

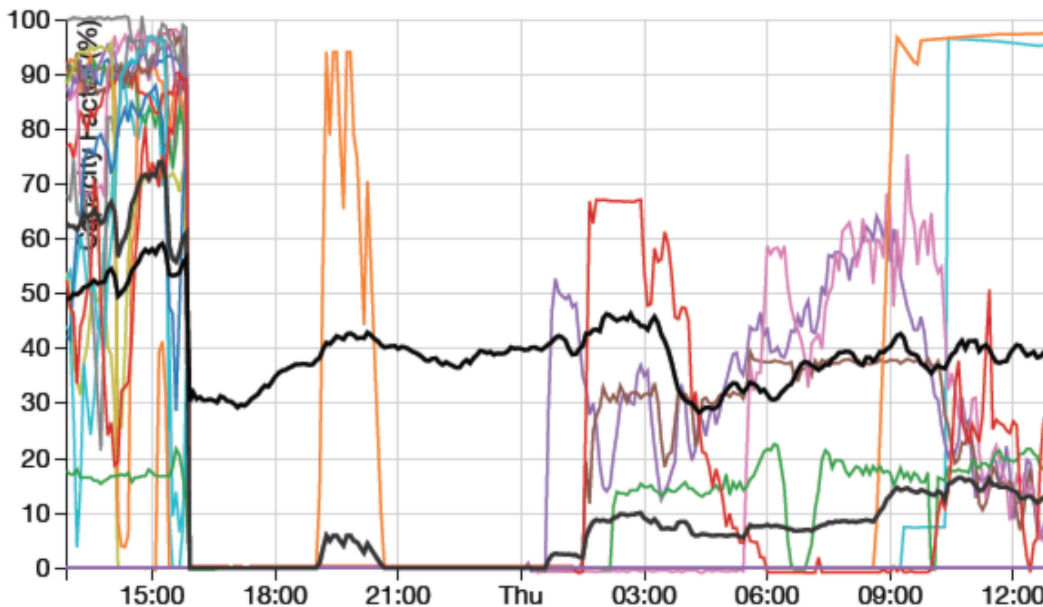
The Great SA Black-out of September 28 and 29, 2016

Politicians are at it again. The Prime Minister, the deputy Prime Minister. The Minister for the Environment and Energy, Senator Nick Xenaphon as well as the usual suspects in the main stream media, including ABC News, have been linking the catastrophic failure of SA's power supply to "too much renewable energy". When individual states set ambitious targets for renewable energy for 2025-2030 while the Federal Government still has no target beyond 2020, nor any policies that will enable us to meet our Paris commitments – it's a bit rich for federal ministers to complain when it's their own inaction (indeed, foot-dragging resistance to doing anything) that puts us in the situation of some States deciding to take responsible decisions that will help de-carbonise our electricity generation.

The State Governments of Queensland, Victoria, South Australia and the ACT deserve praise for their imaginative drive to de-carbonise the electricity sector.

Detailed analysis of the exact causes of the unprecedented power-outage will no doubt go on for quite a while yet. But the broad picture is pretty clear. Renewable energy did not cause the problem! What did happen was a catastrophic failure of a vital part of the SA electricity grid due to unprecedented, severe storm damage. This failure brought about a rapid drop in voltage which then triggered the shut down of all power generation – gas fired, wind powered and solar as well as shutting off the two interstate connectors in order to protect the rest of the national grid.

The graph below shows SA wind farms capacity over a 24 hour period for the 28th and 29th of September 2016. The grid-shut down occurred about 1600 and all wind turbines were shut down. Many of them were running above 80% capacity at the time. The sudden drop to zero can be clearly seen in the graph. The lower black line is the SA production. The upper black line is the whole of the National Energy Market (all states except WA and NT). It was not too much, nor too little wind as suggested by some of the commentators, but the loss of three major, high voltage transmission lines and a lightning strike on a power generator. The gas generators supplying power and in spinning stand-by mode were also cut off from the grid – all within a few seconds.



