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

Improving access to the Western Power Network

Proposed approach to implement constrained network access

Department of Treasury | Public Utilities Office

9 August 2018

TRIM: 00490955

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Table of Contents

List of Figures

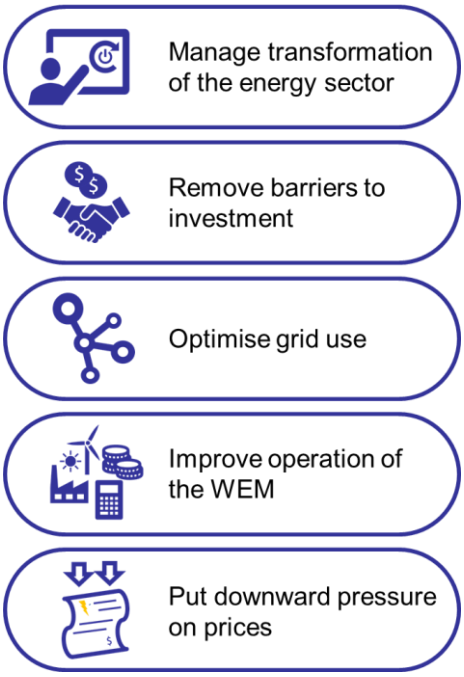
Executive Summary

Improving access to the Western Power Network

Western Australian electricity sector reforms

The electricity sector in Australia and around the world is changing. Technological advances, greater uptake in rooftop photovoltaic systems and distributed generation, the desire to achieve carbon emissions targets are just some of the challenges network businesses and electricity market participants are facing together.

As the sector changes, market arrangements and the regulatory frameworks must also evolve to help facilitate change and ensure electricity consumers can realise the benefits of change. In Western Australia, the regulatory framework and market systems have not kept pace with change. Network access rights and dispatch methods that were fit for purpose when introduced, are rapidly becoming unsuitable for today's market and are unsustainable.



To help meet Western Australia's energy challenges, the Minister for Energy has directed the Public Utilities Office to undertake a suite of electricity sector reform initiatives. The reforms are designed to help the State make better use of its energy resources and infrastructure, attract private sector investment and improve the wholesale market, with the overarching goal of delivering electricity to consumers at lowest possible cost.

The case for constrained access

The case for changing to constrained network access can be distilled down to two key challenges:

- New generators, particularly renewables, cannot connect to the parts of the network they want to, which creates a barrier to investment and optimal grid use.
- Market dispatch is not economic, meaning there is opportunity to reduce market costs, which may result in lower electricity prices for consumers.

Both of these could be addressed by amending the way existing and new generators are provided access to the Western Power Network.

What's the issue?

Legacy contractual arrangements mean a number of electricity generators are entitled to 'unconstrained network access', which means Western Power is required to ensure its network has sufficient capacity to transmit up to the maximum output of these generators under normal operating conditions.

As electricity demand in Western Australia has grown over the years, the network has become more congested. As a result, in some parts of the network there is insufficient spare capacity available to allow new generators to connect.

In some cases, this is due to a physical constraint whereby the transmission network has insufficient physical capacity to transmit additional electricity safely during periods of peak demand. However, in many cases there is actually sufficient physical capacity in the network, but the unconstrained access rights of incumbent generators mean that 'spare' network capacity is contracted out, effectively locking it up and reducing the amount of capacity available for other generators to connect.

This can be a barrier to any new generator seeking to connect in certain parts of the transmission network. If a new generator wants to transmit electricity through a part of the network where most of the capacity is contracted out to a generator with unconstrained access, then the network must be augmented to allow both generators to transmit electricity at the same time. It is not simply a case of dispatching one generator or the other in that part of the network. The generator with unconstrained access rights must always have sufficient network capacity available – it cannot legally be curtailed.[1]

This also leads to inefficient dispatch in the Wholesale Energy Market (WEM). In a truly efficient market, where generators have equal access rights, energy demand is matched against bids from market participants to supply energy, who are then dispatched according to an economic merit order. Essentially, the cheapest generators are dispatched ahead of the more expensive generators.

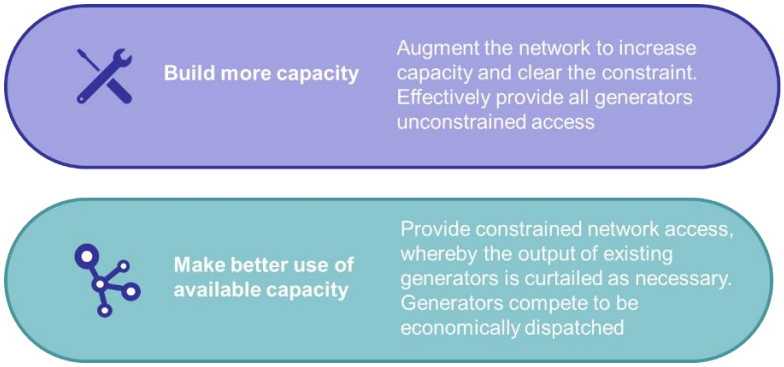
However, when constraints bind under existing arrangements, generators with unconstrained access are dispatched ahead of generators with constrained access. Put simply, if generation is required from behind a network constraint, the generator with unconstrained access rights will be dispatched before any other generators behind that constraint, regardless of whether the generator with unconstrained access rights is more expensive.

This is a fundamental flaw with the current arrangements. Dispatching potentially more costly generation on a first-come-first served basis distorts the economic merit order and inflates the overall cost of the electricity dispatched.

What's are the options?

Theoretically, there are two options for overcoming this barrier to accessing the network:

- build more capacity; or
- make better use of available capacity.



There are challenges in implementing either of these options.

[1] Under a normal SWIS operating state and subject to other exceptions which may be in the relevant access agreement.

First of all, the cost of augmenting the network is high. A major transmission line augmentation can cost hundreds of millions of dollars. A conservative estimate of the cost of building sufficient capacity in the transmission network to allow current and future generators expected to connect in the next 10 years to safely transmit their maximum output is $700 million to $1 billion.

Making better use of available capacity therefore seems the logical and lower cost solution, however it is not without its complexities. While providing all generators constrained network access means Western Power could defer having to make large capital investments to increase capacity, those generators that currently have unconstrained access rights could experience a reduction in net revenue as a result of being constrained off when the network is congested.

What is the preferred solution?

Following feedback from stakeholders during consultation in February and March 2018, the Public Utilities Office conducted market modelling to understand the costs and financial impact to market participants of changing the access regime, with a view to identifying a preferred solution. Three cases were modelled:

1. **Partially constrained access** – the status quo is maintained, and only new generators are connected on a constrained basis, leading to a partially constrained network model;

2. **Fully constrained network access** – all generators have equal access to the network and priority rights of dispatch are removed; and

3. **Unconstrained network access** – the network is augmented such that all generators can be dispatched to their full output capacity without compromising system security.

In summary[2], the modelling indicates:

- partially constrained access results in the highest total market payments and net costs;
- unconstrained access results in the lowest total market payments, but this is at the expense of at least $700 million of transmission network investment; and
- fully constrained access results in lower total system costs compared to partially constrained and unconstrained access.

Modelling indicates that overall, the most efficient solution is fully constrained access. A key finding is that total market payments are forecast to be $288 million less over 50 years in the fully constrained case than the partially constrained case. This means consumers are forecast to be better off under a fully constrained network access framework than they would be under partially constrained network access framework.[3]

[2] Due to the commercially sensitive nature of the findings, the Public Utilities Office cannot provide open access to the modelling. The detailed results of the modelling relevant to each market participant will be shared with individual market participants during one-on-one meetings with the Public Utilities Office.

[3] Forecast savings to consumers from lower market payments will be offset by the quantum of transitional assistance payments to generators with firm access rights.

In addition to the quantifiable benefits of constrained access, unlocking some of the spare capacity available in the network means more diverse generation types can connect as required. This gives Western Australia greater control over its energy future, enabling the market to evolve to meet consumer requirements and providing the flexibility to meet potential emissions targets.

Perhaps more significantly, implementing constrained access (rather than providing unconstrained access) defers the need to undertake traditional 'poles and wires' augmentation, giving the sector time to consider the impacts of change on a network that is likely to evolve significantly over the coming decades as more distributed generation, battery storage and micro-grid solutions come online.

