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## CARBON EMISSIONS INDEX PLUS

*Providing a comprehensive and early indication of key greenhouse gas and energy trends in Australia.*

**National Electricity Market update, data to March 2016.**

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## Introduction

This CEDEX<sup>®</sup> *Electricity Update* contains data for emissions from electricity generation in the National Electricity Market (NEM) up to the end of March 2016. All emissions data are reported as annual moving averages. This approach removes the impact on the reported data of seasonal changes, which particularly influence electricity and gas. Annualised data reported in CEDEX<sup>®</sup> will show a month on month increase if the most recent monthly quantity is greater than the quantity in the corresponding month one year previously.

## Electricity emissions update - data to 31 March 2016

### Emissions and demand continue to climb

#### Key points

The year to March 2016 saw increases in electricity demand, electricity generation and emissions from generation in the NEM. This continued the general pattern of the past seventeen months.

Total electricity demand increased for the thirteenth successive month in the NEM and the seventh successive month in WA. There can be little doubt that the period of falling demand for electricity across Australia has now ended. Total annual demand in the NEM is now 2.5% higher than the low point recorded in the year to February 2015. Sustained demand growth at this sort of rate was considered normal in the electricity industry up to about 2004, but until now had not been seen since then.

Total emissions from electricity generation in the NEM increased again in the year to March 2016. Annual emissions were 5.5% higher than in the year to June 2014.

Total coal generation was 76.1%, compared with a minimum of 72.3% in the year to July 2014. Gas generation recorded another small reduction, notwithstanding an increase in Tasmania to meet the supply shortfall caused by the failure of Basslink.

Total renewable generation reached 13.2% in the year to March 2016, its highest level for several decades, outside the period affected by the carbon price, despite a small reduction in wind generation. There was a small increase in hydro generation and also a modest contribution from the three new grid scale solar farms, the most recent of which, Moree, came on line in late February.

This issue of CEDEX<sup>®</sup> *Electricity Update* concludes with a further look at the Tasmanian electricity supply crisis. With the expected date for restoration of Basslink now being as late as June, we draw particular attention to the challenge of meeting the large increase in demand for electricity to provide winter heating, which normally starts in May.

### Demand

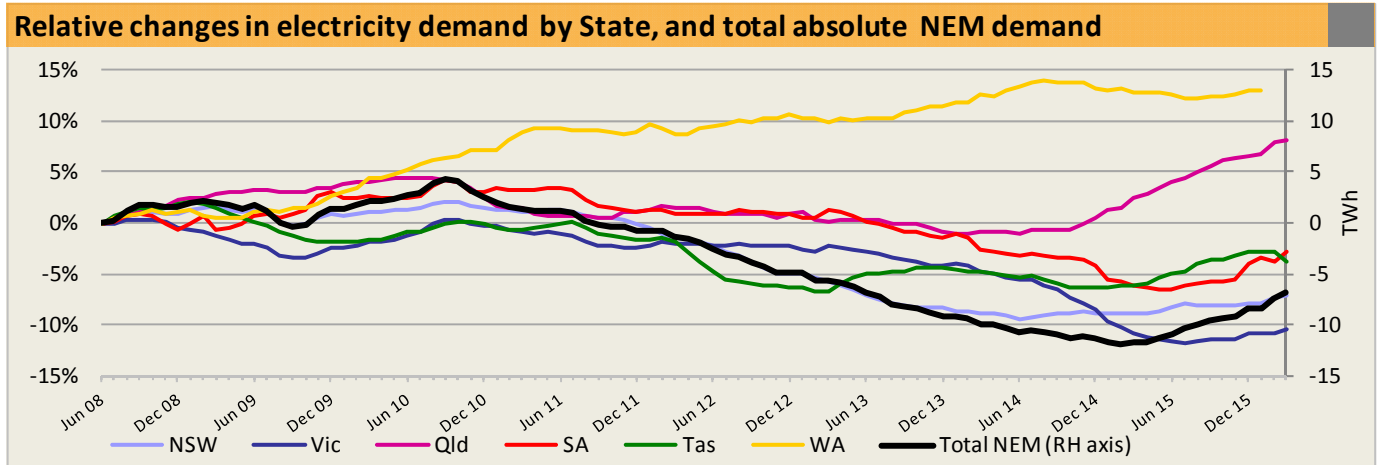
There can be little doubt that the period of falling demand for electricity across Australia has now ended. In the year to March 2016, total NEM annual demand increased for the thirteenth successive month; in the WA SWIS it increased for the seventh successive month (Figure 1). Demand increased in every state except Tasmania, where demand is obviously being affected by the acute supply crisis, examined in detail later in this *Update*. Total annual demand in the NEM is now 2.5% higher than the low point recorded in the year to February 2015. Sustained demand growth at this sort of rate was considered normal in the electricity industry up to about 2004, but until now had not been seen since then.

