Demand-side response and distributed generation

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The problem with extreme peaks

Demand for electricity grows steadily. This is why new generation capacity is regularly needed and transmission and distribution companies must continually invest in augmenting their networks.

The rate of growth in average demand in Queensland has been dropping steadily since 2004, possibly as a result of successful energy efficiency measures. The peak demand on the peak day of each year, however, continues to rise rapidly.

It is the growth in this peak demand that is the expensive problem. Transmission and distribution network companies predict and provide for this figure, and generators respond to market pricing signals by building new peaking plants.

This additional capacity lies idle except during a few hours of extreme peaks each year. In Queensland last year, 430 MW of capacity was used for less than 25 hours. This is not an efficient use of resources.

Demand-side response

Demand-side management is a cheaper, more efficient way to deal with extreme peaks than building all this new infrastructure.

Electricity consumers agree to reduce their loads during extreme peaks, either by load curtailment or by time shifting, and are compensated for doing so.

Very large loads, such as aluminium smelters and other scheduled loads, already have their own arrangements for load curtailment.

Energy Response is working with smaller industrial and commercial customers. The key here is to make participation in demand-side response a streamlined, efficient process which is sufficiently commercially attractive to interest potential participants.

Distributed generation

As well as conventional load curtailment, we can use standby generators to provide demand-side response. The National Electricity Market rules are very generation-centric, so we have more flexibility in how we can use generators than loads, allowing us to create more value.

Essentially, we use standby generators as a decentralised peaking plant for a few hours a year. It's not economic for any one site to do this, as the financial, regulatory and operational issues are complicated, but if we aggregate across many sites, it becomes worthwhile.

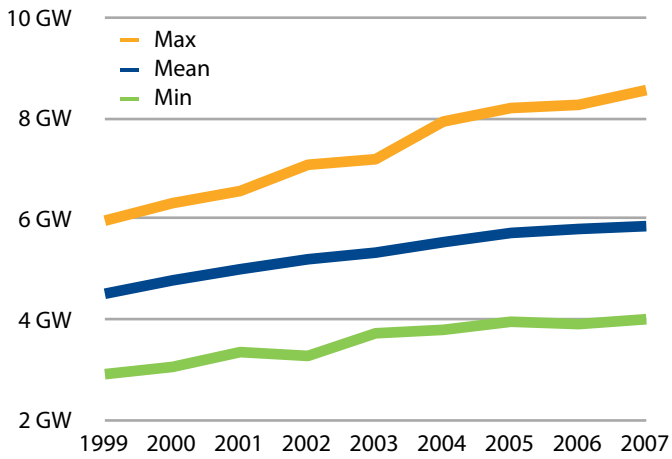

Figure: Electricity demand in Queensland

Benefits for owners of standby generators

This scheme allows owners of eligible standby generators to receive a dependable revenue stream for making their otherwise idle asset available. They are also paid their operational costs when they are asked to generate.

Generators are typically exercised monthly. This costs money, and is often not a realistic test of the generator. Since we pay to run the generator under realistic conditions, owners can have greater confidence that the generator will perform as expected when needed, and will often avoid the need for dedicated test runs.

Wider benefits

When power is generated locally to a load, transmission and distribution losses are eliminated. These losses are proportionally highest at times of peak demand, which is when we run the generators. As a result, our dispatches generally reduce carbon emissions.

Widespread take-up of this approach will reduce the amount of new generation and network infrastructure being built, which should therefore reduce the network and energy charges borne by consumers.

Market design

Our focus on generation is an artefact of the energy-only design of the market. In capacity markets, such as Western Australia and parts of the US and Europe, demand-side participation is easier, more highly valued, and hence much more widespread. Introducing capacity-based elements to this market would improve efficiency and lower costs.

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