Implementing constrained access

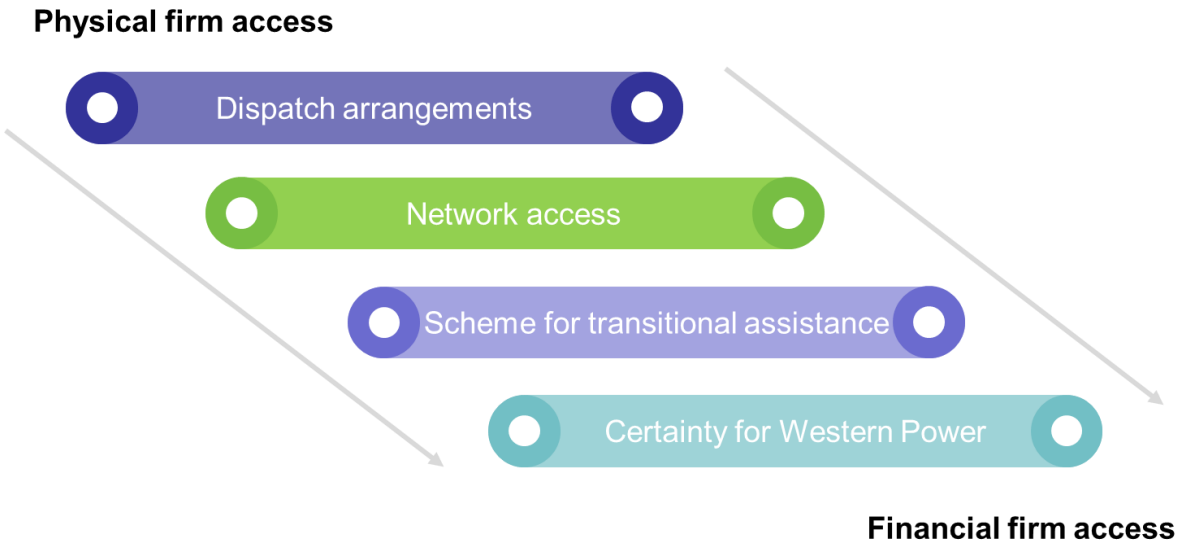
The Public Utilities Office has analysed several options for implementing constrained access. Initial thoughts were to introduce legislation to amend the terms and conditions of access contracts currently held by generators. However, following feedback from stakeholders about the complexities of amending contractual agreements through legislation, the Public Utilities Office is proposing an alternative method of addressing access rights.

The Public Utilities Office is proposing to convert the right to physically transmit energy across the network on an unconstrained basis with a financial right to receive a payment in lieu of being able to do so. These financial rights would be grandfathered, retaining effect until a defined trigger point.[4] This would be implemented through a combination of changes to the WEM Rules, *Electricity Networks Access Code* (and other Western Power instruments such as the Technical Rules), the establishment of a transitional assistance scheme, and the provision of certainty through specific, targeted statutory immunity to Western Power.

Changes to the WEM Rules will enable the Australian Energy Market Operator to dispatch all generators on a constrained basis. Generators that currently have some sort of (unconstrained) physical firm access right would receive a financial payment to cover reasonable losses resulting from constrained dispatch. This would be negotiated individually with affected parties.

[4] The right to transitional assistance for reasonable loss would run until a trigger point to be tested with market participants and other key stakeholders. Potential trigger points could be contract expiry, plant decommissioning, or a blanket sunset date.

Pathway to convert physical firm access to financial firm access



The precise detail behind each of the above steps to implementing fully constrained network access will be tested with market participants and other key stakeholders.

Transitional assistance arrangements

The details of any scheme for transitional assistance are yet to be defined and will be discussed further with market participants. With regard to how transitional assistance would be managed, the Public Utilities Office is proposing an administrative solution resulting in direct negotiation and payment to market participants with affected generation facilities, rather than payment via a market mechanism as originally contemplated in the February 2018 consultation paper.

The quantum of transitional assistance would be based initially on the individual generator's results under the market modelling exercise undertaken by the Public Utilities Office. The Public Utilities Office proposes that these results will be discussed in confidence in a series of one-on-one meetings with participants with affected generation facilities over the coming months.

Invitation for submissions on implementation approach

The Public Utilities Office considers that a fully constrained access is the most prudent course of action. However, the implementation approach outlined in this paper is preliminary only. The Public Utilities Office recognises the need for further consideration of how best to put fully constrained access into practice. The Public Utilities Office therefore welcomes written submissions on the proposed implementation approach.

There will be direct engagement with market participants and key stakeholders on the modelling and modelling outcomes.

Submissions are invited by 5:00 PM (WST) on **10 September 2018**.

1. Background and context

1.1 Purpose of this paper

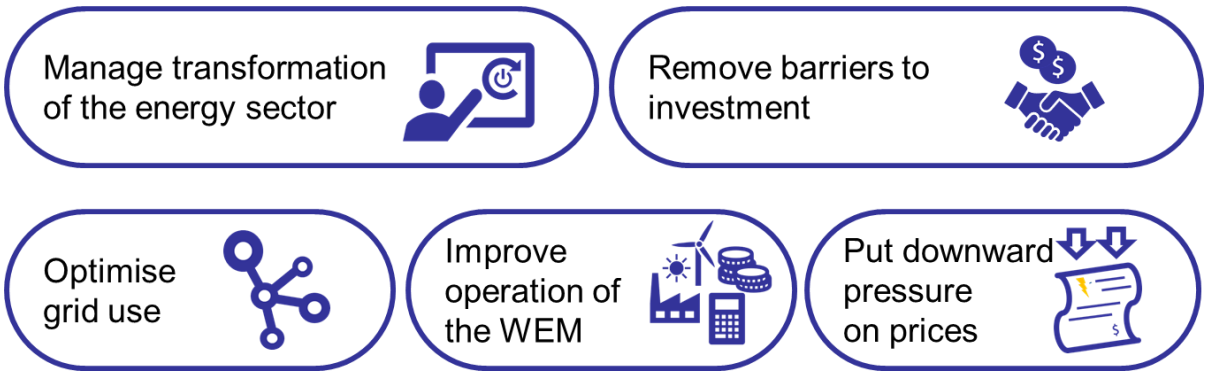
This paper presents the case for change to network access arrangements for the Western Power Network in the South West Interconnected System (SWIS), which operates in the south west of Western Australia. It is a follow up to the February 2018 paper: *Improving access to the Western Power network*[5], which outlined the Minister for Energy's intent to move to a framework of constrained access to Western Power's electricity network.

This paper is designed as an accompaniment to the *Constrained Access Industry Forum*, facilitated by the Public Utilities Office, Western Power and the Australian Energy Market Operator (AEMO) on 3 August 2018. Consultation on the modelling summarised in this paper will be held in one-on-one meetings between the Public Utilities Office and individual generators, and presented in more detail in a subsequent paper to be published in September 2018. However, the Public Utilities Office welcomes submissions on the implementation approach outlined in section 4 of this paper.

1.2 Progressing constrained network access reform

Reforming the way existing and new generators are provided access to the Western Power network is vital. The electricity network access reforms are part of a broader suite of reforms underway, designed to meet the challenges facing the SWIS and to provide a secure, reliable, affordable and sustainable energy supply into the future. Figure 1.1 summarises the aims of the suite of electricity sector reforms currently being progressed by the Public Utilities Office.

Figure 1.1: Aims of electricity sector reforms currently underway



The principal aim of the network access reforms is to optimise grid use and provide more equitable access for generators. This will help remove barriers to investment, which will facilitate connection of more generation (both distributed and renewable), and improve operation of the Wholesale Electricity Market (WEM) by facilitating economic dispatch.

Economic dispatch requires that all generators participating in the WEM have the opportunity to be dispatched on an equitable basis. However, under current arrangements there are a number of generators that have unconstrained access rights (unconstrained access) and some generators that are subject to constrained access (administered via runback schemes and curtailment). This means that under certain circumstances, generators with

[5] https://www.treasury.wa.gov.au/uploadedFiles/Site-content/Public_Utilities_Office/Industry_reform/Consultation-Paper-Improving-access-to-Western-Power's-network.pdf

unconstrained access are dispatched ahead of those with constrained access, irrespective of cost.

Consistency in access rights is fundamental to achieving equitable network access and ultimately a more efficient energy market. This paper outlines the Public Utilities Office's proposed solution to achieving that consistency.

1.2.1 Market modelling

Since the initial round of engagement with industry stakeholders on constrained network access in February 2018, the Public Utilities Office has commissioned Ernst & Young (EY) to conduct wholesale electricity market modelling to estimate the financial impact from introducing constrained network access and dispatch. The Public Utilities Office, in consultation with EY, devised the following three cases for modelling costs and benefits:

1. **Fully constrained** – applying constrained network access and dispatch for **all** existing generators from 2022[6], irrespective of current access rights, and applying constrained access for all new generators that connect in the future[7].

