



**VISION FOR THE FUTURE ENERGY SYSTEM**  
**South West Interconnected System**

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# 1. Foreword from AEC Chair



Australia's energy system is undergoing the most significant transformation in its history. The task is to replace and modernise our aging energy system with cleaner and more advanced technology, while keeping energy reliable and affordable for households and businesses. Delivering on both is what will define the success of the transition.

In the past few years, energy has shifted from being a background utility, passively consumed, to front of mind for households and businesses. Australians are becoming more engaged, as they seek greater control over their energy use and costs, as well as their carbon footprint.

However, volatile global markets, geopolitical tensions and supply constraints are driving up fuel costs and raising sharper questions about security of energy supply. This is creating real and immediate cost pressures for Australians, against a backdrop of broader economic uncertainty.

In this context, the energy transition has never mattered more: building a cleaner and ultimately more affordable system that delivers lasting benefits for customers is critical to our future prosperity.

Today, we are at a point in the transition that can feel messy. Our ambition must be matched by delivery – across engineering, approvals, supply chains and construction. The choices made now will determine how quickly, reliably and cheaply we can deliver the transition and shape better outcomes for customers and the economy well beyond 2050.

The Energy2050 report sets out the AEC's ambitious vision for a 2050 energy system, and the priority areas of focus to get us there. Expectations are high and concerns are real, so we need to speak openly about the challenges ahead, and the opportunities in front of us.

Across the sector, progress is being made. Investment in renewable generation, storage and consumer energy resources continues to grow, and Australians are already helping reshape the system through electrification of their homes and cars. But progress hasn't come without challenges, and we need to be clear-eyed about what it will take to keep the system secure, reliable, and affordable as the generation mix changes.

This report sets out a practical agenda for the near term. It identifies the priority reforms and investment settings needed to keep momentum, and the partnerships industry and governments must build to advance the transition. That means building transmission, storage and firming on time, and providing the policy and market confidence that supports investment, so the system continues to reward reliability and flexibility at the lowest sustainable cost.

Above all, it reinforces the importance of keeping customers at the centre so that the most critical outcomes – affordable power, more control and choice, and trust in the system – are assured as we move forward.

The energy transition will not be linear. But with clear policy frameworks, disciplined execution and collaboration across industry and governments, we can lay strong foundations for Australia's energy future.

I commend this work to you and look forward to engaging with stakeholders as we seek to deliver a system in 2050 that genuinely works for all Australians

**Frank Calabria**

Chair, Australian Energy Council

## 2. Introduction

The Australian Energy Council's (AEC's) Energy2050 project aims to define what a successful transition to net zero looks like for Australian energy consumers, focusing on the core trilemma pillars of reliability, affordability, and sustainability.

Energy2050 is a vision for an energy system which provides affordable, reliable, clean energy for Australian families and businesses. This vision is broadly consistent with official 2050 projections and Energy2050 sets out how to achieve them.

The future potential is clear. Australia can harness our abundance of renewable resources to deliver low cost, reliable and clean energy for all. The technology we need to achieve this is here and now, and there is every reason to believe continued rapid advancements in clean energy technology and scale will create even more opportunities to deliver better energy for consumers where and when they need it.

We are at a critical juncture where much of our current system which has served us well for over half a century needs to be replaced, independent of Government policy. This creates challenges and costs as well as opportunities. The choices we make now will determine how quickly, reliably and cheaply we can transition to a better energy future.

Everyday energy consumers have been the champions of the transition to cleaner, cheaper energy. Their investments in rooftop solar have made Australia a global leader in distributed solar, and the competitive industry supporting them has delivered some of the lowest installed solar costs in the world. This consumer led investment is now providing cheap daytime energy for all users in many areas. We are now seeing consumers further take up the challenge through investments in batteries, electric vehicles and electrification.

The future will be increasingly decentralised. Consumers will be at the heart of a two-way system where they are increasingly exchanging services with each other.

In many ways it's time for the supply side to be empowered to step up and deliver the transition at the wholesale level. Just as competition has delivered low cost solar for households, competition can deliver the lowest cost mix of renewable generation, shaping and firming services needed at all scales to deliver affordable, clean and reliable power to all consumers. Electricity networks – the poles and wires – will continue to play the critical role of providing the platform for the transport and exchange of energy. Clear and detailed plans are required to map out future transmission buildouts and offer certainty to investors. The distribution network is essential in supporting greater CER activity. As natural monopolies, transparency, strong economic regulation and ring fencing of networks will remain essential to protect customers and enable competition.

### **The Energy2050 project**

The Energy2050 project focuses on Australia's two main energy systems: the National Electricity Market (NEM) that covers the eastern states and the South West Interconnected System (SWIS) that serves Perth and the surrounding region in Western Australia. This paper is a comprehensive look at the SWIS. A paper focussed on the NEM have been published separately.

We have started by envisioning what the energy system could look like by 2050, particularly if net zero targets have been met (Section 3). This vision doesn't just entail the physical configuration of the future energy system but also considers the ways consumers' energy needs and

wants will be met, the roles of different parts of the supply chain and the underlying policy and regulatory framework that governs the interactions between different parties. From this starting point we envisage where we might be in 2035 as an indicative milestone to see if we are broadly on track for that 2050 vision. While this is not a prediction of the state of play in 2035, as a marker it seeks to provide a clear sense of what we need to aim for. While we are taking a positive outlook for 2050, an open and honest dialogue about the challenges and costs of the energy transition is required. Alongside the critical enablers that will help us get to Energy2050, we have included a snapshot of current issues and the risks and uncertainties that may prevent us achieving the vision.

