



# Regulatory Changes for Smarter Homes

## Minimum demand fact sheet

The amount of small distributed electricity generators, such as rooftop solar systems, are growing rapidly, with more than 200 megawatts (MW) per year being installed in South Australia.

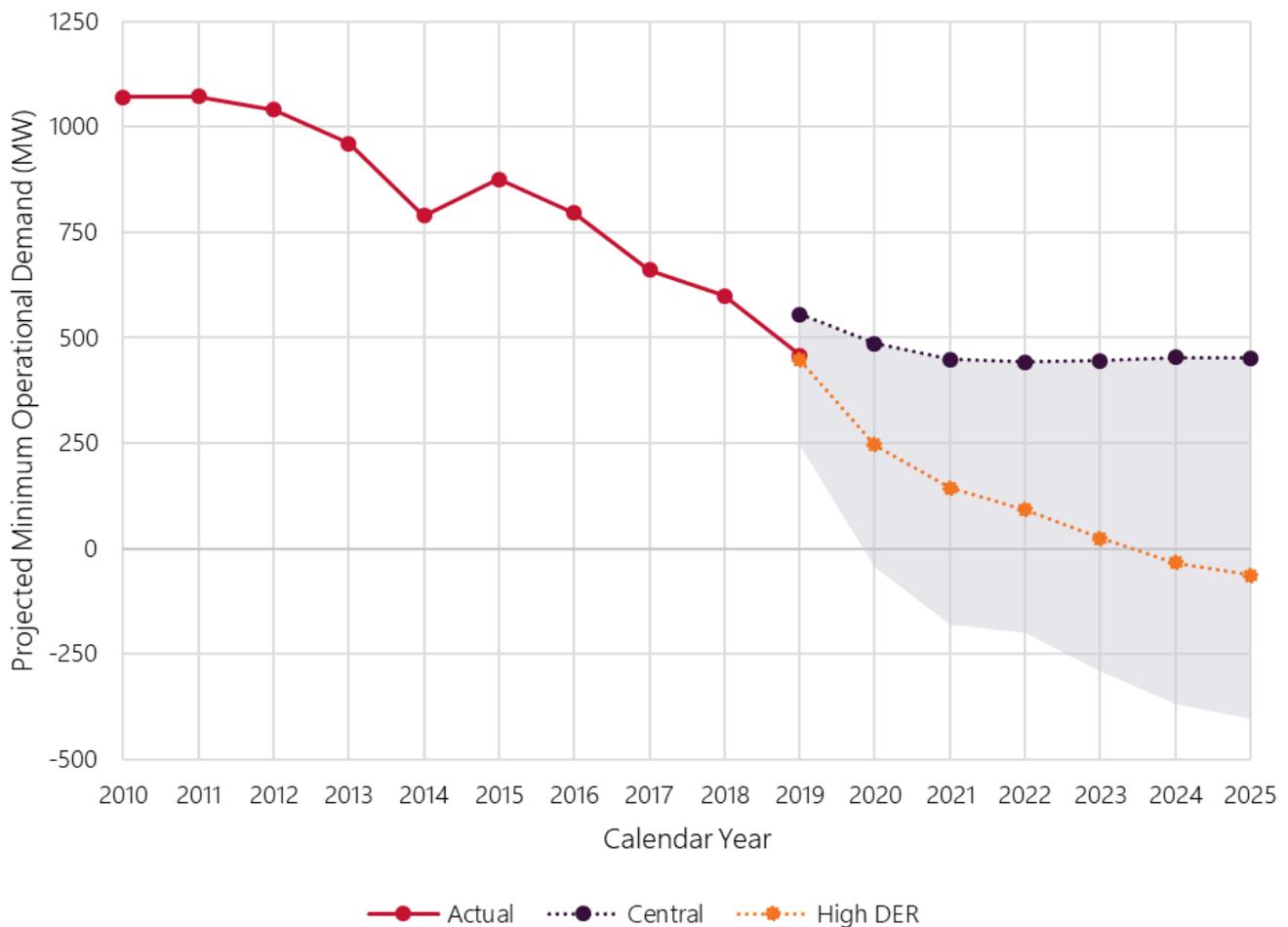
These generators sit behind a customer’s meter and are currently not separately measured by the system operator. The electricity generated by a solar system is therefore seen as a reduction in customer energy demand.