2. **Partially constrained** – introducing constrained access for all generators on an incremental basis, over an extended time period. Generators that currently have unconstrained access rights would have those rights grandfathered and would move to constrained access and dispatch either as their generating plant is retired or when a suitable trigger for re-negotiating access rights occurs. All new generators will be provided network access on a constrained basis. All generators that already have constrained access rights or equivalent arrangements, would continue to be dispatched on a constrained basis.

3. **Unconstrained** – augmenting the Western Power Network to alleviate key transmission network constraints and provide all generators (new and existing) with the ability to export their maximum capacity at any point. This modelling includes forecasting the constraints likely to impact generators over the modelling period.

As highlighted during the March 2018 engagement session with stakeholders, the Public Utilities Office's preferred option is fully constrained network access, as this would remove the inequity in network access and dispatch for all generators within a relatively short timeframe. It would also allow the benefits of economic dispatch to be realised and passed through to electricity consumers more quickly.

The Public Utilities Office received 26 submissions on the initial constrained network access approach. While there was broad support for moving to fully constrained network access in principle, the submissions raised a number of issues with regard to how constrained network access could be implemented, the case for change, and how any transitional assistance arrangements would be managed.

The Public Utilities Office has taken on board feedback from generators, retailers, Western Power, AEMO and other key stakeholders, and has used the EY modelling to help inform the

[6] Only generators that are subject to central dispatch can be constrained on and off.
[7] Transitional assistance will be provided to generators with unconstrained access for the loss of unconstrained access rights.

most efficient option for achieving equitable dispatch. The Public Utilities Office has also looked further at options for transitioning to a constrained network access framework.

1.3 Electricity sector reforms

The electricity sector in Australia and around the world is changing. Technological advances, greater uptake in rooftop photovoltaic systems and distributed generation, and the desire to achieve carbon emissions targets, are just some of the challenges network businesses and electricity market participants are facing together.

As the sector changes, market arrangements and regulatory frameworks must also evolve to help facilitate change and ensure electricity consumers can realise the maximum benefits. In Western Australia the regulatory framework and market systems have not kept pace with change sufficiently. Network access rights and dispatch methods that were fit-for-purpose when introduced, are rapidly becoming unsuitable for today's market and are unsustainable.

For example, providing unconstrained access (and continually expanding network capacity to do so) was appropriate for a rapidly growing and relatively uncongested network. However, these legacy arrangements are now leading to market inequity and uneconomic outcomes. This raises the question of whether to invest several hundreds of millions of dollars to increase network capacity to relieve the network constraints, or whether something can be done to make more efficient use of the capacity that currently exists.

Similarly, the current network model based on centralised thermal generation is being questioned, with consumers, investors and policy makers looking for opportunities to make greater use of renewable generation sources. The challenge here is that many renewable resources tend to be geographically grouped in certain areas at the edge of the network, and often behind network constraints. This raises the question as to how these renewable resources can be used in the most efficient manner and whether it is possible to make better use of the existing capacity in the network.

Historically, the growth in demand has supported the traditional approach to augment the transmission network; building more poles and wires to address connection issues. However, aside from the substantial capital cost involved with traditional network investment, the prevalence of distributed generation in the Western Power Network (combined with the growing potential of energy storage and microgrid solutions) means the future design and use of the network itself is being challenged.

Therefore, although it is inevitable that the solution to today's network constraint challenges will require some network investment in the future, it is prudent to explore what else can be done before undertaking costly transmission capacity expansion.

To help meet Western Australia's energy challenges, the Minister for Energy has directed the Public Utilities Office to undertake a suite of electricity sector reform initiatives designed to:

- place downward pressure on electricity prices;
- enable efficient dispatch of energy and ancillary services, to deliver least cost electricity to consumers;
- remove barriers to private sector investment in generation by releasing some of the contracted but unused network capacity;

- make more prudent use of existing network capacity;
- facilitate greater use of low carbon emission generation;
- improve the operation of the WEM;
- ensure system security and reliability arrangements are able to accommodate an increasing penetration of renewable energy generators and changes to the profile of electricity consumption; and
- facilitate a more responsive capacity pricing regime, delivering clear signals for the efficient entry and exit of capacity to the market.

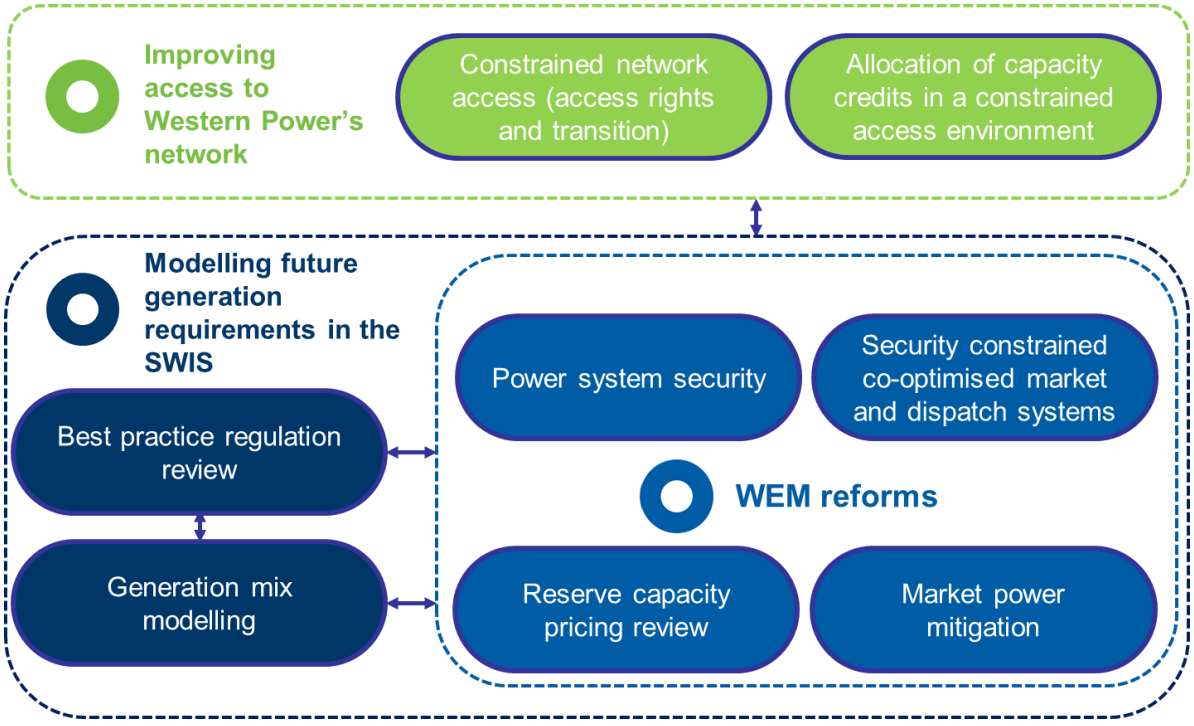
The initiatives being implemented for the SWIS include three key work programs:

- improving access to Western Power's network;
- WEM reform; and
- modelling future generation requirements in the SWIS.

Though these initiatives are being resourced as separate programs, they are inextricably linked. The design and outcomes of the electricity network reforms will directly influence and facilitate the WEM reforms and SWIS generation requirements, and vice versa.

For example, establishing equitable network access provides vital context for power system security studies and generation mix modelling, as the ability for different types of generation to connect will inform future network planning and technical requirements. This work will then feed into reviews of reserve capacity pricing and allocation of capacity credits, which then inform how to realise the full benefits of security constrained co-optimised market and dispatch systems.

Figure 1.2: How the current reform programs interact with each other



Establishing a constrained network access framework in the SWIS is very much a gateway to broader reform. Constrained access is not the sole solution; it is only a first step. However, it is a necessary step so that the benefits of the other elements of the electricity sector reform program can be maximised.

The time frames for implementing reforms are relatively short. The Public Utilities Office's aim is to have reforms in place for the start of the 2022 Capacity Year[8], which commences on 1 October 2022. This requires many of the regulatory changes necessary to give effect to revised network access arrangements to be in place by early 2020.[9]

Given addressing network access rights is a precursor to many of the proposed reforms, it is imperative that action to implement a constrained network access framework commences now.

1.4 Making a submission

Though there will be direct engagement with market participants and key stakeholders on the modelling and modelling outcomes, the Public Utilities Office welcomes written submissions on the proposal outlined in this paper. Specifically, the Public Utilities Office seeks stakeholders' views on the proposed implementation approach for fully constrained access as outlined in section 4 of this paper.

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

Alternatively, submissions can be sent to:
Attn: Mr Ashwin Raj
Manager, Energy Networks
Public Utilities Office
Department of Treasury
Locked Bag 11
Cloisters Square WA 6850

Submissions are invited by 5:00 PM (WST) on **10 September 2018**.