The WA Government and the Australian Energy Market Operator (AEMO) have already offered some modelling and projections for the period until 2050. Some of these projections have, and will continue, to change as the energy transition evolves and further pieces of work (such as the Whole of System Plan) are completed. Energy2050 is not providing alternative or additional modelling. Rather, Energy2050 considers what the SWIS might look like in 2050 as the State Government works towards its commitment of net zero.

Common across all predictions is an expectation that the 2050 energy system will entail an expanded transmission network with large volumes of variable renewables, shorter duration and longer duration storage, all of which is complemented by gas. Demand will have increased due to the electrification of much of the transport sector and many of the energy services currently delivered via natural gas, and so this utility scale infrastructure will still be required even though there will be widespread deployment of CER around the grid – primarily rooftop solar photovoltaic panels (PV) and batteries. Demand flexibility may play a significantly bigger role than it does today. Importantly, the WA State Government has made a commitment to retire all state-owned coal fired plants by 2030, with no new coal plants being built.

Regardless, the official projections about the energy system are just that – projections – and they don't tell us everything required to meet government emissions targets in the chosen timeframe. In other words, if they are the "what", Energy2050 seeks to be the "how". This entails deeper consideration of a range of issues, which are summarised below and canvassed in greater detail in Sections 3 and 4. We have grouped these issues as follows:

- How best to deliver dynamic and flexible energy markets. This examines wholesale market design, the provision of essential system security services, delivering cost effective transmission infrastructure, and considering the role of gas; and
- How to deliver a customer-centric energy system. This examines enabling consumer participation and sharing value, customising products and services, and developments at the distribution level.

While the industry has plenty of work to do to deliver this future, we need governments and policymakers to set the right frameworks for us to operate within. As such we have identified a set of priority actions to create and strengthen these frameworks:

**Table 1: Priority actions**

<b>Theme</b>	<b>Actions</b>	<b>How this drives affordability</b>
<b>Establish and update a commonly accepted transmission plan</b>	<p>One authoritative source to create and maintain a transmission plan</p> <p>Charging and cost-recovery mechanisms for transmission investments should be clear and applied equally to all connecting projects</p>	<p>More certainty about the roll-out of new transmission promotes investment and helps to keep wholesale prices down</p>
<b>Make the grid connection process efficient and transparent</b>	<p>Reform grid connection process to reduce delays and facilitate the connection of new generation</p>	<p>More generation connecting to the grid will add supply and put downward pressure on wholesale prices</p>
<b>Revenue certainty for generators</b>	<p>Implement measures to address the missing money and shallow contracting market problems in the SWIS</p>	<p>More generation connecting to the grid will add supply and put downward pressure on wholesale prices</p>
<b>Improve coordination of the SWIS</b>	<p>An overarching plan for the energy sector that identifies a central pathway, guiding policies and providing certainty to investors</p>	<p>Encourages investment in the SWIS and increases generation supply</p> <p>Prioritises reforms and reduces market fees</p>
<b>Create opportunity for retail and behind-the-meter competition</b>	<p>Support greater contestability and more innovation</p>	<p>An increase in competition will drive better outcomes for consumers and the energy market</p>
<b>Promote collaboration across CER participants</b>	<p>Enable collaboration across CER participants so consumers can choose how deeply they engage</p>	<p>Access to increased CER will bring sustained bill savings, reliability and trust</p>
<b>Create more dynamic signals for consumers</b>	<p>Establishing more dynamic ways to send signals to customers on when to consumer or export power will maximise the advantages of CER</p>	<p>Flexible solutions will improve outcomes for consumers</p>

### 3. Overarching 2050 Vision for Net Zero

The AEC's vision for 2050 is deliberately intended to be a positive, aspirational "light on the hill". We recognise it's a challenging goal to achieve, but its purpose is to drive action today with a view to getting as close to these outcomes as possible, as a result of intentional policy design choices rather than by accident.

The vision has two main components:

1. Dynamic and flexible energy markets; and,
2. Customer-centric energy systems.

#### Dynamic and Flexible Energy Markets

**Dynamic and flexible energy markets** are the driver of secure, reliable, efficient and affordable wholesale markets and other arrangements.

As the energy market transitions towards net zero by 2050, there will be an ongoing requirement to determine the least cost mix of reliable supply (including demand response) at any given time. Ideally the revenue stack comprising the spot market, contract markets and the Reserve Capacity Mechanism will be sufficient to incentivise and reward generation and storage while keeping energy affordable for all users. However, there may still be a role for additional revenue streams or other mechanisms to support the entry of new generation.

As the transition unfolds it is likely that gas will play a key role in firming supply. If Western Australia is to meet its net zero targets, gas generation will need to be decarbonised (whether via offsets, carbon capture storage or renewable gases) and delivered by a highly flexible production and transportation system, each of which could be provided in a range of different ways.

To get to net zero by 2050, there needs to be a build-out of new transmission in the SWIS to enable the large volumes of renewables and storage to connect to the grid. If this occurs then it is hoped that transmission planning and investment will start to return to a steady state by 2050, allowing a reversion to market-led expansion when required rather than centrally planned expansion. Since networks may be better optimised using network support by 2050, an increase in demand may also not require a significant new investment in "poles and wires".

