DEMAND RESPONSE – A COOL SOLUTION FOR THE ENERGY GRID

It only happens a few times each year, but when Australia's summers sizzle, households and businesses send electricity demand sky high by simultaneously switching on their air conditioners. When this happens, we use 46 per cent more electricity than average.

The challenge for the Australian Electricity Market Operator (AEMO) is to find the most cost-effective way of meeting the occasional spike in the demand for electricity.

DEMAND RESPONSE INITIATIVE

Size: 143 MW by Dec 2017, 200 MW by 2020
ARENA funding: $28.6 million for 10 pilot projects
NSW Government matching funding: $7.2 million
Locations: NSW, VIC and SA

Diesel generators or gas-fired peaking power stations have often been used for this. ARENA is helping develop and commercialise newer technologies and approaches that can fill a similar 'flexible capacity' role in a lower-emissions electricity system.

A cost effective way to reduce demand during peak periods, and relatively quick to implement, is to pay some energy consumers to voluntarily cut or shift their use of power to better match supply.

This 'demand response' approach lowers the amount of electricity required from the grid during peak periods to reduce the likelihood of a blackout, and can ramp up demand during off-peak periods, or when renewable energy output is high, to use excess electricity more efficiently. It can even help to bring down wholesale electricity prices, which increase when demand is high.

Demand response is a proven method that is successfully and cost effectively used elsewhere in the world, such as in some parts of the United States, as well as in Taiwan and Korea.

One of ARENA's investment priorities is to deliver affordable low emission electricity solutions that keep the lights on as we shift to a higher share of renewable electricity. As part of our work on this priority, we teamed with AEMO and the NSW Government to fund a $35.7 million, three-year trial featuring ten creative demand response projects from eight companies across Victoria, New South Wales and South Australia. ARENA's share of the funding is $28.6 million with $7.2 million provided by the NSW Government.

Together, these projects will help change behaviour and shift electricity use, freeing up around 200 megawatts of capacity by 2020.

Businesses, large companies and individual householders participating in the projects will have the opportunity to receive incentives in exchange for limiting or shifting their electricity use during peak demand times such as heatwaves, when the grid is under stress and at risk of blackouts. The economy overall will also benefit from a more efficient electricity system that has avoided the cost of having to build unnecessary new infrastructure.

The ten projects span a diverse range of technologies, innovative ideas and geographic locations. They include electricity retailers such as AGL and Powershop, poles and wires businesses like United Energy, the smart thermostat maker Zen Ecosystems, the demand response aggregator EnerNOC, and the Adelaide-based metals manufacturer Intercast and Forge.

DEMAND RESPONSE: HOW IT WORKS

Demand Response, a joint initiative of ARENA and the Australian Energy Market Operator, aims to ensure stable energy supply during times of peak demand.

ARENA has contributed $28.6 million to the initiative and the NSW Government provided matching funding of $7.2 million.

STEP 1

Energy users such as companies, factories or even individual consumers sign up to voluntarily reduce energy usage in times of extreme demand

STEP 2

Electricity demand surges

STEP 3

Users reduce their energy consumption

STEP 4

Reduced demand helps to balance supply and demand, and stabilises grid

STEP 5

Users are paid for their reduced demand

'SMART' POOLS TO CUT ENERGY USE AND SUPPORT THE GRID

Lead organisation: Pooled Energy
ARENA funding: $2.5 million
Total project cost: $5.0 million
Locations: Sydney, NSW

Another project addressing demand response in a novel way is a pilot being run by Pooled Energy, which aims to slash the energy consumption of household swimming pools while reducing stress on the nation's electricity grid.

Swimming pools are notoriously power hungry, with residential pools typically using 30 to 40 per cent of total household energy consumption.

Under the Pooled Energy pilot project being supported by ARENA, the pools of up to 5000 participating homeowners are being made 'smart'. This involves connection to the internet and the installation of an intelligent controller that manages the pool's pump and the dispensing of chemicals.

This allows the control system to not only monitor the pool's water chemistry and temperature, but also the local weather, electricity prices and the state of the grid to deliver the best possible pool management system. An average pool's energy use can be reduced by up to 50 to 70 per cent using this system.

In addition to providing a financial benefit to pool owners through reduced energy costs, the trial will also test the smart pool system's ability to respond to requests from AEMO to cut or shift energy use during spikes in demand.

If proven to be viable, the technology could reduce demand for electricity from the grid during peak demand by up to 3.7 gigawatts using Australia's 1.4 million swimming pools. That is the equivalent of two Liddell-sized power stations running at full capacity.