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.

[8] A period of 12 months commencing at the start of the Trading Day which commences on 1 October and ending on the end of the Trading Day ending on 1 October of the following calendar year.

[9] Further detail on the time frame for implementation of constrained network access and subsequent reforms is provided in section 5 of this paper.

Persons making any claim for confidentiality should familiarise themselves with the provisions of the *Freedom of Information Act 1992* (Western Australia), 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 the Project Leader, Ashwin Raj on 08 6551 1407 or email ashwin.raj@treasury.wa.gov.au.

2. The case for changing to a constrained network access framework

The case for changing to constrained network access can be distilled down to two key challenges:

- new generators, particularly renewables, cannot connect to the parts of the network they want to, which creates a barrier to investment and optimal grid use; and
- market dispatch is not economic, meaning there is opportunity to reduce market cost, which may result in lower electricity prices for consumers.

2.1 Issues with the WEM

The WEM commenced operation on 21 September 2006. Over the past decade, the WEM has evolved, with the aim of increasing private sector participation in electricity generation, and delivering lower prices for end-use consumers. This aim has been achieved to some extent through changes to the market design to deliver greater liquidity, timeliness, transparency and more economic outcomes.

The current market arrangements in the WEM include:

- a spot market, the balancing market, which is dispatched two hours ahead in 30-minute intervals;
- a financial day-ahead, hedging mechanism, the short term energy market;
- an administered capital cost recovery mechanism, the reserve capacity mechanism;
- a real-time load following ancillary services (LFAS) market; and
- the provision of other ancillary services through the negotiation of commercial contracts with the market operator.

These incremental changes to the market were designed to enable the greater trade of physical energy and financial products, and encourage the entry of new participants to the WEM.

The positive changes to market design have been broadly successful, as the number and mix of generation facilities in the WEM has increased since 2006. However, a substantial proportion of all new generation facilities connected since 2006 (regardless of fuel type) are owned by (or contracted by) one of the small group of electricity industry participants that existed at market start.

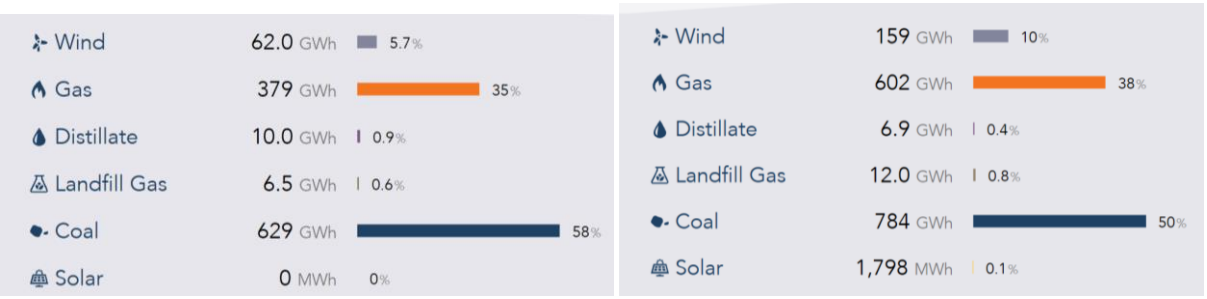
To maximise the potential benefit of the WEM, it is important to have a strong mix of generation participants and generation technologies as this will promote least cost outcomes, putting downward pressure on wholesale market costs and ultimately the end cost to consumers. While there has been an increase in the number of generation participants as well as an increase in the diversity of the generation capacity mix, there is still room to improve.

2.2 Ability for renewables to connect

A further issue is that the current wealth of renewable energy resources available in the State is not being fully harnessed. In Western Australia we are fortunate to have excellent wind and solar resources. While we have seen an increase in the proportion of electricity generated by renewable sources by around 5 per cent (see Figure 2.1), the opportunity to connect much of this clean and relatively inexpensive generation capacity is limited by the existing capacity of the network.

Figure 2.1: Generation fuel type mix used in generation, AEMO WEM data dashboard

January 2007[10] **March 2018**



2.3 Why can't these new generators connect?

Western Power owns, operates and maintains the principal transmission and distribution network in the SWIS. The Western Power Network, like all transmission networks, has physical limits to the amount of electricity it can transmit safely, reliably and securely at any one time. As the network has expanded and evolved, on peak load days some parts are approaching these physical limits. Though this only occurs a few times per year, where there is a physical constraint, there are limits to how much more generation can be connected to that part of the network without investing in additional capacity.

In addition to these physical constraints, there are contractual constraints within the Western Power Network. A consequence of some generators' unconstrained access rights is that network capacity is contracted out, effectively locking it up and reducing the amount of available capacity available for other generators to connect.

This can be a barrier to any new generator seeking to connect in certain parts of the transmission network. This is because Western Power must ensure any new generation connections do not affect the access rights of generators with previously negotiated unconstrained access contracts. Therefore, if a new generator wants to transmit electricity through a part of the network where most of the network capacity is contracted out to a generator with unconstrained access, then the network capacity must be increased to allow both generators to transmit electricity at the same time. It is not simply a case of dispatching one generator or the other in that part of the network. The generator with unconstrained access rights must always have sufficient network capacity available; it cannot legally be curtailed.[11]

[10] While the WEM officially started on 21 September 2006, the majority of facilities were commissioned and certified by January 2007 so the Public Utilities Office has used this date as a relevant comparison.

[11] Under a normal SWIS operating state and subject to other exceptions which may be in the relevant access agreement.

Theoretically, there are two options for overcoming this barrier to accessing the network:

1. **Build more network capacity** - augment the network to increase capacity and remove the constraint. This would enable any new generators to connect behind the constraint and would effectively provide all generators unconstrained access; or

2. **Make better use of the network capacity available** - provide constrained network access, whereby the output of generators is curtailed such that the available network capacity is not exceeded. Generators could then compete or bid to be economically dispatched.

There are significant challenges in implementing both of these solutions.

The cost of network augmentation is high – often prohibitively so. The cost of increasing network capacity (building out a constraint or removing congestion) can run into hundreds of millions of dollars if it requires construction of a major transmission line, and can take many years to construct. This means building out constraints is often not economically viable.

Option 2 is complicated by the current connection and access framework for the Western Power Network. As discussed, under the current framework Western Power is contractually required to provide some generators with unconstrained access to the network when the power system is in a normal operating state.[12]

As a consequence, if a new generator wants to connect in a part of the network where capacity has been contracted out to generators with unconstrained access, it faces the following options:

1. pay for the network to be augmented so there is sufficient capacity to enable the new generator to transmit electricity without compromising the incumbent generator's access rights;

2. connect without the network being augmented and agree to have their maximum permissible output curtailed, either on a post-contingent[13] or pre-contingent[14] basis; or

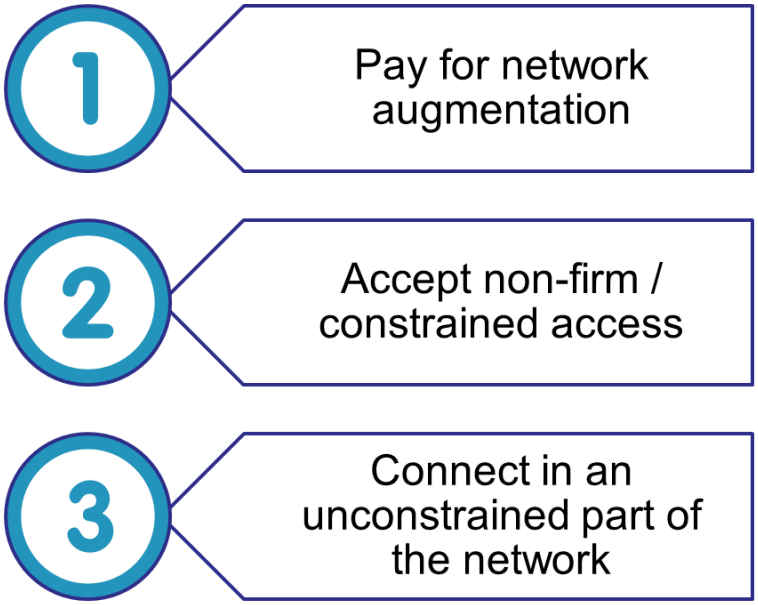
3. connect to a part of the network that is not physically or contractually constrained.

[12] A normal operating state is where the SWIS is not subject to any load shedding or transmission line outages that would affect a generator's ability to transmit electricity.

[13] Post-contingent is where their output is automatically turned down or 'runback' if nominated trigger events occur, in order to avoid overloading the network.

