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Electricity supply: are we in for summer brownouts?

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Recent heatwaves and bushfires have had people worried about their property, life and health – but one thing they haven't had to worry about is electricity supply failing during summer peak demand.

Some years ago, there were predictions eastern Australia's electricity supply might struggle to meet demand in summer (when demand peaks due to airconditioning), leading to restrictions on supply and brownouts. But despite recent challenging weather conditions, data from the Australian Energy Market Operator (AEMO) shows our electricity system has met demand with little visible stress, and is expected to continue to do so despite the likelihood of further extreme weather.

So, can we afford to relax on electricity?

Historically unusual factors have affected both the supply and demand side of electricity in recent years. While it is not yet clear how things will play out when these factors are less intertwined, the immediate outlook is positive, on balance.

Peak electricity demand now occurs in summer in all states except Tasmania, and the maximum demand in the National Electricity Market (NEM) in 2010-11 reached an historical high of just over 36,000 megawatts. At that time, the total installed capacity was 48,500 megawatts. To put that in perspective, a typical coal or gas-fired power station has a capacity of around 1000 megawatts.

Meeting electricity demand in summer is made easier by the fact that in January, industry demand is low. Even heatwaves that trigger a sharp increase in electricity consumption for home cooling are unlikely to put unbearable stress on the system. The one exception would be direct fire damage to a major transmission line, and fortunately this hasn't occurred in the current summer.

Failure of electricity assets caused five fires in the 2008-09 summer, according to the 2009 Victorian Bushfire Royal Commission. It is the nature of our summer and weather patterns that the biggest challenge will arise from a three to four-day heatwave across southern Australia in February. So the real threat for 2013 is still to come.

The second, and less understood issue, is the reduction in demand growth across the NEM. Until the early part of this century, electricity demand had been steadily growing in line with the economy and was driving a need to build around 1000 megawatts of extra capacity each year. At the same time, the maximum (or peak) demand was growing faster with the increasing penetration of air conditioning.

However, energy demand growth slowed and then flattened around 2009-10. Since then total demand has even fallen. Peak demand growth has also slowed, falling to 34,500 megawatts in 2011-12. Industry and governments largely failed to predict these changes. So what has been happening?

The relatively mild seasons of the last two to three years have played a role. A return to extreme heatwave conditions would trigger widespread use of air conditioners and cause a spike in demand. But this is not the only factor.

A recent analysis in NSW by market consultants IES Advisory found that underlying demand had declined regardless of temperature. Across the NEM, the other identified factors are reduced manufacturing activity (driven by the high dollar and closure of light metals refining, among other causes); increased penetration of solar PV and solar hot water; customer responses to increasing prices, and even the move from CRT and plasma television to LCD.

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It is difficult to separate out these factors. The IES study estimated that rooftop solar PV, solar hot water and larger embedded generators might account for more than half of the total demand reduction in NSW since 2008. It is reasonable to assume growth in energy and peak demand is unlikely to return to the rates of previous decades any time soon.

In its 2012 forecast, AEMO does not show maximum summer demand exceeding 42,000 megawatts before the end of this decade.

Since 2000, there has been considerable growth in installed supply capacity in the NEM, from 36,500 to 49,100 megawatts. Gas-fired generation capacity was the biggest contributor, from less than 10 to nearly 21% of total capacity between 2000 and last year. Both wind and solar have also grown rapidly, from negligible bases, due to government support programs. Wind farms now contribute more than 2000 megawatts – or more than 4% of our power supply capacity.

Because wind has generally been the lowest cost form of renewable energy over the past decade, it has benefited from the federal government's Renewable Energy Target, which is expected to deliver more than 25% of electricity in 2020 from renewable sources. Solar PV has grown to around 1500 megawatts in 2012 with the support of various rebate programs and feed-in tariffs at the state and territory level.

One problem with adding an increasing amount of wind and solar energy to power generation is that they are intermittent power sources and cannot be stored. Southern Australia, in particular, faces the likelihood of a coincidence of peak summer demand with low wind energy output.

Even so, the demand/supply position looks reasonably sound for several years. In this vein, and at the beginning of this summer, AEMO concluded that Victoria was generating enough electricity to get through the summer, although localised supply issues could interrupt supplies in specific areas. However, it warned: "Forecast weather conditions suggest a challenging summer ahead."

Australia's energy system and policy structures are facing many challenges in coming years, not the least on the climate change front. Yet it looks like failure to meet peak summer demand, even through extreme weather conditions, will be one of our lesser problems.

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