

# Australia leads the world with rooftop solar installations

Rooftop solar\* has become critical to the nation's energy transition.

Only a decade ago, about 90% of our country's electricity was generated by burning coal and gas.

Today, rooftop solar is currently installed on around one-third of Australian homes.

AEMO forecasts rooftop solar installations will continue to increase.

This rapid uptake of rooftop solar means the core technical attributes of Australia's power systems are changing, including reducing the reliance on electricity from the grid.

\*Also referred to as distributed photovoltaic (DPV)



## Challenges of rooftop solar

Rooftop solar provides immense benefits in generating clean and affordable electricity. With so much energy now coming from rooftop solar, some changes are required to make sure the power system continues to provide reliable, secure and affordable electricity.

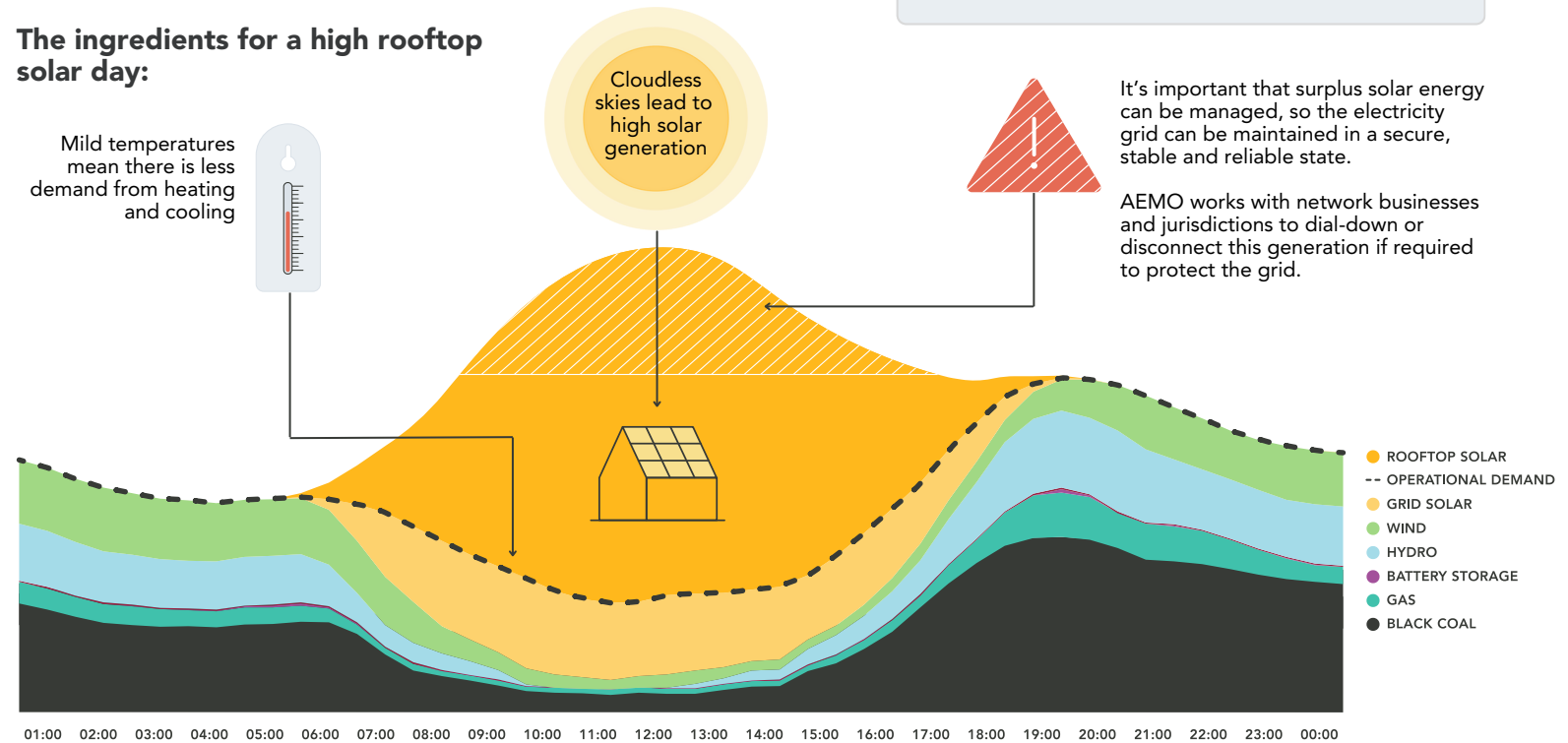
Currently, AEMO can operate the energy system with high levels of rooftop solar generation most of the time.

When rooftop solar generation is high and temperatures are mild, the need for electricity from the grid plummets, and displaces large gas and coal-fired generators, which not only provide electricity, but critical system security services. These security services are crucial to maintaining a finely tuned and balanced electricity grid.

Another risk when rooftop solar output is high is a potential issue on the power system that coincidentally disconnects a large power station and rooftop solar systems. These risks are explained in further detail over the next pages in the 'Frequently Asked Questions' section of the document.

In these rare circumstances, the surplus rooftop solar energy needs to be managed to ensure the grid continues operating reliably, securely and safely.

## The ingredients for a high rooftop solar day:



## Unlocking value



AEMO is collaborating closely with governments and industry to modernise the NEM and WEM power grids so they will be able to handle 100% instantaneous renewable generation, including rooftop solar, at times.

This work aims to unlock the benefits of rooftop solar and other consumer energy resources (CER), such as household batteries and electric vehicles, for all Australians.

Research and development are underway to harness CER's full potential, ensure better compliance of rooftop solar devices, unlock new technologies that can support power system stability and continue future power grid studies.

AEMO is also improving its forecasting and modelling capabilities to maintain power system security.