[14] Pre-contingent is where network conditions are assessed at the time of dispatch and the generator's output is capped if necessary to avoid breaching network limits before a contingency event occurs. This method of pre-contingent constraint is currently use in the NEM, and will be used with the Generation Interim Access (GIA) scheme.

Figure 2.2: Options for new generators seeking network connection in the SWIS



In most cases paying for network augmentation is cost prohibitive and therefore a new generator will not connect on an unconstrained basis. It is also not always feasible for generators to connect elsewhere in the network (discussed in the following section). This leaves the only realistic option being to connect on a constrained basis and be subject to curtailment.

2.4 Why don't generators connect where the network is not congested?

Generators tend to locate near their fuel source. Coal-fired power stations are located near coal seams and gas-fired power stations near gas pipelines. The same is true for renewables – windfarms locate where the wind is consistently strong, solar farms connect where the sun is consistently intense. As a result, a generator often has limited choice in where it can connect.

Most generation in the SWIS is coal or gas-fired and is located in and around the Perth metropolitan area. These generators transmit energy to all parts of the SWIS and the Western Power Network was built to accommodate this.

As a result, the Western Power Network is long and stringy. It has long transmission lines emanating from a central meshed network in the Perth metropolitan area, extending out hundreds of kilometres to regional areas such as Kalbarri, Kalgoorlie and Albany. It is along the transmission lines to these extremities where the network congestion tends to occur (although parts of the meshed network around Mandurah can also experience congestion due to the rapid growth in the area). There is limited redundancy in key parts of the transmission network, which restricts the transfer of energy between regions, typically those at the edge of the grid.

In addition, a significant amount of the capacity that is potentially available along these transmission lines is contractually constrained, meaning that while there may actually be

capacity available to transmit electricity from new generators, the unconstrained access rights of incumbent generators prohibit this.

Unfortunately, these edge-of-grid regions tend also to be where the wind and solar resources are strongest, meaning renewable generators are applying to connect there. As a result, the Perth metropolitan area, where the majority of electricity consumers are located, has limited access to the clean and inexpensive electricity produced by renewables.

Figure 2.3: Geographical generation map, facilities by capacity, AEMO WEM data dashboard

One solution to allow new renewable generators to connect is to invest in the transmission network and build out the constraints. As discussed, this is estimated to cost hundreds of millions of dollars.

The Public Utilities Office recognises that over the longer term, as centrally-located coal and gas generators are retired and more renewables come online at the edge of the network, a degree of transmission network investment will likely be required. However, the uncertain outlook for future grid demand suggests it would be prudent to defer this investment at least until the WEM reforms are fully implemented and any new market design is in operation. This would provide the time and data to allow a detailed study of consumers' evolving energy requirements and the application of new technologies to be undertaken.

The WEM reforms will require analysis of what energy and ancillary services are required in various parts of the SWIS, to help inform the timing and nature of network and power system investment in the future. This may also aid the development of suitable locational pricing signals to provide generators an incentive to build generating facilities in the parts of the

network where it is most valued.[15] Therefore it makes sense to defer significant transmission investment until the path forward is clearer.

2.5 If new generators can currently connect on a constrained basis, what's the problem?

As explained, new generators have been able to connect to the network on a constrained basis. However, there are a number of problems with this.

First of all, there are limitations on the number of pre-contingent and post-contingent curtailment schemes available to future generators. The GIA solution, which is currently under development, is designed to allow generators to connect on a pre-contingent curtailment basis. However, the GIA is as yet untested and there are limits to the amount of generation that can be connected under it. Therefore, connecting generators on a pre-contingent basis is only conceived as a short-term solution until the broader WEM reforms are implemented (expected 2022).

The current practice of connecting generators with post-contingent curtailment or 'runback' schemes is also now significantly restricted. This is because the number of post-contingent runback schemes that can be supported in certain parts of the network has reached saturation point. While a more advanced dispatch engine could be developed to manage more post-contingent runback schemes, this would not resolve the other problems associated with maintaining the status quo.

However, the most pressing problem with maintaining the current form of network access is the inequity it creates in the WEM itself.

Having a significant number of generators with unconstrained access rights leads to inefficient dispatch in the energy market. In a truly efficient market, where generators have equal access rights, energy demand is matched against bids from market participants to supply energy, who are then dispatched according to an economic merit order. Essentially, the cheapest generators are dispatched ahead of the more expensive generators.

However, the presence of generators with unconstrained access rights distorts this economic dispatch. This is because generators with unconstrained access are dispatched ahead of generators with constrained access in periods in which constraints bind. Put simply, if generation is required from behind a network constraint, the generator with unconstrained access rights will be dispatched before any other generators behind that constraint, regardless of whether the generator with unconstrained access rights is more expensive.

This is a fundamental flaw with the current arrangements. Dispatching potentially more costly generation on a first-come-first served basis distorts the economic merit order and inflates the overall cost of the electricity dispatched.

To summarise, while a mix of unconstrained and constrained network access is present, WEM dispatch arrangements:

- are unlikely to result in economic dispatch and therefore do not allocate resources efficiently (i.e. cheapest first);

[15] Subject to fuel constraints.

- do not provide efficient signals for transmission, generation and demand-side investment; and
- lead to wholesale market and transmission costs that may be materially higher than otherwise.

A truly equitable market with efficient price signals requires security constrained market and dispatch systems that co-optimise energy with ancillary services.

Security constrained co-optimised market and dispatch systems would allow all market participants to offer energy and ancillary services in a competitive manner and enable AEMO to dispatch the market in accordance with a merit order that achieves the most economic outcomes. Introduction of such a system is a key component of the WEM reform program and is a solution that market participants have expressed a desire for. However, to implement security constrained co-optimised market and dispatch systems that achieve maximum benefit for the WEM, the inequity caused by a mix of constrained and unconstrained access rights must be resolved.

3. Options for improving access to Western Power's network

There are three options available for improving access to the Western Power network:

1. Do nothing, whereby the status quo is maintained and only new generators are connected on a constrained basis, leading to a partially constrained network model;

2. Move to a fully constrained network access model, where all generators have equal access to the network and priority rights of dispatch are removed; or

3. Revert to an unconstrained network, where the network is augmented such that all generators can be dispatched to their full output capacity without compromising system security.

To test what the most appropriate solution is, and taking on board feedback from market participants and other key stakeholders, the Public Utilities Office has conducted more detailed analysis on options for implementing a constrained network access framework.

3.1 Partially constrained access

Under this option, all new generators would be connected on a constrained basis and be subject to being constrained on and off in response to network congestion. Existing generators with unconstrained access rights would retain their access to the network for a defined period of time, with a priority right of dispatch during periods of congestion. This would effectively result in a partially constrained network.

Essentially, a partially constrained access model extends the introduction of fully constrained access over a longer period rather than making blanket changes 'overnight'. This approach provides an opportunity to take incremental steps towards a fully constrained regime, for example by requiring generators to relinquish unconstrained access rights as generation plant is retired.

A partially constrained network access model would achieve economically efficient dispatch over time as the unconstrained access rights of generators are relinquished after a defined period. This approach would soften the impact on incumbent generators but could potentially mean consumers would pay more as a result of inefficient dispatch outcomes over the transition period.

For the wholesale market modelling, the following assumptions were made in the partially constrained access case;

- existing generators with unconstrained access to the network are not subject to being constrained off. However, to provide greater flexibility to manage system security constraints, these generators are able to be constrained on, in response to network congestion, and receive a financial payment in accordance with existing WEM Rules; and

- all other generators can be constrained on or off in response to network congestion. These generators include the new generators assumed to be in service by 2022 and any new entrant generators connecting to the Western Power network from 1 October 2022.

3.2 Fully constrained network access

Under this option, economic security constrained dispatch would be applied to all generators[16], regardless of any unconstrained access rights that may exist. All incumbent and new generators would be dispatched on an equitable and economic basis, using new security constrained co-optimised market and dispatch systems.

A fully constrained model would promote greater competition and result in economic dispatch. No generator will have a guaranteed right to export electricity into the Western Power Network.

For the wholesale market modelling, in the fully constrained access case it was assumed that all generators are able to be constrained on or off in response to network congestion.

3.3 Unconstrained network access

Under this option, all generators connected to the network and generators that connect to the network in the future, can be dispatched to their full output capacity without compromising power system security. This scenario would require all network constraints to be built out by Western Power.