Data from AEMO for wind generation capacity 28/29 September, 2016. Graph supplied by Aneroid Energy (<http://energy.anoero.id.au/>)

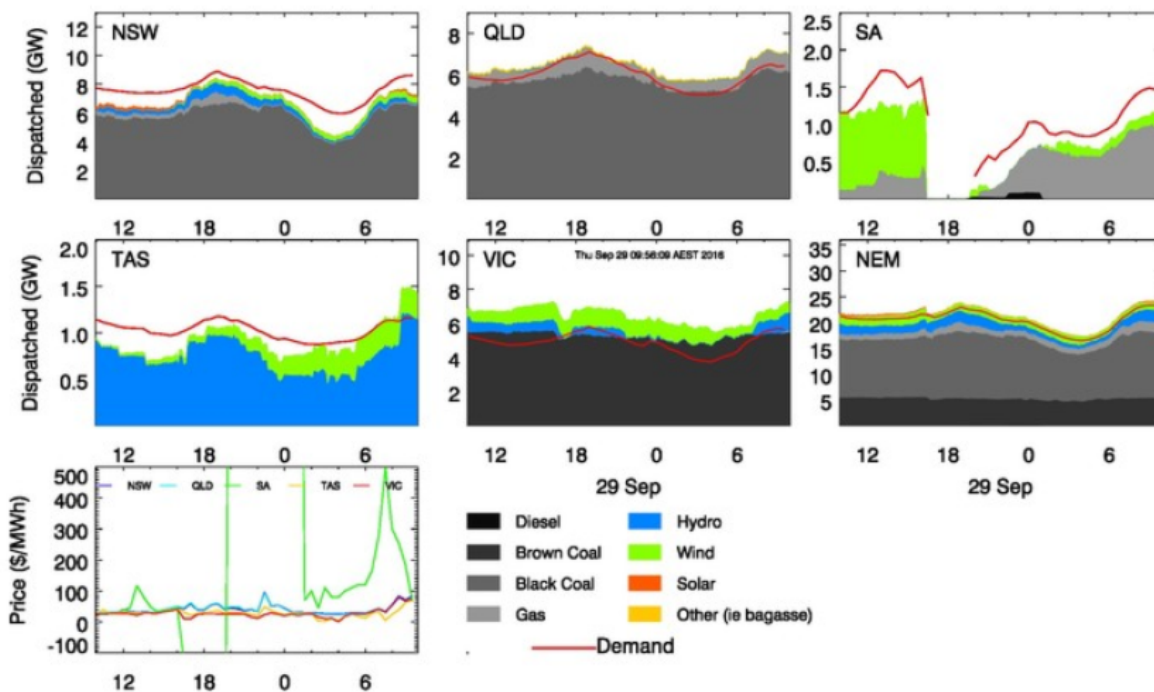
If we had the Port Augusta coal-fired power station still running, it too would have been taken off-grid.

Snowtown came back on briefly from about 1900 to 2100 (see the orange line in the graph above). This was part of the slow process of bringing a grid back up to full power from a total black-out – all of it controlled by the Australian Electricity Market Operator (AEMO). It has never had to be done before in Australia. The good news is that the system worked. AEMO did its job competently and power began to return within 4 hours. That’s a really rapid and successful “boot up”.

The gradual return of the wind power began a little after midnight on Thursday, 29/09/2016. By early afternoon on the 29th wind capacity was at about 21-15%. Many wind generators were not back on line at that stage which may have been partly due to high winds or partly due to the damage to the transmission network in the mid-north or both. Wind was producing about 200MW at 1300 on 29/09/2016 about the same as small scale solar (about 15% each).

The questions that are not yet resolved are: “Why did the whole grid in SA shut down? Why not just the Northern part of it where the power lines went down? Why could the gas generators operating and spinning in reserve not respond fast enough to avoid the shut down?”

The graphs below show power output in all states and come from the AEMO. The SA graph deserves to be archived: we may never see something like that again. On the other hand, with a heating-up planet storing more energy in the seas and the atmosphere, events like the one we have been experiencing may occur more frequently.



Source: AEMO, provided by Roger Dargaville, Deputy Director, Energy Research Institute, University of Melbourne and published in The Conversation, 29/09/2016. Note demand in SA is greater than supply: we were also relying on imports from Vic. Supply in Vic was higher than demand allowing some export.

Brian Phillips
29/09/2016