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With all three LNG plants now in operation, total annual demand in Queensland is now more than 4 TWh, equivalent to around 9%, higher than it was before the beginning of the shift to electric motor drive for gasfield production, in November 2014. This is about half of what AEMO expects to be the eventual total increase in electricity demand consumption for coal seam gas production.

In the other four mainland states, it is likely that some of the increase in annualised demand over recent months is attributable to the abnormally high average summer temperatures, as discussed in the February 2016 *Electricity Update*. The unusual weather extended into March, with the long run of consistently hot weather during the first two weeks of the month. This weather was undoubtedly the main factor behind the sharp uptick in annualised demand in the year ending March, seen in NSW, Victoria and SA. Most unusually, peak 30 minute demand (the highest demand averaged over a 30 minute trading interval) for the summer in Victoria occurred on 8 March. The NSW peak was in late February, the Queensland and WA peaks in early February and the SA peak in December (a more “normal” pattern). Seasonal peaks are shown in Figure 2 for every state except Tasmania, where annual daily peak demand is actually at its minimum during the summer months.

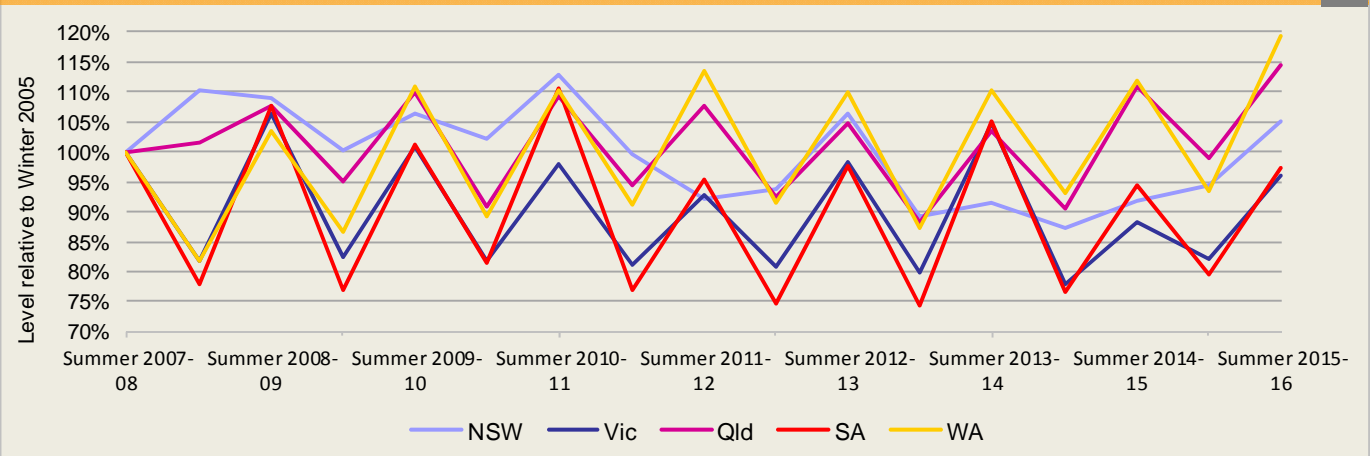
FIGURE 1



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FIGURE 2

Seasonal 30 minute peak electricity demand by State, relative to Summer 2007-08

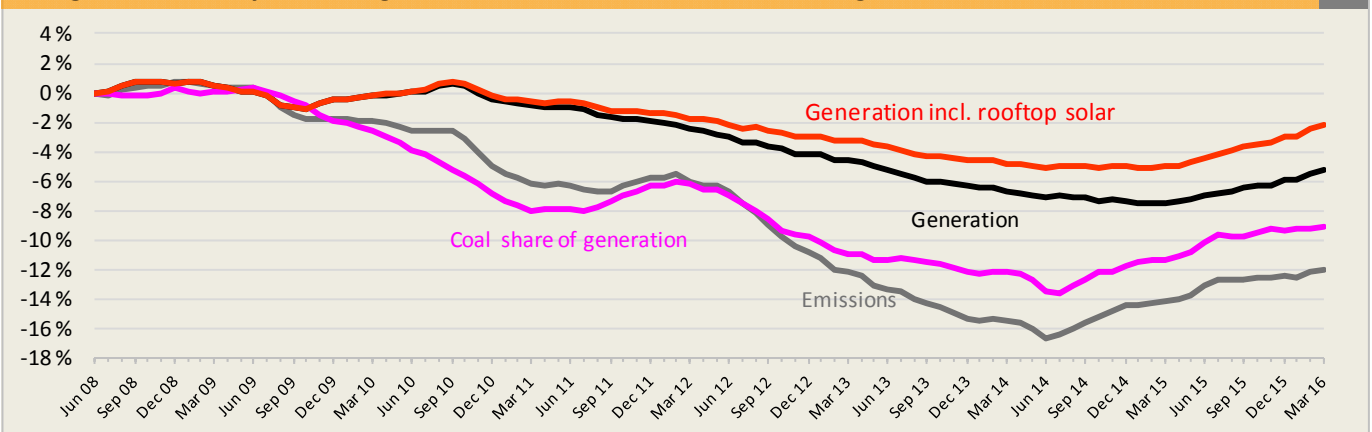


Generation and emissions

Total emissions from electricity generation in the NEM increased again in the year to March 2016 (Figure 3). Annual emissions were 5.5% higher than in the year to June 2014. The emissions increase continues to be driven by growing black coal generation in Queensland, to supply the growing demand, and more modest increases in NSW to make up for steadily falling imports of Queensland black coal electricity (Figure 4). Over the