Similar to fully constrained access, a fully unconstrained model provides equitable network access for all generating market participants and therefore enables economic dispatch. However, this comes at a cost of building out all the network constraints to maintain the unconstrained access of existing generators while connecting all GIA generators and forecast new generation capacity on an unconstrained basis, which in the base scenario modelled is estimated by Western Power to be up to $700 million.[17]

One advantage of unconstrained network access is that it means there would be no requirement provide transitional arrangements for generators, as their unconstrained access rights will not be affected. Building out all constraints would also remove current barriers to investment, enabling more renewable and dispatchable generating fleet to connect to the Western Power Network.

For the wholesale market modelling, in the unconstrained network access case it was assumed that the dispatch of generation is not subject to network constraints. In this case, no network constraints are modelled so that generation is dispatched based on offers into the market without any network limitations.

3.4 Modelling inputs

To quantify the relative financial impact to generators and whole of system outcomes as a result of constrained access, EY was asked to examine the impact of introducing constrained access by comparing outcomes across the three cases (partially constrained, fully constrained and unconstrained), using AEMO's 2018 WEM ESOO 'Expected' demand outlook (the Base scenario) as the forecast demand assumption.[18]

[16] By all generators, the Public Utilities Office means all generators that are subject to central dispatch. Some generators, for example non-market generators, are not subject to central dispatch and will not be subject to constrained dispatch.

[17] These projects comprise the Mid-West Energy Project Southern Stage 2, rebuild of a transmission line in East Country, and removing constraints in the Mandurah region. This does not include the cost of removing runback schemes, which would push the network project costs above $1 billion.

[18] A 'High' demand and 'Generation Retirement' scenario has also been modelled, which will be presented in EY's final modelling report, expected at the end of August 2018.

The methodology and all other data inputs and assumptions used in EY's model are based on the *Modelling the Financial Impacts of Constrained Access – Methodology and Assumptions* report dated 28 February 2018.

For each of the cases, EY developed a forecast of the capacity mix, as economically driven by the forecast wholesale market prices, capacity market prices, allocated capacity credits and assumed costs of new entrant capacity.

To quantify the relative impact on whole of system costs and the relative financial impact on generators with unconstrained access, the following key metrics were estimated:

- total market payments, calculated by EY from the modelling outcomes. This is the sum of the forecast revenues for all generators in the wholesale energy market, the capacity market, Large-scale Generation Certificates (LGCs) for renewables, and constrained on payments;
- overall net revenue impacts for existing unconstrained access generators, calculated by EY from the modelling outcomes. This is the total market payments less the sum of fixed and variable operating and maintenance costs (including fuel costs) for existing generators with unconstrained access only; and
- the cost of network projects to provide unconstrained access rights to generators, estimated by Western Power based on the outcomes from EY's modelling. Network projects are included where they are required to build out any binding constraints in accordance with the Planning Criteria.

3.5 Modelling high level findings

The Public Utilities Office will not be providing open access to the detailed results of the EY modelling, due to the commercially sensitive implications of the findings. However, results will be shared in one-on-one engagements with generators, as the modelling will be used to inform any transitional assistance to generators whose access rights are affected by changes in the network access model. Findings for the Base scenario are provided below. These results are high level only and do not describe the full detail of the Base scenario outcomes. There are also two other scenarios modelled that will be presented in EY's complete modelling report.

The partially constrained case results in the highest total market payments and net system costs. The following table presents the outcomes for the fully constrained and unconstrained cases relative to the partially constrained case[19]. The metrics presented are the relative outcomes for total market payments and network costs along with a total impact on generator revenues and net revenues for generators with unconstrained access only.

[19] The partially constrained case is essentially the status quo.

Table 3.1: Relative outcomes in the Fully Constrained Access and Unconstrained cases, compared to the Partially Constrained Access case – Base scenario ($ million, NPV)

Case	Total market payments	Network costs	Net impact	Total revenue for existing generators	Total net revenue for existing generators
Fully constrained	-$288	No change	-$288	-$289	-$194
Unconstrained	-$709	+$700	-$9	-$654	-$508

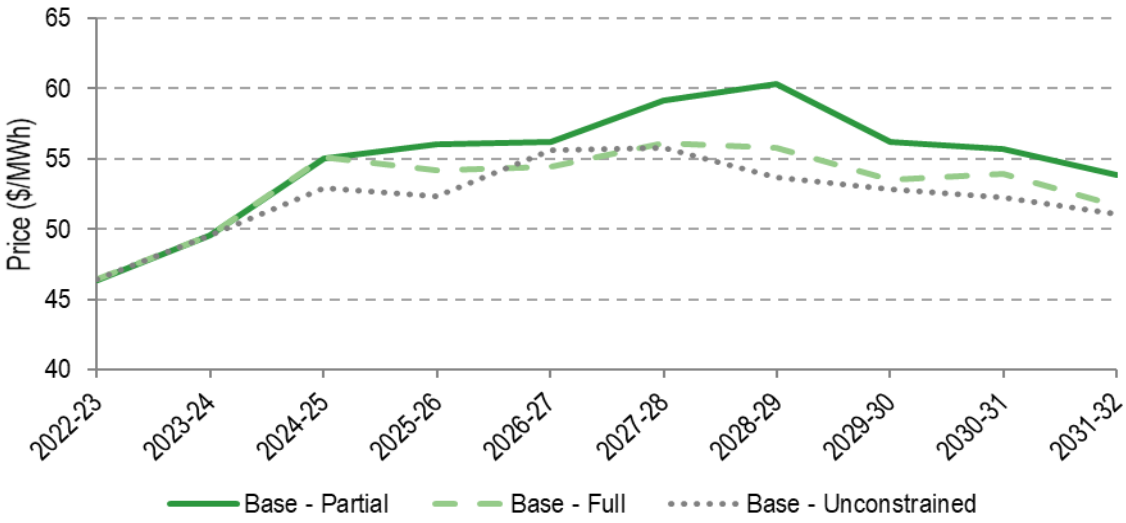
Figures are reported in June 2018 dollars, and discounted to June 2018 from the annual outcomes in the modelling (using a discount factor of 7.5 per cent).

To allow a direct comparison between the total market payments and network costs between the partially constrained, fully constrained, and unconstrained cases, the total market payments represent the impact on the payments to 2080-81. This is based on an extrapolation of the ten years modelled by repeating the average of the final three years for every year post 2031-32. The 50-year period reflects the expected economic life of the network assets that are required under the unconstrained case.

The total net revenue for existing generators identifies the revenue impacts for existing generators that currently have unconstrained access to the network. The modelling has considered 50 years, but extrapolating the impact on total revenue and total net revenue for existing generators out to 2080-81 does not account for generator retirements in that period. The total revenue and net revenue figures provided have therefore been extrapolated to 2037-38, at which point half the existing generators are expected to reach the end of their technical life and are assumed to have retired.

Based on this approach, the least cost option for consumers in the Base scenario is forecast to be the fully constrained access case, as shown by the net impact numbers in Table 3.1. This is primarily driven by balancing prices over the 10-year study period being forecast to be lower in a fully constrained access case relative to the a partially constrained case (see Figure 3.1).

Figure 3.1: Time-weighted average price outcomes – Base scenario ($/MWh)



While the unconstrained case results in the lowest total market payments, with a lower balancing market price, this is offset by $700 million of additional network costs required to provide unconstrained access as estimated by Western Power based on EY's modelling outcomes. The $700 million figure is a conservative estimate, and includes the cost of building out all constraints to meet the Planning Criteria and to allow unconstrained access for generators assumed to be in service by 2022 and any new generation capacity planted during the 10-year study period. It does not include network project costs associated with removing runback schemes.

As shown in Table 3.1, in an unconstrained network, existing generators are forecast to experience a net revenue reduction of $508 million compared to the partially constrained case. This figure represents the net revenue reduction to existing generators as a result of being displaced in the merit order through the effects of competition, compared to the partially constrained case.

The cost and time of providing unconstrained access means that it is unlikely that reverting to unconstrained access is a practicable option. If we consider the costs and benefits of fully constrained access compared with partially constrained access, the modelling results indicate that, for the Base scenario:

- total market payments are forecast to be $288 million less to 2080-81 in the fully constrained case than in the partially constrained case. This means consumers are forecast to be $288 million better off from fully constrained access than they would be under partially constrained access.[20] The lower total market payments in the fully constrained case occurs because there are more options to dispatch generation to achieve the least cost outcome within security constraints, and additional capacity is forecast to connect to the network; and
- existing unconstrained access generators experience a net revenue reduction of $194 million to 2037-38. This is a result of being displaced in the economic merit order through the effects of competition, as well as the revenue reduction to existing generators as a result of being constrained off to manage network congestion.