#### Customer-Centric Energy Systems

Customer-centric energy systems are oriented towards ensuring that customers of all types and sizes can participate to the degree they want to in the energy system. This will be across the spectrum from completely disengaged, passive consumers through to those seeking to actively self-optimize across their consumption and production. To get to this point, the retail and behind-the-meter markets will need to transition towards more competition to facilitate greater innovation, complete solution packages and frictionless innovation. Behind the scenes, service providers will ideally be aggregating resources to respond to signals for energy, system services and network support in a co-optimised manner designed to minimise overall system costs. All users will benefit from this cost minimisation process regardless of their level of participation or whether they have their own CER.

Wholesale and network requirements will most likely be driven by customer need in the future. This is the opposite of the traditional utility model where customers are obliged to take and pay for the services the utility decides the customer needs. Instead, households and small businesses will see

their energy wallet shrink as they have transitioned from paying for three fuels (gas, electricity and petrol/diesel) to one (electricity) and self-generate much of their own consumption.

There is a lot of work to do in order to achieve these outcomes. The next section sets out a path forward focussing on the critical enablers and when we need to take these actions.

## What the system could look like in 2050

The likely physical configuration of the system and the inherent uncertainties are described in the table below.

System element	Uncertainties
<b>The amount of low-cost solar and wind generation will significantly increase. They will become more geographically dispersed across the SWIS relative to the historic system.</b>	The contribution of wind and utility scale solar amongst the broader generation mix is unclear.
<b>Transmission networks, existing and new, will connect renewable energy with consumers, bringing low-cost electrons to heavy industry, businesses and households.</b>	The timing and location of new transmission build beyond 2030 is not known. There may be merit in seeking to locate new industry closer to generation.
<b>Firming and shaping technologies will smooth out the variations in renewable supply.</b>	The SWIS has limited scope for hydro, so it is likely to have a different mix of firming technologies. Batteries, and increasingly long-duration batteries, are expected to dominate, but other longer-duration storage technologies (such as compressed air) may become commercial by 2050.
<b>Gas-powered generation will provide the necessary back up with critical power supply both for ‘renewable droughts’ or to meet peaks in consumer demand.</b>	Gas may play a larger or smaller role than anticipated. If there is only a small role for gas, the gas network may struggle with the required flexibility.
<b>Batteries, gas, and other network investments will deliver essential system security (ESS) services to maintain grid security and stability.</b>	There is a need to make a switch from relying on spinning machines for ESS to relying mostly on inverters. How and when this occurs remains to be determined.
<b>Rooftop solar and batteries will generate consumers’ own electricity, store it for when they need it, and supply the excess back to the grid.</b>	The scale of distributed resources is uncertain, as is how its owners will use it and whether they will allow their resources to be aggregated and orchestrated to optimise system needs or self-manage to meet their own needs.  The timing and scale of any further competition in the retail and behind the meter markets is unknown.

While emissions reduction and the need to progressively replace old plant are key drivers of the transition, even once we reach net zero the system could continue to evolve. Demand patterns may change and infrastructure will need replacing or upgrading. While new technology typically takes decades to reach widespread deployment, the further into the future we look, the more likely that a technology emerges that reshapes the system. So, while 2050 and net zero may be an important milestone we need market and policy settings that will continue to be fit for purpose beyond 2050.

## 4. Dynamic and Flexible Energy Markets

### The target 2050 future state

There is a limited pool of projections to draw on when considering what the SWIS might look like in 2050. The SWIS Demand Assessment (SWISDA) is the only contemporary publication that considers the generation mix for the decades ahead and this report extends out to 2042. The SWISDA, published in 2023, is an assessment of potential electricity demand over the next 20 years to meet industry and Government commitments of achieving net zero greenhouse gas emissions by 2050. The aim of the SWISDA is to model the optimal mix of renewable generation and storage required to meet the anticipated demand, and to identify the network augmentations necessary to get the electricity to end users.

Through interviews with the resources industry and renewable developers, the Treasury-led taskforce developed four demand scenarios each reflecting different outlooks for major loads connecting to Western Power's transmission network over the next 20 years. In the middle-path 'future ready' scenario, SWIS generation capacity increases from 5.9GW in 2022 to more than 50GW by 2042. The majority of this new generation capacity is large-scale wind and solar, increasing from 1.2GW in 2022 to reach 41.8GW in 2042. The SWISDA also says that an additional 3.9GW of new gas generation capacity will come online after 2030 to support renewable generation. Some of the forecast growth in the SWISDA is attributed to large amounts of hydrogen loads connecting to the grid during the 2030s, which is now considered somewhat ambitious.<sup>1</sup>

Whatever the specific level and mix of generation and storage, it is hoped that the hard work underway now to facilitate the energy transition will lead to policy stability by 2050. Measures to address revenue adequacy and the shallow contracting market in the SWIS will have long been implemented to promote new investment, while transmission plans will be regularly produced by one authority – sending clear signals to investors on where and when to build new projects.

The cornerstone of a future market in the SWIS is effective competition and market-led investment. As a complement to the wholesale market, a future retail market could also be in a "steady state" by 2050 with cost reflective tariffs and a lower contestability threshold to promote retailer and behind-the-meter competition.

