

Factsheet

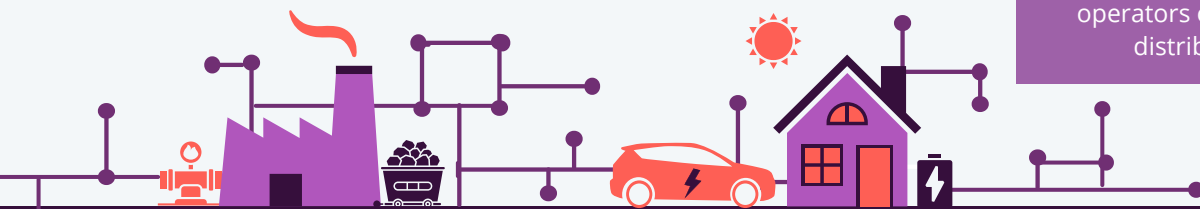
Operating the grid with high roof-top solar generation

Rooftop solar power is an Australian success story. Together, households with rooftop solar photovoltaic (PV) panels have created Australia's largest electricity generator which extends from the top of Queensland, down to Tasmania and across to South Australia. We are now in the enviable position of having a **surplus of solar energy**, especially during spring and summer when there is an abundance of clear, sunny days and just the right temperature for solar panels to produce at their maximum potential.

As the electricity system rapidly transforms from large-scale, centralised generators to a system with generators spread out across millions of homes – known as a 'distributed' system - we need new tools to keep the grid running securely and avoid risking widespread blackouts. Especially at times when the grid is under stress, due to things like bushfires, routine repairs or when powerlines unexpectedly break, the increased reliance on millions of individual solar systems is challenging the security and reliability of the power system.

Who are we and what do we do?

It's AEMO's job to keep the lights on. We don't make or sell electricity – **our role is to make sure the supply of electricity always matches the demand every minute of every day.** This is done in our control rooms around the country, working closely with the owners and operators of the transmission and distribution powerlines.



Contingency and minimum system load events

Fortunately, the electricity grid can handle high rooftop solar generation most of the time. However, on rare occasions, when the grid is under stress from a **number of factors and these combine with high roof-top solar generation**, there can be a risk to the secure and reliable supply of electricity.

What happens during these rare times is that free flowing rooftop solar displaces the need for large power stations, which provide capability we need to securely operate the grid. In these periods there is also a risk of rooftop solar unexpectedly disconnecting in large volumes at the same time as a large generator, also risking system security because we don't have enough load in reserve to cover the loss.

What actions are taken?

AEMO and electricity networks have worked together to put in place a number of actions to manage risks during these rare periods when the power system is under stress at the same time as high roof top solar generation. **AEMO has introduced new market notifications** to let the market know about these actions and when we think there may be a problem ahead that could result in rooftop solar being affected. These notices signal for a market response such as additional load prior to operational measures being taken.

AEMO has a process to manage periods when there is not enough energy supply in reserve to meet forecast demand. These are Lack of Reserve (LOR) conditions, involving three notifications. These notices let the market know there may not be enough supply and a risk of load shedding, they seek a market response such as additional generation and then advise the operational actions being taken to manage the energy shortfall.

This process for managing a 'lack of supply' is being mirrored for when there is a 'surplus of supply' at times of stress on the power system. AEMO is asking for help to manage these events and communicating what actions are being taken.

New notification process



Notice 1 – Advance notice of possible event to manage the risk of rooftop solar PV disconnecting at the same time as a large power station and/or minimum system load.



This notice will generally be issued 1 day in advance where challenging operating conditions are forecast to provide the market time to prepare, and respond, but could be issued quite quickly if unexpected conditions arise.

Notice 2 – Confirm operational actions taken



This means the market hasn't been able to take sufficient action to clear the risk and that AEMO is taking available steps to maintain system security, such as cancelling maintenance on the network or turning down large power plants.

Notice 3 – Notify that curtailment of rooftop solar PV is occurring



Signals that some rooftop solar PV is being prevented from generating as a last resort to protect system security and reduce risks, such as a state-wide black-out.

Why do we need to do this?

The electricity grid wasn't designed with rooftop solar in mind and we are working extremely hard to fix this. It was designed for energy from large power stations that would be dispatched at the request of a system operator and which would flow in one direction from generators to homes and businesses. Now energy is also flowing into the system independently, and in reverse, from homes and businesses. AEMO is working with industry to explore new technology, engineering, and services that will help bring more renewable energy into the electricity system and avoid these last resort situations. AEMO does not take these steps lightly but just as occurs today with last resort load shedding measures, when all other operating tools have not been sufficient in keeping the power system secure, it is important that emergency operating tools are available to avoid issues that risk state-wide outages, which have a far greater impact on consumers.

Where will rooftop solar PV be affected?

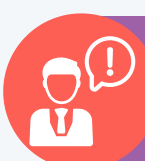
Right now, the types of risks that would require AEMO and networks to trigger these actions are mainly of concern in South Australia. To help manage these risks in South Australia, the SA Smarter Homes Program has been implemented. As the mix of generation on the electricity grid continues to change across the country, these challenges are emerging in other states too.



South Australia Smarter Homes Program

Customers installing or upgrading solar systems in SA are required to appoint a Relevant Agent who will be responsible for disconnecting and reconnecting the system as a last resort during events that risk the power system staying secure.

The SA Smarter Homes Program and Contingency Minimum System Load framework will help AEMO keep the system in balance while other solutions are developed.



AEMO will communicate to the electricity market ahead of, and during, any event that may result in rooftop solar PV being prevented from generating.



For each event that solar is impacted it will cost no more than a few dollars or less per rooftop solar system. The economic cost of the major blackout in South Australia has been estimated to be in the hundreds of millions of dollars.



This will only take place as a last resort and after everything else possible has been done, to keep the power system running securely



AEMO, industry and households' collective actions will help keep the system secure and reduces the potential for widespread blackouts