The modelling results for the Base scenario indicate that there are parts of the Western Power network where it is economically viable for new generation plant to locate (based on a set of assumptions). With no transmission augmentation, by 2031-32 around 400MW of new wind generation capacity could be economically viable, mostly in the Eastern Goldfields, and another 500MW of new gas generation capacity could be installed in the metro area. This is additional to the expected 900MW of new generation capacity that is expected to be connected under the GIA solution. However, the Public Utilities Office acknowledges that decisions around siting of future generation will be influenced by a combination of factors, including government emissions policies, the availability and intensity of renewable resources, and future network augmentation.

[20] Forecast savings to consumers from lower market payments will be offset by the quantum of transitional assistance payments to generators with firm access rights.

4. Proposed approach

Based on the modelling outcomes, the Public Utilities Office's preferred approach is to implement a fully constrained network access model that would involve the introduction of bid-based security constrained dispatch for all generators.[21] This model would promote greater competition and result in more economic dispatch than under current arrangements.

4.1 Implementing fully constrained access

As raised during the consultation process in February 2018, the Public Utilities Office's initial proposal to achieve fully constrained access was to introduce legislation to amend the terms and conditions of the access contracts currently held by a number of generators. However, following input from stakeholders about the complexities of amending contractual agreements through legislation, the Public Utilities Office is proposing an alternative method of addressing access rights.

The Public Utilities Office has also taken on board feedback that direct negotiation with those generators negatively impacted by the introduction of constrained network access is required, particularly with regard to transitional assistance measures. After careful consideration of these matters, the Public Utilities Office is proposing a revised method of implementing fully constrained access. The revised method involves the conversion of physical firm access rights to financial firm access rights.

Effectively, the right to physically transmit energy across the network on an unconstrained basis will be replaced with a financial right to receive a payment in lieu of being able to do so. These financial rights would be grandfathered, retaining effect until a defined trigger point.[22] This would be implemented through a combination of changes to the WEM Rules, *Electricity Networks Access Code* (and other Western Power instruments), the establishment of a transitional assistance scheme, and the provision of statutory immunity to Western Power.

Changes to the WEM Rules will enable AEMO to dispatch all generators on a constrained basis. Generators that currently have some sort of (unconstrained) physical firm access right would receive a financial payment to cover reasonable losses resulting from constrained dispatch. This would be negotiated individually with affected parties.

The aim of this revised method is to reduce the level of protracted contractual negotiation and the potential for inequity in the renegotiated physical access contracts. While a level of negotiation will be necessary with regard to the quantum of the transitional assistance, this will be subject to a transitional assistance scheme, which would provide equitable access to transitional assistance within carefully defined parameters. The Public Utilities Office considers this may be a more efficient method of moving to fully constrained network access.

This conversion from physical to financial firm access rights will be achieved by:

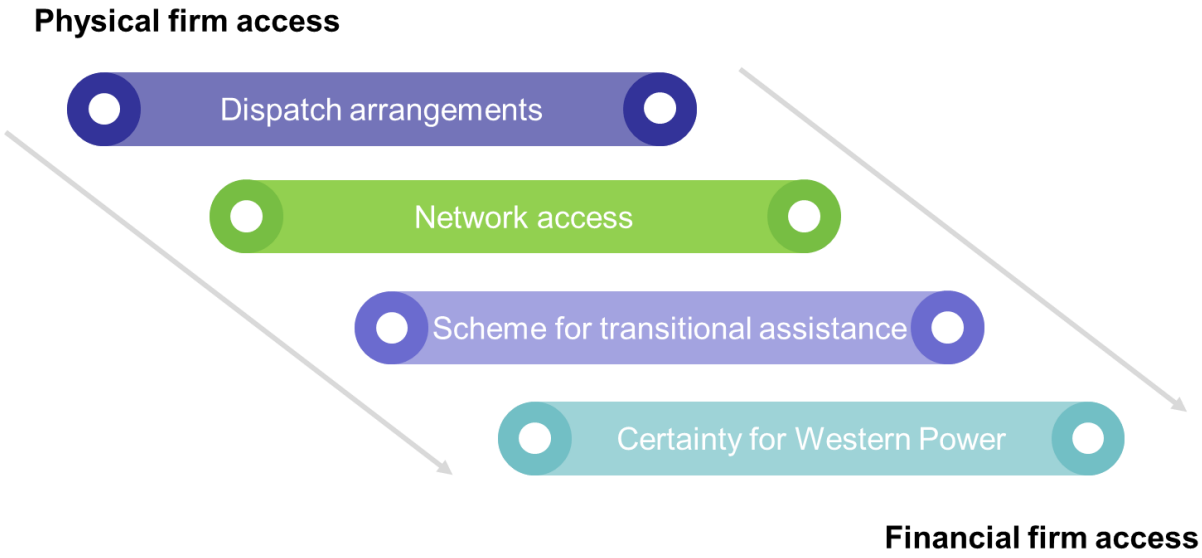
- amending the WEM Rules and Procedures that govern dispatch arrangements, to allow AEMO to apply constrained dispatch to generators;

[21] All generators that are subject to central dispatch.

[22] The right to transitional assistance for reasonable loss would run until a trigger point to be tested with market participants and other key stakeholders. Potential trigger points could be contract expiry, plant decommissioning, or a blanket sunset date.

- amending the framework governing connections and access to the Western Power Network, to ensure that all generators are subject to the same rules;
- establishing an opt-in scheme to provide transitional assistance to eligible generators in the form of a financial payment to cover the reasonable losses the generator may incur as a result of the implementation of constrained network access; and
- providing Western Power legal protection against claims for not meeting contractual obligations under the provisions of a current access agreement to provide access to a generator up to a specified capacity.

Figure 4.1: Pathway to convert physical firm access to financial firm access



The precise detail behind each of the above steps to implementing fully constrained network access will be tested with market participants and other key stakeholders. However, an overview of how the Public Utilities Office envisages the transition to fully constrained access will be executed is provided in the following sections.

4.1.1 Amendments to dispatch arrangements

Changes will be made to the WEM Rules and Procedures to implement security constrained economic dispatch. These changes will allow AEMO to dispatch all generators based on the merit order of costs subject to security constraints, irrespective of any unconstrained access requirements.

In practice, this means generators would be subject to being constrained on or off through the dispatch process to achieve economic dispatch and manage system security. This is similar to arrangements currently in the National Electricity Market (NEM). However, the key differences in WA compared to the NEM would be:

- a mechanism to ensure all generators that are constrained on as a result of dispatch are made whole for the costs of being dispatched, and
- only generators that previously held unconstrained access rights would be entitled to a financial payment for being constrained off.

The provision of financial payments to generators for being constrained on would be built into AEMO's new market systems. The provision of financial payments to generators for being constrained off would be done under a proposed administrative transitional assistance scheme (discussed in section 4.1.3).

Existing access rights that permit AEMO to curtail the output of generators in specified conditions remain unchanged (for example due to a post-contingent runback scheme). Where a generator's output is curtailed outside of the dispatch process to manage system security, a generator will not be entitled to a financial payment for being constrained off.

Note also that the reforms are not intended to change the connection and access arrangements for loads.

4.1.2 Amendments to the framework governing network connections and access

The framework governing connections and access to the Western Power Network includes the *Electricity Networks Access Code,* Western Power's Applications and Queuing Policy, its Transfer and Relocation Policy, and the Technical Rules.

Amendments to this framework are necessary to ensure all generators have equal access to the network and are all subject to the same limitations with respect to the treatment of access rights. To achieve this objective, amendments to the connections and access framework would be required. They include (but are not limited to) the following:

- new generators seeking to access the Western Power Network will only be granted access on a constrained basis. New generators will not be able to obtain unconstrained access to the network;
- network capacity contracted under an access agreement that is not required for a relevant generator will be relinquished on commencement of constrained access (i.e. no such capacity could be retained for future use or otherwise commercially exploited via a 'bare transfer' or similar);
- network capacity contracted under an access agreement that becomes unused following the commencement of constrained access will also be relinquished under certain conditions (i.e. no such capacity could be retained for future use or otherwise commercially exploited); and
- the transfer and relocation of network capacity between connection points (including bare transfers and assignments) will not be permitted following the commencement of constrained access and, for the purposes of the transitional assistance scheme, it may be that transfers and relocations are not recognised after a specified date reflecting the introduction of the policy.

The precise nature and wording of the proposed changes to the *Electricity Networks Access Code* and Western Power's subsidiary instruments have not yet been defined and will be subject to a detailed study and review in late 2018 and early 2019. This could include consideration of other potential costs and benefits to generators, including application of transmission use of system charges. The Public Utilities Office will consult with stakeholders on these changes during the review process.

4.1.3 Scheme for transitional assistance

As part of the conversion from physical to financial access rights, the Public Utilities Office would (subject to a decision by State Government) establish a scheme via a legislative head of power to provide transitional assistance (the scheme).