### Where do we need to be by 2035 to achieve the 2050 targets?

Drawing on AEMO's WEM Electricity Statement of Opportunity (WEM ESOP) it is expected that coal will be fully retired in the SWIS by 2030, while Pinjar gas turbines 1, 2, 3, 4, 5 and 7 exit in 2029 and Pinja gas turbines 9, 10 and 11 come offline in 2032 due to age. By 2035 new renewable projects will have connected to the Clean Energy Link – North line and stage 1 of the Clean Energy Link – East line, some new gas projects could have entered, and residential solar and battery projects will continue to proliferate. An unknown is the extent to which hydrogen projects will advance over the next decade. If the economics of green hydrogen has improved by the mid-2030s then additional demand will need to be met.

Key to unlocking future demand and the pipeline of potential new renewable projects is energising the next wave of transmission lines and resolving grid connection bottlenecks, providing timely and cost-

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<sup>1</sup> AEMO has cast doubt on such large amounts of hydrogen entering the grid and significantly reduced hydrogen production forecasts in its 2025 WEM ESOP.

effective grid connections to new entrants. This is a key challenge and will require sustained focus from policy makers and market participants.

An equally important challenge is ensuring that new generators in the mid-2030s earn sufficient revenue and can secure offtakes. In the absence of a large uptick in energy demand from industrial customers expanding the power purchase agreement (PPA) market, it's likely that the initial tranche of renewable projects connecting to the Clean Energy Link – North line and stage 1 of the Clean Energy Link – East line will consume most of the existing contract market in the SWIS. The State Government, policy makers and industry will need to have worked together to implement measures to minimise the offtake risk, boost revenue adequacy and promote the entry of new projects in the 2030's.

Another priority issue to be addressed before the mid-2030's is the stabilisation of wholesale prices. Moderating energy costs for contestable customers will be needed to improve affordability, promote new investment in Western Australia, and demonstrate that the energy transition can put downward pressure on energy prices. Improving customer choice by lowering the contestability threshold could help to stimulate competition for larger consumers, although introducing cost reflective tariffs will be a necessary precursor.

## The current state

The current energy market in the SWIS is characterised as one of rapid change where the challenges of the energy transition are being uncovered in real time.

The proliferation of rooftop solar driven by attractive feed-in tariffs may have been the precursor to many of the changes in the SWIS. Rooftop solar is now the largest generator in the SWIS and is installed in more than one-in-three households. The addition of large amounts of rooftop solar, plus new utility-scale wind and solar projects joining the grid, has seen the share of renewable generation more than double from 15% in 2018 to 35% in 2024. On some days, over 80% of the SWIS is powered by wind and solar.

The increase in renewable generation has mostly displaced coal generation. In 2014, coal represented 50% of the generation mix but that share has now dropped to about 30% of total generation. The State Government intends to phase out its coal power stations, with Muja and Collie closing by 2030. Bluewaters Power Station is set to remain open longer than expected but regardless, by 2035 it's unlikely that coal generation will remain in the grid.

The energy transition has led to a widespread, and rapidly deployed set of reforms intended to ensure that the market is able to deal with the vast amounts of new renewable and battery storage projects that are expected to connect to the grid before coal exists. There have been amendments to the Access Code, the WEM Rules have been entirely updated, a new market started in 2023, market power mitigation rules have changed, five-minute settlement has been pursued, and there have been reforms to the Reserve Capacity Market. Some of these reforms have been implemented without decision makers having first put together a budget, undertaken a cost/benefit analysis, assessed its priority or considered how the reform interacts with other projects, and whether it might create a duplication of efforts. Taken together, the reforms are complex, costly to implement, and have increased market fees.

The feedback from stakeholders is that there is 'reform fatigue', and an erosion in investor confidence. The amount of reform has outstripped the ability for market participants to meaningfully understand and respond to all of the consultations, and every change in the market increases costs and chips away at investor confidence. The AEC agrees with comments made by FTI Consulting as part of the *Triennial review of the effectiveness of the Wholesale Electricity Market* that reducing uncertainty

brought about by changing policies is crucial to encouraging new investment in the SWIS over the coming decades.<sup>2</sup> Improving the coordination of regulatory change is a necessary step to meet the ideal 2050 future state.

Wholesale prices are also becoming another pain point in the SWIS. Efficient and equitable prices are critical to managing cost of living pressures for household and maintaining cost-competitiveness to encourage new industries to enter Western Australia.

The wholesale price stack broadly comprises wholesale costs, reliability costs, transmission and distribution costs and AEMO costs. The last few years have seen prices across each of these categories increasing sharply.

AEMO noted in its Q2 2025 Quarterly Energy Dynamics report that costs in the WEM increased by \$9.52/MWh (+7%) from Q2 2024 to reach \$147.78/MWh.<sup>3</sup> The rise in costs was largely attributed to:

- Reserve capacity costs increasing to \$42.07/MWh in Q2 2025, a \$12.22/MWh (+41%) rise.
- Energy uplift costs reaching \$0.35/MWh because of a planned network outage.
- Normalised non-co-optimised Essential System Services (NCESS) costs rising to \$5.96/MWh, caused by the commencement of 10 new NCESS contracts since Q2 2024.

Frequency Co-optimised Essential System Services (FCESS) costs did decrease substantially during this period primarily as a result of changes implemented as part of the FCESS Cost Review in November 2024.

In all, costs in the WEM are trending upwards and this is expected to continue. One major contributor to rising costs is the Reserve Capacity Price. An analysis undertaken by Rennie Advisory found that the total market value of capacity credits will be \$1 billion higher in 2027-28 compared to 2023-24, adding \$56 to the cost of each MWh. This will get even worse in coming years as the reference technology changes from a 4-hour battery to a 6-hour battery, and again in 2031 when the transitional pricing rolls off.



