

# MSL & DPVC Market Notices - FAQs

## What is AEMO implementing?

AEMO is introducing a new market notice and operating framework to support market development and maintain power system security during challenging system operating conditions that occur concurrently with high rooftop solar PV exports.

This framework will increase transparency regarding instructions that may result in rooftop solar PV being curtailed in South Australia. The operational protocol will forecast and communicate risks, aiming to prompt a market response and make clear the system level actions being taken prior to last resort measures to avoid an insecure power system that can cause widespread blackouts.

AEMO's new protocol consists of three market notices for contingency or minimum system load events, including:

1. Forecast potential DPV Contingency or Minimum System Load event that may require a market response.
2. Advise action has been taken to maintain system security, such as recalling planned transmission maintenance outages, increasing electricity demand by directing scheduled load into service or curtailing large-scale generation. If these measures are not sufficient, then as a last resort instructing to maintain demand or rooftop solar within thresholds, which could result in curtailing small scale solar PV.
3. Notify that curtailment of rooftop solar PV is occurring as a last resort because preceding actions have not been sufficient to maintain power system security.

AEMO uses a similar process to forecast and communicate low electricity reserves, known as Lack of Reserve (LOR) notices. The notices encourage generators to bid into the market and businesses to reduce usage, and signal the activation of the Reliability and Emergency Reserve Trader mechanism to avoid load shedding. If other states implement the rooftop solar 'emergency backstop' – a capability to curtail rooftop solar - as per the Energy Security Board's recommendation this protocol will then also apply in those jurisdictions.

## Why is this needed?

Today, the National Electricity Market has 14 gigawatts (GW) of rooftop solar installed, roughly 23 per cent of total generation capacity. This is forecast to grow to 23 GW by 2025.

In rare circumstances, certain issues on the power system at times of high rooftop solar PV exports threaten electricity supply on a large scale, which can't be controlled solely using existing levers, such as turning off large-scale generation.

Specifically, AEMO is trying to manage two major risks to power system security with this initiative:

1. Vulnerability to the power system caused by rooftop solar PV inverters disconnecting along with a large power station following a disturbance on the network, causing a major supply-demand imbalance; and
2. [Minimum system load](#), where energy demand is low, but rooftop solar PV continues to push electricity into the network, displacing large synchronous generating units (coal, gas and hydro) that are required to be on to provide essential system services.

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## What is minimum system load?

'Minimum system load' is a general term developed to describe situations where the level of load in a region is approaching the minimum amount required to avoid risks to system security. It is not a new definition of load.

## Why do rooftop solar PV inverters disconnect due to disturbances?

Electrical disturbances change power system conditions, such as voltage or frequency, which can impact rooftop solar and other parts of the power system such as large generators. Disturbances can be caused by a wide range of things, including a problem at a nearby substation or a large generator.

When a disturbance occurs, some solar inverters switch off and stop exporting<sup>1</sup>. When large portions of electricity demand are being met by rooftop solar exports, there is an emerging risk that if a large number of rooftop solar systems disconnect after a disturbance at the same time as a large generator disconnecting, it can cause a large supply-demand imbalance and under extreme circumstances could lead to a regional blackout. This is especially relevant when there are transmission outages and additional electricity supply isn't available from other states.

AEMO has collaborated across industry to minimise the number of systems that disconnect with [new inverter standards](#).

## Won't new inverter standards solve the issue?

New inverter standards already implemented in South Australia and more broadly across the NEM from December 2021 will help but won't address the legacy inverter fleet which will likely remain in service for another 10-15 years.

## Why are falling minimum operational demand levels an issue?

Today, the National Electricity Market has 14 gigawatts (GW) of rooftop solar installed, roughly 23 per cent of total generation capacity. Our [2021 Electricity Statement of Opportunities](#) report forecasts a further 8.9 GW of rooftop solar PV by 2025 in the mainland NEM states.

As a result, minimum operational demand across the NEM mainland is expected to drop from 15 GW in 2019 to a record low of 4 to 6 GW by 2025. Without additional operational tools, AEMO may no longer be able to operate the mainland NEM securely in all periods from 2025 due to a lack of security services when demand from the grid is so low.

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<sup>1</sup> AEMO (May 2021) Behaviour of distributed resources during power system disturbances, <https://aemo.com.au/-/media/files/initiatives/der/2021/capstone-report.pdf?la=en&hash=BF184AC51804652E268B3117EC12327A>

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## Is this an issue across the National Electricity Market?

Whilst SA has the highest penetration of rooftop solar PV, with more than one in three homes having adopted solar, low demand issues are emerging in other states and NEM wide, due to ongoing investment in rooftop solar PV. Queensland is similar to SA in that the power system can “island” from the rest of the NEM if transmission outages occur, thereby reducing the ability to export excess solar generation or import essential system services.

