



Industry update

Renewable Energy Integration in the SWIS

October 2021

In 2019, the Australian Energy Market Operator (AEMO) released a report that prompted the State Government's Energy Transformation Strategy (Strategy). Two years on and following significant steps in delivering the Strategy, AEMO's *Renewable Energy Integration – SWIS Update* report shows that even with the substantial acceleration in household solar uptake in recent years, we are on the right track.

Energy Transformation Strategy

In March 2019, the McGowan Government launched Western Australia's Energy Transformation Strategy, setting out our response to the unprecedented changes happening in the energy sector.

The Strategy led the development of our inaugural [Whole of System Plan](#), as well as significant reforms to the rules governing how generation and storage facilities connect to the grid and participate in the Wholesale Electricity Market (WEM).

The [Distributed Energy Resources \(DER\) Roadmap](#) developed under the Strategy responded to the challenges associated with distributed energy, to harness the immense potential of DER while keeping our power system secure.

Households leading the transition

Since the Strategy was launched in March 2019, the amount of large-scale renewable capacity connected to the South West Interconnected System (SWIS) has more than doubled.

Far exceeding forecasts, the rate of rooftop PV generation connections have increased by 51%, bringing the total amount of rooftop solar capacity

to more than 1,700 MW – by far the biggest generator on the system.

Western Australians are installing solar on their homes at record rates and are on track to see one in two households with solar by 2030.

Renewable Energy Integration – SWIS Update

The 2019 AEMO [Integrating Utility-scale Renewables and Distributed Energy Resources in the SWIS](#) report identified the challenges and opportunities that came with integrating renewables into the SWIS. It called for urgent action to ensure that the system was ready to support the growth in rooftop solar and other renewables that we expected at the time.

The 2021 [Renewable Energy Integration – SWIS Update](#) report has acknowledged the work of Government, in partnership with AEMO and others, in shifting the dial on the challenges and having deferred the imminent threats to power system security while long-term solutions are being implemented.

However, it also recommends actions to ensure the transition can continue and the system remains stable in the years to come, particularly in response to the increased rate of household solar uptake.

Energy Transformation Strategy Phase 2

Many of the actions that AEMO has recommended have been captured in the second phase of the Government's [Energy Transformation Strategy](#), which was launched in July 2021 and is being supported through strong collaboration with AEMO, Western Power and industry.

The following table summarises the State Government's actions addressing the AEMO recommendations.

Recommendation		State Government actions underway	Delivered by
1	AEMO to explore options to maximise capability to deliver Fast Frequency Response (FFR), prior to the commencement of new WEM.	Implementing the new Non-cooptimised Essential System Services (NCESS) Framework. The new Wholesale Electricity Market Rules for this framework are under development and on track to commence in early-2022. This framework will enable the procurement of contractual services to support system security issues in the interim ahead of new market commencement. PRIORITY	Energy Policy WA (EPWA) with AEMO + Western Power
2	Implement more dynamic monitoring of Under-Frequency Load Shedding (UFLS) loads, shifting of customers between bands and management of contingency sizes.	Under DER Roadmap action 10, a new framework for UFLS has been approved, clarifying the role of AEMO in developing UFLS requirements for the SWIS, and Western Power in designing and implementing UFLS schemes to meet those requirements. The new WEM Rules also clarify the responsibilities of these entities and other market participants in supporting the system when predicting and acting during an UFLS event. AEMO must now work with Western Power to ensure that the arrangements are implemented in accordance with the WEM Rules and are fit for purpose. PRIORITY	Western Power with AEMO + EPWA
3	Investigate a ramping service for controllable facilities to meet intra-day or intra-week peak periods via instruction issued ahead of the dispatch interval.	Implementing the NCESS Framework (see Recommendation 1) to enable the procurement of contractual services, such as fast-ramping or dispatchability services.	EPWA with AEMO
4	Ongoing inverter monitoring and compliance.	Under DER Roadmap action 4, development of a process to ensure that inverters remain compliant with connection requirements and settings update over time is underway, with expected completion in July 2022. Compliance and monitoring of inverter performance is also a consideration in developing frameworks for aggregated DER participation in the WEM.	Western Power with EPWA
5	As soon as practically possible, enable the capability to manage newly installed and upgraded DPV on instruction from AEMO to a third party to assist in managing power system security and reliability in all emergency operational conditions, including during extreme low system load conditions and black start, as a measure of last resort.	Undertaking assessment of a range of options to address extreme low system load conditions in the SWIS, including how output from new and upgraded DPV systems may be managed on instruction from AEMO. EPWA acknowledges that AEMO has identified this as a priority action and has recommended that it be undertaken as soon as possible, in order to manage power system security during extreme low load conditions. PRIORITY	EPWA with AEMO + Western Power

