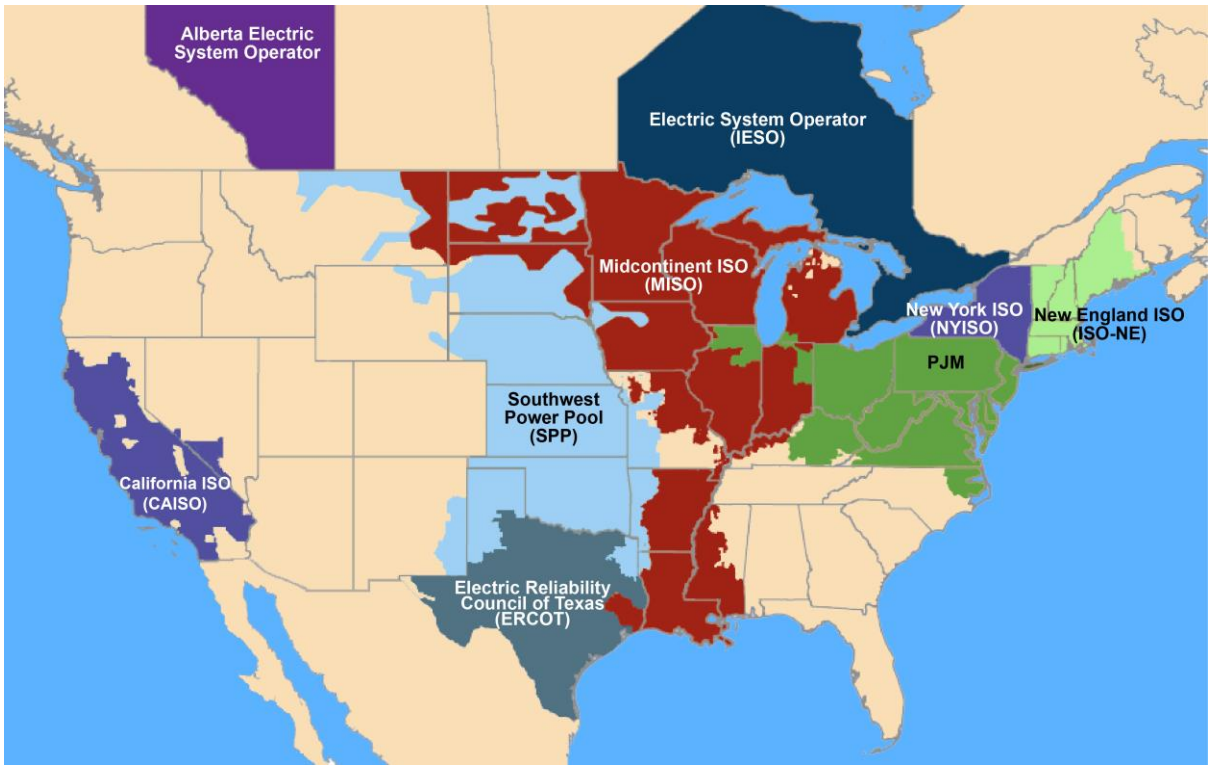

Table A.1 below provides a high level summary of the market design in North American jurisdictions.

Table A.1: Northern American Energy Market Designs

	Market Design	
	Alberta Electric System Operator	Historically an energy only market supported by a security service load shedding arrangement. Now transitioning over three years to a capacity market design.
	California ISO	Day ahead and real-time energy and ancillary services market with congestion revenue rights.
	Electric Reliability Council of Texas (ERCOT)	Non-discriminatory nodal energy only market supported by an emergency response service, procured by auction three times per year.
	Electric System Operator (EISO) – Ontario	Historically an energy only market based on separate dispatch and pricing schedules and supported by recent auctions, specifically to procure demand side capacity resources. Proposing to implement a non-discriminatory forward incremental capacity market.
	Midcontinent ISO (MISO)	One year ahead (prompt) capacity auction with a fixed resource requirement and locational capacity pricing. Day ahead energy markets. Non-discriminatory. A MISO plan to implement a three year ahead auction only for contestable retail zones has been disallowed by FERC.

	New England ISO (ISO-NE)	Capacity market with three year forward capacity auction. Zonal demand curves. Non-discriminatory participation.
	New York ISO (NYISO)	Installed capacity market with forward auction. Locational capacity pricing.
	PJM	Capacity market with a three year forward (Base Residual) auction. Variable Resource Requirement with locational capacity pricing. Non-discriminatory participation.
	Southwest Power Pool (SPP)	Energy only market with locational pricing and transmission capacity rights.

European Union electricity markets

The review of electricity markets in the European Union concentrated on different approaches in the markets for remunerating and pricing capacity resources. The markets reviewed are: Belgium, France Germany, Greece, Ireland, Italy, Netherlands, Poland, Portugal, Romania, Spain, Sweden and the United Kingdom.

Figure A.2 below shows the location and design of the markets reviewed.

Figure A.2: European Union Electricity Markets

The survey of European Union markets identified all five approaches to procurement of capacity as outlined in Section 2 of this paper: capacity payments, strategic reserve, capacity obligations, reliability options and capacity auction.

Table A.2 below outlines the above capacity procurement models as they relate to the various European Union Member States.

Table A.2: European Union Capacity Remuneration Mechanisms

	Strategic Reserve	Capacity Payments	Capacity Auction	Capacity Obligation	Reliability Options
Price vs Volume Based	V	P	V	V	V
Centralised vs Decentralised	C	C	C	D	C
Target vs Market-wide	T	T or MW	MW	MW	MW
Competitive vs Administrative Price (generally)	C	A	C	C	C
EU Application	Germany Belgium Sweden Poland	Spain Portugal Greece	UK Romania	France	Ireland Italy

Source: Modified from FTI-CL Energy