However, South Australia has a rooftop solar PV management program in place, which has put a capability to curtail solar in place, which is part of the South Australian Government’s [Smarter Homes](#) program. The construction of the SA-NSW Interconnector, Project EnergyConnect, is expected to significantly reduce the likelihood of South Australian “islanding” from the rest of the NEM.

## What are the market or other responses before curtailing rooftop solar PV?

Pumped storage, large and consumer batteries can have the capability to respond to price signals that often accompany minimum system load events. Innovative new products for ‘turn-up’ services of flexible load like pool pumps and hot water systems are emerging in the market and the Energy Security Board has a significant program of work to enable these markets further under its ‘Flexible Trader’ model. The South Australian Government also has demand management trials underway which seek to better utilise solar energy, and SA Power Networks has introduced new “solar sponge” tariffs to encourage solar consumption.

The notification process will forecast these challenging events so that market responses can be implemented which includes increasing electricity demand where available. The process may also encourage emerging new products into the market for rooftop solar PV to be actively managed for retail purposes.

## What are the ‘system level’ actions that may be taken and in what order do they occur?

AEMO actions, which are dependent on operational conditions, availability and pre-event consultation with network service providers, may include:

- Recall relevant planned line outages
- Constrain non-essential scheduled and semi-scheduled generation
- Direct and/or instruct scheduled and non-scheduled generation
- Direct scheduled load in service (such as pumped hydro)

This structure is indicative of approach but the order in which these actions are implemented will depend on the operational circumstances of each event, which are available, and are beneficial.

## Does AEMO instruct NSPs to interrupt rooftop solar?

AEMO’s control room will communicate directly to TNSP control rooms. If the action to maintain system security falls under the purview of the distribution network, DNSPs will determine how demand is maintained and this may include curtailing rooftop solar where this capability is available.

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## **Will I receive an update under the Smarter Homes project before or after my rooftop solar PV system is curtailed?**

The detailed information as to the level of the response is not available in real-time, nor which customers are likely to be impacted. AEMO will publish aggregate details of the response a few days after the event.

## **Is it likely consumers' rooftop solar PV will be curtailed this year?**

It's likely that rare challenging operating conditions will arise, which is why these protocols have been established. It's very unlikely to be needed under normal power system operating conditions. However, the notifications will increase transparency around forecast risks, prompt a market response and hopefully reduce any impacts to rooftop solar PV.

The capability to curtail rooftop solar PV is only enabled in South Australia at present, under the State Government's Smarter Homes program and other capabilities SA Power Networks have in place.

## **Does AEMO view curtailing rooftop solar PV as a permanent emergency backstop solution?**

These challenging operating conditions essentially arise due to a surplus of supply. There can be too much energy for the power system and our risk mitigation measures to manage. In the absence of other interventions, these scenarios will become more frequent over time with almost 80% of demand forecast at times to be supplied by rooftop solar PV by 2025 in the NEM. The commissioning of Project EnergyConnect, the SA-NSW Interconnector, is likely to reduce the amount of rooftop solar that is curtailed by reducing the risk of islanding and providing new connections to sources of demand.

To manage this growth distribution networks and the Energy Security Board have extensive programs of work to better integrate rooftop solar PV and all forms of Distributed Energy Resources (DER) including flexible load side responses. Importantly this includes networks actively managing DER in real-time which will allow existing rooftop system export caps to be removed or reduced and consumers to install bigger systems and more rooftop solar PV. These types of systems can be slightly curtailed during periods of peak export while being free to generate more during 'off-peak' periods, in total allowing consumers to export more to the grid.

This more dynamic management capability is being rolled out by SA Power Networks and is under consideration or development by most other distribution networks. It will reduce the need to activate the 'emergency backstop' mechanism but just as occurs today with last resort load shedding measures when all other 'market' and 'standard' system operating tools have been unable to keep the power system secure, it is important emergency operating tools are available to avoid system security issues that risk state-wide outages.

## **Will Project EnergyConnect help reduce the risk in South Australia?**

Yes. The interconnector will lower the future risk of South Australia separating from the National Electricity Market and increasing the capability to export greater amounts of generation. Project EnergyConnect has been given final regulatory approval but AEMO will need to remain very hands on until it is fully commissioned. The emergency backstop capability to curtail rooftop PV will still be required following the commissioning of EnergyConnect to manage the power system securely with the amount of rooftop PV projected to be installed across the whole NEM mainland.

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## **What will the impact of this be on customers?**

The main impact is that customers will see their power supply remain secure. If a disturbance were to occur, the counterfactual may be significant and involve the loss of power as well as solar generation. If a disturbance does not eventuate, however, it's expected that the bill impact would be around 0.1% of the average South Australian household bill – a few dollars over the course of a year for impacted households.

## **Are large generators compensated when they are directed to reduce power demand?**

No, generators are compensated when they are required to generate, such as being directed on for system security reasons. It is quite common for large wind and solar farms to not generate in response to the prevailing price of power or system constraints. Curtailing rooftop solar is the last resort under this framework.