Total market value of capacity credits

Source: Rennie Advisory

<sup>2</sup> See p27 and p28, [Revenue Adequacy for Generators in the WEM](#)

<sup>3</sup> See p84-85, [Quarterly Energy Dynamics Q2 2025](#)

Gas is both a key fuel in the SWIS and an important energy source for both industrial and household consumers. Gas prices have also risen above historical trends, putting further pressure on consumers.

The increasing wholesale prices is a particular concern to contestable customers and the State Government who support residential customers through regulated tariffs.

### Key risks and uncertainties

Moving from the current state to the ideal 2050 scenario will require a coordinated effort, targeted reforms and significant investment. Some of the key risks and uncertainties in reaching the target 2050 position include:

- The lack of an overarching single long-term system plan which identifies a central transition pathway. Without this, there is no clear alignment on planning and policy creating uncertainty for investors and market participants.
- Mixed signals over who is responsible for producing transmission plans. The SWIS Transmission Plan, published by the State Government, only focuses on the short term and does not include critical information about transmission routes and timing that is needed to promote investment.
- Delays in the grid connection process continue to stall new developments.
- The impact of rising wholesale prices on consumers and the State Government.
- The shallow contracting market potentially makes it difficult for some projects to secure an offtake, especially in the post-2030 period.
- Security of gas supply for gas generators.
- Lack of a long-term vision for the supply of essential system services.
- A limited contestable market and a lack of retailer choice for customers consuming less than 50MWh.
- CER activity is currently dominated by one entity, reducing competitiveness and innovation in the market.

### Critical enablers to bridge the gap between current and future states

**Establishing and updating a commonly accepted transmission plan** - It is imperative that transmission planning is coordinated and fast tracked to meet the evolving needs of the SWIS.

The key elements to achieving good transmission planning are:

- A credible transmission plan needs to be produced and maintained.
- There should always be only one authoritative source of network planning.
- Charging and cost-recovery mechanisms for transmission investments should be clear and applied equally to all connecting projects.

Any delays in transmission planning and investment have significant consequences. This is highlighted by a report prepared by Baringa that considers the costs of delaying new transmission in the SWIS. Baringa modelled the market with a one-year delay to transmission build-out and compared it to a base case no-delay scenario by calculating the difference in wholesale costs (cost to serve demand) and Reserve Capacity Mechanism costs between the two scenarios. A one-year delay in transmission build is estimated to increase total consumer costs by \$1.4 billion across 2028-2033, driven mostly by increases in wholesale energy costs. A three-year delay in transmission build would increase consumer costs by \$3.9 billion. In either scenario, coal and gas generators would need to

operate much more than they are now to bridge the gap, causing emissions to jump towards the back end of the decade. Baringa drew the following conclusion:

*“Getting the initial long-term planning arrangements right is critical to enabling a timely, coordinated, transition in the SWIS ... Without a commonly accepted plan to provide direction, a coordinated and timely energy transition becomes harder to deliver with the risk of detrimental outcomes for energy security, reliability, affordability and sustainability.”<sup>4</sup>*

The release of the SWIS Transmission Plan in 2025 was a welcomed step. However, transmission planning needs to evolve so that the transmission plan is authored and maintained by one source, and key information, such as transmission routes and timing, is included in the plan to promote investment.

**Making the grid connection process efficient and transparent** - Getting the required amount of new generation online in the coming decades will require a grid connection process that is flexible, efficient, and transparent.

Currently, Western Power is only required to use ‘reasonable’ and ‘best endeavours’ to process grid connections and this was approved by the Economic Regulation Authority (“ERA”) as part of the fifth access arrangement with some minor guardrails added.

Western Power has, however, undertaken a good amount of internal work to improve communication and reduce the grid connection timeframe. In practical terms, this has meant Western Power offering more customer self-service options, streamlining the connection process, and implementing the Major Customer Portal.

Another change implemented by Western Power is the establishment of the critical project framework. The purpose of the framework is to prioritise projects that have more prospect of proceeding. Western Power assessed the first tranche of projects in 2024 and gave ‘connection ready’ status to 7.73 GW worth of projects. However, the process hasn’t been without some issues and Western Power’s assessment of projects has caused unusual outcomes.