Details of how the scheme would operate will be subject to further consultation with industry, but at a high level, such a scheme could operate as follows:

- generators must register for the scheme;
  - a generator seeking to be registered for the scheme must agree to disclose its access contract. The purpose of disclosing the access contract is to enable the Public Utilities Office to assess whether the access contract is eligible (i.e. whether it grants some form of unconstrained access right). The disclosure of the access contract will be subject to strict terms of confidentiality.
- if an access agreement is deemed eligible, then as a condition of qualifying for the scheme and to receive transitional assistance payments, generators will be required to agree to a set of terms and conditions that reflect the policy intent of Government around the provision of transitional assistance.

  For example, generators could be required to:
  - allocate contracted capacity (declared sent out capacity or DSOC) to relevant connection points to the extent not already allocated (e.g. where the access agreement covers multiple generation connection points);
  - agree to conditions that restrict what generators can do with contracted network capacity, including restrictions on transferring DSOC between connection points, restrictions on increasing a generator's registered DSOC;
  - agree to a set of trigger events that will bring transitional assistance payments to an end. The Public Utilities Office intends on consulting further with industry on appropriate trigger events, but these could include one or more of the following:
    - a blanket sunset date;
    - expiry of access contract;
    - decommissioning or mothballing a generating facility;
    - refurbishment or expansion of a generating facility;
    - modifications to access contract or connection; and
    - assignment of access contract or change of control of generator.
- as an alternative to requiring generators to agree to a set of terms and conditions, generators could be provided the option to enter into a new access contract with Western Power that reflects the operation of constrained access but incorporates other unrelated legacy contractual matters into the new agreement:

- legacy contractual matters could include, for example, technical performance standards that have been agreed between the generator and Western Power under their existing access agreement can be transferred into the new access agreement (e.g. agreed derogations from the Technical Rules);
- if this approach was used, the new standard form access agreement could be developed in consultation with industry through Western Power's fifth Access Arrangement with due consideration for a new constrained access regime environment.

4.1.4 Legal protection for Western Power

Under the proposed implementation approach, providing Western Power with a statutory immunity is necessary to eliminate Western Power's exposure to claims arising as a result of a purported failure to provide a level of physical access to its network in accordance with contractual obligations (or other contractual commitments) due to the introduction of constrained access.

The immunity is intended to achieve two outcomes:

- provide Western Power legal protection against potential monetary liability under access agreements for not providing access to its network in accordance with the agreement as a result of the introduction of constrained access.
- provide Western Power with protection from potential outcomes (other than monetary liability) of not providing access to generators in accordance with the agreement as a result of the introduction of constrained access. Potential outcomes could include, for example, rights of the generator relating to payment suspension, termination and force majeure rights.

4.1.5 Transitional assistance arrangements

As previously discussed, the details of the transitional assistance scheme are yet to be defined and will be discussed further with market participants. With regard to how transitional assistance would be managed, the Public Utilities Office proposes an administrative solution resulting in direct negotiation and payment to affected generators, rather than payment via a market mechanism as originally contemplated in the March 2018 engagements.

While a market mechanism may provide a more accurate estimate of revenue losses, it may not capture other revenue impacts resulting from constrained access. It may only be possible to identify and quantify these additional costs on a case-by-case basis.

The quantum of transitional assistance would be based initially on the individual generator's results under the market modelling exercise undertaken by the Public Utilities Office. The Public Utilities Office proposes these results will be discussed in confidence in a series of one-on-one meetings with participants with affected generation facilities over the coming months.

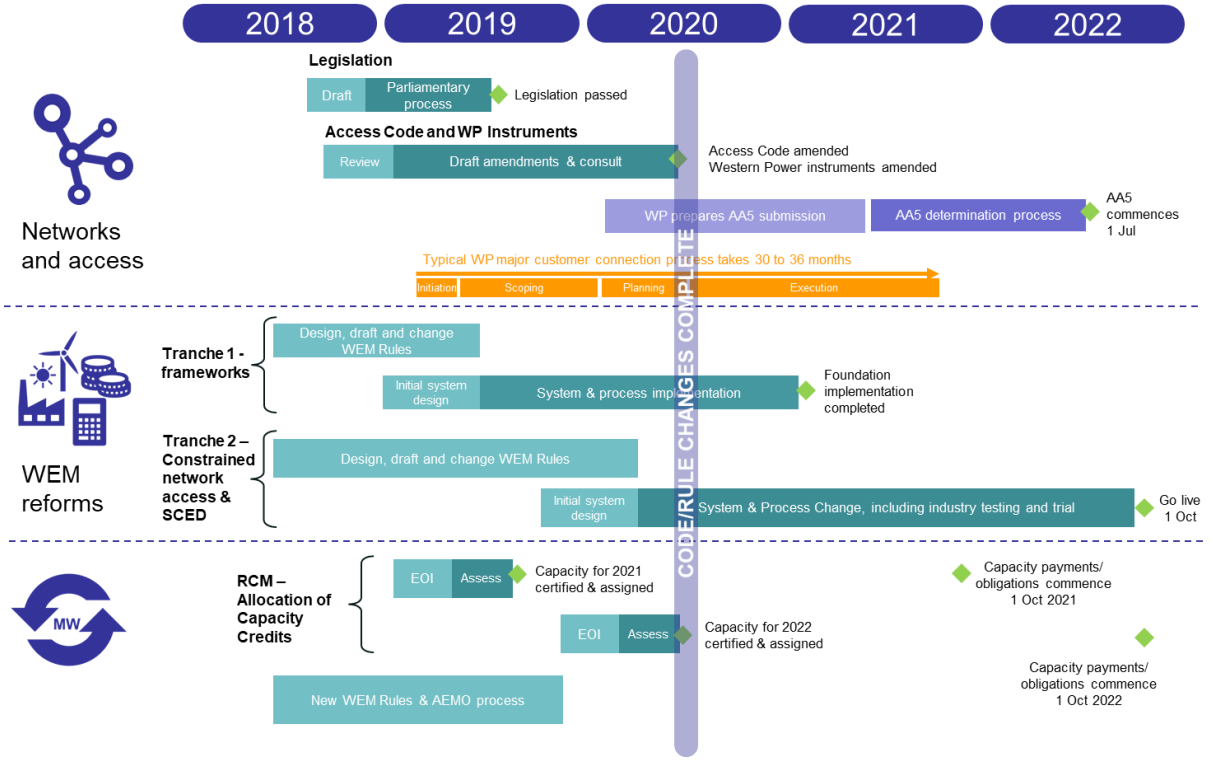
5. Timeframes for implementation and next steps

Following the 3 August 2018 *Constrained Network Access Industry Forum*, the Public Utilities Office and EY will complete the market modelling of the impact of constrained access under two additional scenarios, and will release a final report setting out the modelling outcomes. The modelling paper is expected to be released at the end of August 2018.

The Public Utilities Office will also commence one-on-one confidential discussions with participants with affected generation facilities about their individual modelling results. The Public Utilities Office expects this will be an ongoing process that will extend well into 2019.

The Public Utilities Office will provide final advice to Government on the proposed implementation approach in September 2018, together with recommended legislative amendments. The high level time line and milestones relating to the transitional assistance scheme are summarised below.

Figure 5.1: Time line for electricity network and WEM reform



The proposed process and timing for the scheme for transitional assistance are as follows:

- **August 2018** – the Public Utilities Office commences one-on-one discussions with participants with affected generation facilities about their individual modelling results.

  During these discussions, generators will have the opportunity to interrogate the modelling methodology, data and assumptions used. Generators will also have the opportunity to identify any other costs specific to their circumstances that should be considered by the Public Utilities Office as part of the transitional assistance payment.

- **end-August 2018** – the Public Utilities Office releases a final report on the modelling results. Final advice to Government on the recommended approach to implement constrained access, including a recommendation to establish a scheme for transitional assistance.

  The Public Utilities Office commences further consultation with industry on the scheme for transitional assistance and its implementation, including funding arrangements and the payment of assistance.

- **mid-November 2018** – legislation is introduced into Parliament.

  The Public Utilities Office anticipates that it will consult with industry on the drafting of legislative amendments, but that consultation period will be driven by timing constraints.

- **mid-2019** – legislation expected to be passed by Parliament.

  At around the same time, the Public Utilities Office expects to have reached agreement with generators on the quantum of financial payments to convert physical firm access rights to financial firm access rights.

- **end 2019** – amendments to the *Electricity Networks Access Code* are made, including amendments to establish and implement the scheme for transitional assistance.

- **early 2020** – Government approves transitional assistance amounts. The scheme for transitional assistance is established and generators register for payments under the scheme.