With growth continuing at the current rate, the Australian Energy Market Operator (AEMO) advise that there are times when demand could reach zero in South Australia within the next 1-3 years. This is most likely to occur when there is a coincidence of mild temperatures, clear skies, and low economic activity (such as on a weekend or public holiday, combined with reduced industrial activity during spring and autumn).

Under the most favourable conditions, operational demand in South Australia could reach zero as soon as late 2020.

To AEMO’s knowledge, South Australia is the first gigawatt-scale power system in the world to approach zero operational demand due to such high proportions of demand being met by distributed energy resources (DER) such as rooftop solar.

Graph: Minimum operational demand projections for South Australia



Source: AEMO 2020 *Minimum operational demand thresholds in South Australia*

## Why is minimum demand important?

Electricity supply and demand must always be in balance to maintain a stable operating frequency of 50 Hertz, with AEMO required to maintain this frequency within tight bands during normal operation and when a fault occurs on the network.

As part of power system balancing, AEMO dispatches large, grid scale generators to meet customer demand on the basis of a supply curve created from generator bids, from lowest to highest bid. Accordingly, as demand from the grid decreases as more consumer needs are met from rooftop solar (and any excess exported to grid), less grid scale generation needs to be dispatched.

**When less grid scale generation is dispatched in the National Electricity Market (NEM), many of the essential system services they provide as a by-product of energy production are also reduced, in particular inertia, frequency control, voltage control, and system strength.**

AEMO has undertaken extensive analysis to determine the minimum levels of system strength, inertia and frequency control that are required in South Australia to ensure secure operation under a range of scenarios. The most challenging scenario to operate the system is if South Australia is separated (islanded) from the rest of the National Electricity Market (NEM), as occurred for a number of weeks in early 2020.

AEMO currently maintains secure operation of the electricity system by requiring a minimum number of grid scale generating units to be on at all times, as well as procuring essential frequency control services.

To achieve this in an islanded situation or during periods of elevated risk of islanding, there must be sufficient demand from the grid to ensure that the minimum amount of generation required for secure operations is in balance and that the system can withstand an unexpected fault in the network.

South Australia currently has more than 1,300 MW of installed capacity from distributed rooftop solar, which is more than the largest grid generator (being Torrens Island Power Station at 1280 MW).

**While AEMO undertakes power system balancing actions to match demand in real time, the vast majority of distributed rooftop solar does not have the capability to have its output controlled. If distributed rooftop solar is supplying the majority of our electricity needs but cannot be actively managed in real time, it may not be possible to maintain a sufficient number of grid scale generating units online to provide all the essential system security services that are needed.**

This would mean that South Australia is operating in an insecure state, and a single fault could lead to a cascading failure. The ability to restart the system may also be compromised at these times, if distributed rooftop solar is operating in an uncontrolled manner.

During the recent extended islanding event in early 2020, as part of a range of power system balancing actions undertaken by AEMO to maintain the South Australian electricity system in a secure operating state, SA Power Networks was directed on three occasions to curtail generation from the larger (than 200 kilowatt) distributed solar systems that can be directly controlled by SA Power Networks so as to increase demand.

With increased levels of solar generation, there is an urgent need to provide a 'last resort' ability to control the output of distributed rooftop solar during periods when the security of the power system is at risk. Ensuring smart controls are incorporated in rooftop solar installations will enable AEMO to direct this generation to be curtailed in emergency circumstances as an additional power system balancing action when all other options have been exhausted.

Importantly, the government is also actively supporting the delivery of Project EnergyConnect, with AEMO having advised that the project needs to proceed and be commissioned as soon as possible to reduce the likelihood of South Australia's energy system being islanded from the NEM.

Visit [www.energymining.sa.gov.au/smarterhomes](http://www.energymining.sa.gov.au/smarterhomes) for more information about South Australia's new rooftop solar standards.