Recommendation		State Government actions underway	Delivered by
6	Market and incentive frameworks for aggregated DER participation	<p>Delivering the DER Roadmap, which is predicated on DER participation in the power system, including a review of the framework for licensing energy entities in order to enable new business models and facilitate microgrids and embedded networks, with appropriate customer protections.</p> <p>Under DER Roadmap actions 17 to 19, pilots for improved electricity tariff structures are being delivered.</p> <p>In addition, under DER Roadmap actions 22 and 23 a comprehensive Virtual Power Plant technology pilot is being developed to understand technical performance and market participation of aggregated DER.</p>	EPWA
7	Develop options for increasing the visibility and incentives for flexible loads.	<p>Under DER Roadmap actions 22 and 23 a comprehensive Virtual Power Plant technology pilot is being developed to understand technical performance and market participation of aggregated DER.</p> <p>The Reserve Capacity Mechanism already facilitates the participation of Demand Side Programmes to contribute to maintaining the reliability of supply.</p> <p>The new NCESS framework will enable the procurement by AEMO of services from flexible loads to address system security issues. It will also enable Western Power to procure services from flexible loads to address local network issues.</p>	EPWA with AEMO, Synergy + Western Power
8	Investigate options for hybrid component level market submission and dispatch.	<p>Various Amending Rules have been progressed to facilitate the emergence of hybrid facilities (generators with colocated energy storage) in the WEM while contributing to the security of supply on the system.</p> <p>Hybrid facilities are likely to be the most viable location for large scale batteries in the SWIS. Any further changes to the rules applying to hybrid facilities need to be considered with care so not to inadvertently undermine the business case for hybrid facilities.</p> <p>Government will continue to liaise with AEMO and market participants over the longer-term to identify whether evolution of the framework for hybrid facilities would be beneficial.</p>	EPWA
9	Improving market incentives to address system variability.	A Cost Allocation Market Evolution Review is on the Market Advisory Committee market evolution program. A draft review scope is scheduled for consideration at the Committee's November 2021 meeting.	EPWA

Recommendation		State Government actions underway	Delivered by
10	Develop a centralised SWIS reliability standard and supporting frameworks.	Changes to relevant legislation and rules are being developed to help improve the efficiency of energy sector policy and decision making, including the framework for and governance of power system and network security and reliability. Consultation on proposed changes to energy legislation is scheduled for late 2021, with legislation proposed to be developed during 2022, followed by more detailed regulations and rules.	EPWA
11	Develop a framework for contingency planning and management for power system resilience.	Reviewing current contingency arrangements, including risk and performance studies of different technologies, and making recommendations, where necessary, to build on the essential system services framework in the new WEM.	EPWA with AEMO + Western Power
12	Build on the inaugural Whole of System Plan.	Producing the next update of the Whole of System Plan by the end of 2023, which will model the future energy mix and network requirements under a number of refreshed scenarios.	EPWA with AEMO + Western Power
13	Embed requirements for interoperability and cybersecurity with the objective of keeping the power system secure.	Under DER Roadmap actions 1 to 4, uplift and maintenance of inverter standards are being pursued to ensure continued interoperability. The DER Roadmap's work on DER aggregation and Western Power's Advanced Metering Infrastructure program also have consideration of cybersecurity at their core (in communications and customer data). The implementation of the new security-constrained economic dispatch model for the WEM is considering cybersecurity in relation to market systems and communications with wholesale market participants. Energy Ministers nationally have also recognised cybersecurity as a priority work area, with work underway across the national energy sector.	EPWA with AEMO + Western Power

Details of the Energy Transformation Strategy Stage 2 can be found at [Energy Transformation Strategy \(www.wa.gov.au\)](https://www.wa.gov.au/government/energy-transformation-strategy)

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