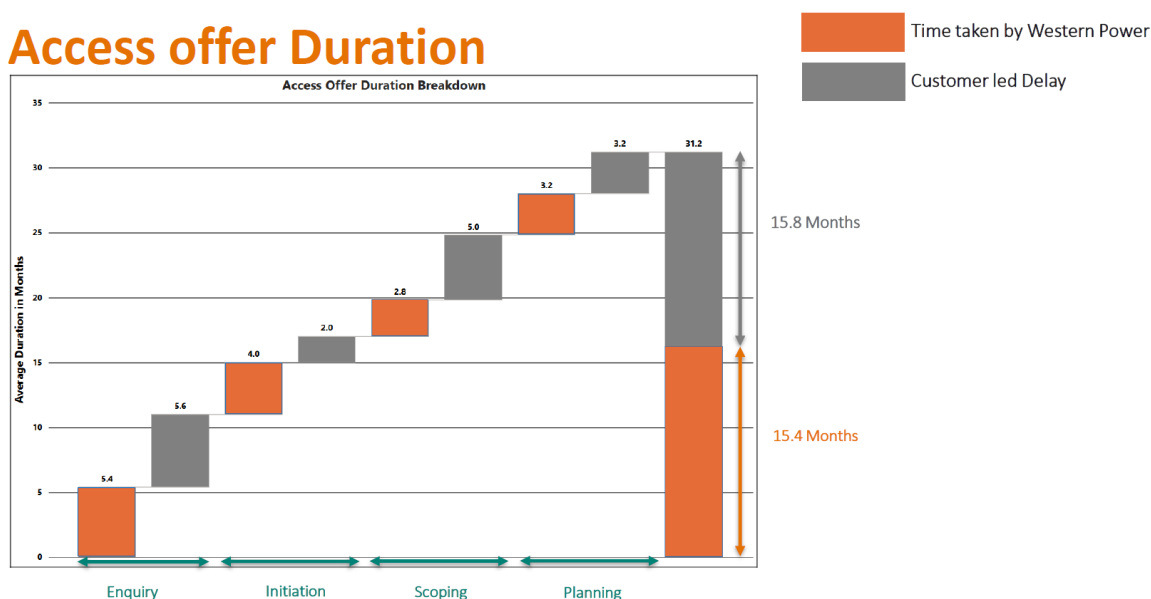
The critical project framework does have merit in an energy sector that is undergoing a rapid transition. Western Power’s statistics indicate that only 10% of applications are making it through to the end of the process so anything that can be done to improve that strike rate is welcomed. But all projects – not just ‘critical’ projects – need improved levels of support if the required capacity is to enter the grid and transition the SWIS to a future 2050 market.

The first annual progress report prepared by the ERA on Western Power shows that the average time to receive a grid connection for a project increased from almost 47 months in July 2023 to over 60 months in March 2024, involving 101 projects totalling 50,450 MW. The figures in Western Power’s March 2025 quarterly report says that timeframe has now reduced to around 30-months, involving 101 projects totalling 32,946 MW.

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<sup>4</sup> See p17, [Powering ahead: Progressing the SWIS transition](#)

## Access offer Duration



**Source: Western Power**

Western Power has worked hard to improve the grid connection process and increase communication. The self-service options and Major Customer Portal are useful tools, and connection activities are now more streamlined. Western Power has also flagged further changes to the AQP to prioritise projects that are more likely to advance. The AEC also welcomes further reforms and some options raised by members include:

- Allowing proponents to self-select and pay for a premium service that is quicker and more streamlined.
- The ERA setting minimum service standards and Western Power guaranteeing service levels.
- Outsourcing activities to speed-up the connection process.
- Enabling the Project Scope Definition and Grid Input Package activities to be progressed in parallel.
- Expanding the network data Western Power makes available in the interactive network map portal.
- Measures to improve transparency.

**Providing revenue certainty for generators** - the build out of new transmission and a supportive grid connection process are key ingredients to promote new investment in generation and move the SWIS closer to the 2050 position. Another crucial element is whether generators can secure an offtake and earn sufficient revenue to make new investment viable and attractive.

The AEC engaged Marsden Jacob Associates (MJA) in 2022 to better understand if generators will receive adequate revenue during the energy transition. MJA found that new renewable, gas and battery storage projects will be out of money mostly due to the floating Reserve Capacity Price (RCP), which focuses only on capital and other fixed costs rather than total system costs. FTI Consulting reinforced this point in its paper on the *Triennial review of the effectiveness of the Wholesale Electricity Market* when it noted that investors require certainty and “to invest in long-life, long lead-time assets, there needs to be clear and reliable revenue opportunities to produce a strong business case for investment.”<sup>5</sup> However, the volatility in the RCP does not support long term investment in flexible

<sup>5</sup> See p142, [Triennial review of the effectiveness of the Wholesale Electricity Market 2022: Discussion paper](#)

generation and storage facilities, and it is unlikely that a five year fixed capacity price is enough to underwrite investment in new flexible generation and storage in the WEM.<sup>6</sup>

The likely expansion in new renewable projects is also likely to cannibalise revenues. Enough windfarms will need to be built to provide reliability in low-wind years which means that in high-wind years there will be significant excess capacity. As more windfarms enter service in the coming years, the average capacity factor will fall, and year-on-year output will be more varied. The current combination of reserve capacity payments plus energy sales will not provide adequate revenue certainty in this situation.

The shallow contracting market in the SWIS also exacerbates the missing money problem. The limited pool of offtakers in the SWIS means that most new generators rely on securing a PPA with Synergy, a state-owned entity such as the Water Corporation, or an industrial load. The shallow contracting market in the SWIS may become more of a problem for proponents post-2030, when a raft of new projects are expected to enter the grid as new transmission is built, because contracts could already be filled (for instance, Synergy, Water Corporation and other industrial loads may have sufficient PPAs in place by this time). The viability of new projects post-2030 could be put in jeopardy if they fail to secure an offtake or don't strike an adequate price.