About us: AEMO is the independent energy market and system operator and system planner for the National Electricity Market (NEM) and Western Australia's Wholesale Electricity Market (WEM). We are a not-for-profit company, with a membership of state and federal governments (60%) and energy industry members (40%).

More info: [aemo.com.au/about/who-we-are](https://aemo.com.au/about/who-we-are)

## Managing risk

New technologies and batteries will help maintain a secure and reliable grid with high levels of rooftop solar. Until the levels of these technologies grow high enough, additional management measures are required to maintain Australia's power systems and keep the lights on for all energy users.

Prior to this, AEMO has a number of actions available, which are further outlined in the FAQ section of this document.

## Temporarily dialling down or disconnecting rooftop solar

If these actions fail to maintain system security, there are solar management programs that can be implemented as a last resort.

These actions prevent state-wide blackouts, while also enabling rooftop solar to continue being installed so more consumers can benefit.

### What do consumers need to do?

In most circumstances, consumers do not need to take any action.

#### Further information:

Temporary rooftop solar management programs are in place in [Queensland](#), [South Australia](#), [Western Australia](#) and [Victoria](#).

More information on minimum operational demand [here](#).



## Frequently asked questions

### Q: Why does AEMO need to manage surplus rooftop solar?



Ongoing investment in rooftop solar systems is valuable and will continue to make a significant contribution to the NEM on Australia's east coast and the WEM in Western Australia.

While AEMO can operate the energy system with high levels of rooftop solar generation most of the time, in rare circumstances, high rooftop solar exports coincide with other challenges in the power system. When this happens, electricity supply is put at risk.

The two main risks AEMO is looking to manage in the short-term are:

**Minimum operational demand (also referred to as minimum system load):** When rooftop generation is high and temperatures are mild, electricity demand from the grid drops and displaces large gas and coal-fired generators, which not only provide electricity but critical system security services.

The grid needs a number of these critical services, such as system strength, voltage and frequency management. In the past these services have been provided by large gas and coal-fired generators.

These services help AEMO maintain system security and their absence risks widespread blackouts or extreme measures to maintain security.

**Distributed photovoltaic (DPV) contingency (also known as rooftop solar risk):** This risk represents the proportion of rooftop solar that could unexpectedly disconnect in large volumes at the same time as a large generator (coal or gas plant) – risking system security if there is not enough other electricity generation available to cover the loss.

### Q: What measures does AEMO take before resorting to solar management actions?



Rooftop solar management is a last resort action, which would only be used when all other options are exhausted. AEMO undertakes a range of 'system level' actions to maintain security before and during an DPV contingency or minimum system load event.

These actions can include:



Issuing market notifications on the forecast level of risk to secure a market response.



Recalling planned transmission outages.



Constraining and directing non-essential grid-scale generation.



Increasing electricity demand by directing large consumers into service to absorb excess energy, such as pumped hydro or batteries.

Additionally, AEMO has introduced market notices for [Queensland](#), [South Australia](#), [Western Australia](#) and [Victoria](#).

AEMO's notification system was designed to provide more transparency around forecast risks, prompt market responses and hopefully reduce any impacts to rooftop solar.

In most circumstances, the above mentioned actions will prevent the need for any solar management.

More FAQs



**Q: What is AEMO doing to reduce the need for this emergency intervention?**



AEMO is also undertaking a range of activities in collaboration with industry and governments to help prepare Australia for operating, at times, with 100% instantaneous renewables.

Research and development are underway to harness CER's full potential with pilot studies such as Project Symphony in WA and Project EDGE in the NEM showcasing the potential of co-ordinating CER to create virtual power plants (VPPs) that can successfully work in the electricity market as both an electricity consumer during minimum demand events and as an aggregated generator. Governments around Australia have committed to a CER roadmap.

Other activities include ensuring better compliance of rooftop solar devices to reduce risk, unlocking new technologies that can support power system stability and continuing future power grid studies.

AEMO is also improving its forecasting and modelling capabilities to maintain power system security.

There are additional complementary measures that can reduce the likelihood of rooftop solar interventions. These include solutions to 'soak up' solar generation in the middle of the day (eg, by charging electric vehicles, electric hot water heaters, and storage, and by shifting electricity use to this time), new storage solutions of different sizes, and electrification programs.

Governments and industry have implemented a range of initiatives to increase 'solar soaking'.

**Q: Is AEMO directly interrupting rooftop solar?**



In the event temporary remote rooftop solar management was necessary, AEMO would communicate directly with transmission network service providers (TNSPs) when there is a minimum system load or DPV contingency risk.

In most jurisdictions, distribution network service providers (DNSPs) would be responsible for determining how to maintain demand in their networks. Therefore, the TNSP would then communicate directly with DNSPs, which could seek options to manage rooftop solar remotely where this is required and if the capability is available.

**Q: How often will solar management occur?**



To-date rooftop solar management has occurred on very rare occasions in South Australia.

Challenging operating conditions that could lead to emergency rooftop solar interventions are more likely to arise on mild sunny days during spring and autumn and weekends and public holidays.

However, they are very unlikely to be needed under normal power system operating conditions.

**Q: Will I be notified when my system is being curtailed?**



Detailed information on the type of response, and the customers likely to be affected, are generally not available in real-time.

Please refer to your particular state's rooftop solar management policy and electricity retailer for further information.

**Q: How will solar management affect small consumers?**



Rooftop solar management will generally not impact consumers' power supply. This management uses functions and features that align with Australian Standards. However, it may mean some consumers may need to draw from their storage systems or the grid for short periods of time.

Some retailers provide financial incentives for customers to sign-up to be part of emergency rooftop solar management. Please contact your retailer for further details.

In the absence of this tool, customers could be faced with the widespread and prolonged loss of power as well as solar generation.