AEC members and other stakeholders have put forward various solutions to address the missing money and shallow contracting market problems in the SWIS. Some of these recommendations include:

1. Investors who are willing to invest in long-lived generation and storage assets in the WEM should be able to lock in a price at or near the gross Cost of New Entry (CONE) for a minimum of 15 years. FTI Consulting notes that:

*“Offering 15-year contract lengths provides significant benefits to the market, including securing a lower cost of capital that helps reduce the cost of securing required capacity in the WEM and helps reduce market concentration in the WEM.”<sup>7</sup>*

MJA highlights similar benefits with longer term capacity contracts:

*“Offering 15-year contract lengths provides significant benefits to the market:*

- Investors will be able to secure a lower cost of capital that helps reduce the cost of securing required capacity in the WEM.
- Long term capacity contracts will support merchant plant entry into the SWIS and help reduce market concentration in the WEM.
- Long term capacity contracts reduce barriers of entry to the WEM by eliminating some complexity of the market mechanisms.”<sup>8</sup>

There is also a precedent for such longer-term contracts, with the UK Capacity Market offering 15-year contracts and the I-SEM in Ireland providing 10-year contracts.

2. Potentially triggering the Supplementary Reserve Capacity scheme earlier.
3. Exploring the merits of staging the Reserve Capacity Mechanism (for instance, locking in 90% of the capacity five years in advance, and the remaining capacity two years in advance).
4. A wholesale energy price guarantee for renewable generators.

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<sup>6</sup> See p12, [Revenue adequacy for generators in the WEM](#)

<sup>7</sup> See p147, [Triennial review of the effectiveness of the Wholesale Electricity Market 2022: Discussion paper](#)

<sup>8</sup> See p81, [Revenue adequacy for generators in the WEM](#)

5. The State Government acting as a long-term counter party to help underwrite new investment.
6. Adopting some recommendations from the NEM Review, such as implementing mechanisms like the Electricity Services Entry Mechanism.
7. Developing a functional financial market to sit over the top of the physical electricity market to enable insurance products to be developed and allow for additional revenue streams to be achieved for peaking plants, enabling market depth to emerge.
8. Reverse auctions.

**Improving coordination of the SWIS** - A final and critical enabler for a future 2050 market is getting the long-term planning arrangements right to facilitate a timely and coordinated transition in the SWIS.

The planning of the SWIS has for a long time been undertaken in an ad hoc manner in an environment of relative stability; baseload generators dominated the grid, and peak and minimum demand remained constant. The playing field has now changed and without clearly articulated responsibilities for all stakeholders (agencies, departments, Ministerial offices, the market operator and Western Power) and a commonly accepted plan to provide direction, a coordinated and timely energy transition becomes harder to deliver with the risk of detrimental outcomes for energy security, reliability, affordability and sustainability.

There are currently multiple inconsistent system and planning reports published for the SWIS, which creates complexity and uncertainty, and erodes investor confidence. The Whole of System Plan (“WOSP”), developed by the Coordinator of Energy, is broadly intended to provide the centralised system plan for the SWIS but its latest version only modelled scenarios and did not provide a central path. The WOSP is only published every five years and the next WOSP is expected in 2027.

Since the inaugural WOSP report was published, the government has published the SWISDA, the SWIS Transmission Infrastructure Plan and the SWIS Transmission Plan, none of which are consistent with the WOSP. Meanwhile, AEMO publishes the WEM ESOO annually and Western Power produces its own annual Transmission System Plan but without alignment to the WOSP (because the WOSP did not have a central scenario). The lack of a single, commonly accepted, report and central scenario creates uncertainty for stakeholders across the market.

Baringa identified this issue as a critical barrier in its report on the cost of delaying the transition in the SWIS. Baringa states that:

*“While a lot of considered planning work has been undertaken to date, the SWIS needs a single long-term system plan which identifies a central transition pathway and – critically – which key stakeholders can align on as the overarching system plan. The common acceptance and adoption of the plan, including across government, is important to ensuring all other planning and policy programs and publications are clear in their alignment with the plan and its central transition pathway, providing certainty to network businesses and the wider market.”<sup>9</sup>*

Baringa suggested in its report that either AEMO, EPWA or Western Power could have responsibility for the plan and each have their own merits and drawbacks. Irrespective of who produces the plan, it is important that it is recognised across all key stakeholders as being the overarching planning report, and that a central transition pathway is identified. Without this, transitioning from the current market to a future 2050 SWIS will be full of complexities and risks.

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<sup>9</sup> See p22, [Powering ahead: Progressing the SWIS transition](#)

## 5. Customer-Centric Energy Systems

### The target 2050 future state

An ideal 2050 future state should see customers co-create value through their homes, businesses, communities, and data. Behind the scenes, complexity is orchestrated - delivering simplicity, reliability, and trust. Customers choose how deeply they engage, from simple, low-cost, reliable supply to full CER participation. People are active participants in the energy transition, not passive recipients of supply.

While authoritative projections for CER in the SWIS aren't available for 2050, it is expected that rooftop PV will reach saturation, home batteries will be the norm, and EVs will be the dominant drive train for personal transport. In this environment, customers will be able to choose how deeply they engage with CER, from simple low-cost reliable supply to full CER participation.

Key to CER providing more benefits is an effective retail market. The opening of the retail market to competition and a move to cost reflective tariffs will see contestable customers having access to diverse energy products as retailers compete to offer solution packages rather than simply lower MWh rates. Retailers and energy service providers will be able to offer "total bill" systems integrating price and usage in real time, with customers being able to see the whole-of-household cost – electricity, transport and heating – and actively balance them. Together, this will bring sustained bill savings, reliability and trust, while the market will benefit from demand moderation.

### Where do we need to be by 2035 to achieve the 2050 targets?

The mid-2030s will be an important waypoint in the transition towards greater CER. Moving consumers to more active participation in the market will require coordinated effort from participants and the implementation of supportive policies, while acknowledging that such a shift will have an impact on Synergy, Western Power and the market operator.

Conducive market settings will be critical to making more CER viable over the next decade. It is anticipated that by 2035 new market offers and tariff structures will begin to be adopted so that consumers get value out of using their energy resources and participating in grid and community resources.

More CER in the next decade will also mean there is an impact on the market. Enabling consumers to export and import more power to and from the grid should, by 2035, start to support the security and reliability of the SWIS, and manage maximum and minimum daily demand. This could well mean that the need for urgent and expensive non-co-optimised Essential System Services starts to diminish.

However, the fast transition towards more CER and consumer participation is not without challenges. Access to the benefits of CER will probably still be uneven in 2035. Large users and homeowners may be able to unlock some of the benefits of CER, but renters, apartment owners and small businesses may still be left out of the market.

The spotlight will also be put on consumer protections during this period. In an environment where more consumers will be actively deploying their energy to get the best product bundles, it is vital that consumers continue to be adequately protected. Work is already underway in this area through National Consumer Energy Resources Roadmap, and it will be an evolving space as CER participation increases.

## The current state

Rooftop solar is now the largest generator in the SWIS and is installed in more than one-in-three households. The amount of rooftop solar generation will continue to grow as prices decline and average system sizes increase. Meanwhile, the uptake of residential batteries is proliferating as a result of the Western Australian Residential Battery Scheme and Federal Government Cheaper Home Batteries Program. The program will provide discounts and no interest loans for households and small businesses to support the adoption of small-scale battery systems, with households required to participate in a Virtual Power Plant (VPP) to be eligible for the scheme. The 2025 WEM ESOO suggests that the program will help to boost distributed battery capacity in the SWIS from 200 MW in 2025 to approximately 1000 MW in 2035/36.<sup>10</sup>

Programs like the Western Australian Residential Battery Scheme will play a key role in transitioning consumers from passive consumers to active participants. However, it is still early in the process and the adoption of these VPPs depend on the implementation of new policies and the outcome of pilot trials.

One such pilot trial underway in the SWIS is Project Jupiter. The Federal Government announced Project Jupiter in early 2025 as an initiative designed to accelerate the integration of residential solar, home and community batteries into the SWIS through VPPs. These VPP's have the ability to empower consumers, change demand profiles (particularly maximum and minimum daily demand), and can reduce costs by eliminating some need to undertake traditional network augmentation.

## Key risks and uncertainties

Empowering consumers and shifting towards a truly customer-centric energy system by 2050 involves a range of risks and uncertainties, including:

- Technology cost trajectories. How fast PV, battery, and EV costs fall will have implications for how fast they are taken up.
- Consumer behaviour and participation. Consumer willingness to sign up to VPPs cannot be taken for granted. Consumers' ability and willingness to be flexible with their demand and uptake of energy efficiency measures is also uncertain.
- There may be limited opportunities for independent service providers such as third-party orchestrators to flourish in a non-competitive retail environment. This is one reason that a move to greater retail contestability is considered an important enabler.
- Tariff setting may limit customer responses that support system outcomes. Tariffs are not everything, but they are a low-cost tool to encourage behavioural change from customers.
- The traditional regulatory framework may not be fit for purpose for the current context, with rigidities arising from a capex bias, risk aversion, a five yearly reset cycle, and lack of recognition of shared investment models together acting as a potential inhibitor to Western Power moving towards becoming an innovative platform provider, facilitating demand response and orchestration of CER.

## Critical enablers to bridge the gap between current and future states

Moving from the current situation to the future 2050 scenario will rely on the following critical enablers:

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<sup>10</sup> See p16, [2025 Wholesale Electricity Market Electricity Statement of Opportunities](#)

- Opportunity for competition – more retail competition along with cost reflective tariffs will allow service providers to deliver innovative and tailored products to customers that maximise flexibility, cost savings and consumer control. Similarly, opening CER and VPP participation beyond a single entity to a broader range of providers could improve the economics of household batteries, reduce customer energy bills, and enable distributed storage to play a greater role in meeting evening peak demand and supporting renewable integration.
- Collaboration across participants – No single provider can meet all customer needs. Success depends on open collaboration across Synergy, retailers, Western Power, aggregators, governments, and communities.
- Appropriate policy settings – Network regulation needs to evolve to become nimbler, creating more scope for mid-period opportunities and shared projects.
- Signals for consumers – Establishing more dynamic ways to send signals to customers on when to consume or export power will maximise the advantages of CER. Tariff setting is one approach but more flexible solutions can be developed.
- Educating consumers – Customers need to be educated on the benefits and value of using CER.
- Removing the barriers – The technical and regulatory barriers preventing consumers being more active CER participants needs to be eliminated.
- Improving connection times – Expediting approval timeframes is vital to facilitating more solar, distributed battery capacity and EV chargers connecting to the grid in a timely manner.
- Protecting consumers – During the transition to higher CER uptake, reforms will be needed to protect customers and ensure consumers have more equitable access to the benefits of CER.
- Clarity of roles – The main participants in the SWIS require clear roles, responsibilities and resources to deliver a fair transition for all consumers.
- Smart meter roll out – The adoption of more smart meters in the SWIS will empower consumers and assist retailers in tailoring products.
- Knowledge sharing – Learning from pilot programs and tracking and reporting the uptake of customer-focused CER products and services are valuable insights into who participates, who benefits, and where gaps remain.

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