seventeen months since the switch to electricity in the coal seam gas fields started, at the end of October 2014, the increased supply from Queensland coal fired generators has added an additional 5 million tonnes CO<sub>2</sub>-e to the Earth's atmosphere. The projected full increase in electricity demand from coal seam gas production will add about 8 million tonnes CO<sub>2</sub>-e per year to Australia's emissions, unless there is a shift away from coal to lower emission sources of electricity.

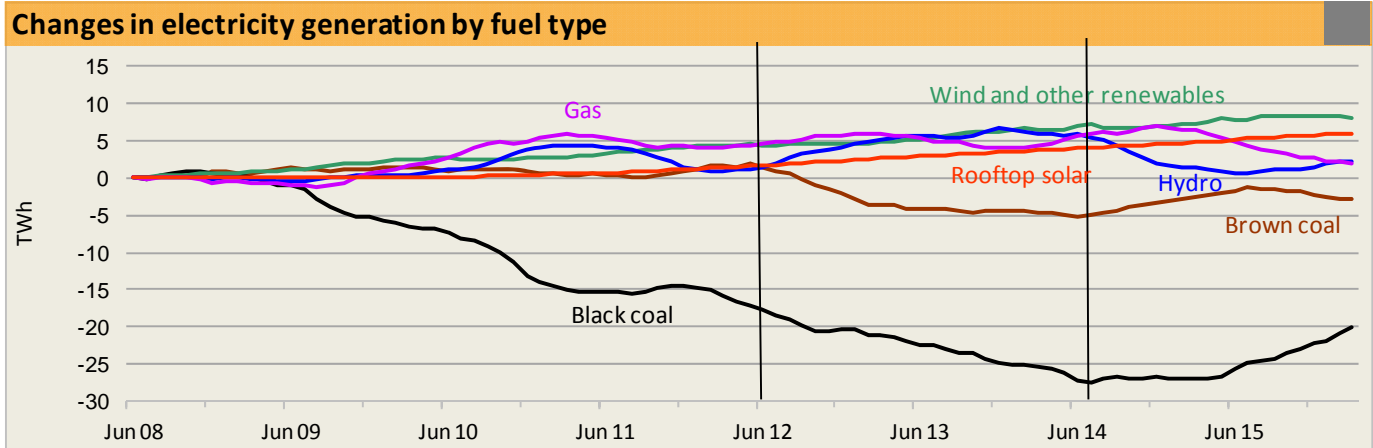
FIGURE 3

Changes in electricity sent out generation, emissions and coal share of generation



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FIGURE 4



Annual brown coal generation fell slightly in the year to March 2016, almost entirely because of the cessation of exports from Victoria to Tasmania. It is likely, however, that these emissions have merely been postponed. Given the seriousness of Tasmania's electricity supply crisis, large volumes of brown coal electricity are certain to flow south through the Basslink cable as soon as it has been repaired, so as to allow hydro storage levels to recover. In the year to March 2016, black coal generation supplied 53.1% of NEM electricity and brown coal supplied 23.0%. The total coal generation was 76.1%, compared with a minimum of 72.3% in the year to July 2014.

Gas generation continued its fall with small decreases in Queensland, SA and NSW more than offsetting a small increase in Victoria and a somewhat larger increase in Tasmania. Gas supplied 10.7% of NEM electricity in the year to March 2016, the lowest share since July 2010. Hydro generation increased slightly in all three states with major hydro capacity, while wind generation fell slightly, probably because of the unusual hot, still weather across southern Australia throughout the first two weeks of March. A year has now passed since a new windfarm came on line in the NEM, the longest such period for over a decade.

There was one new renewable generator, however – the Moree Solar Farm – meaning that there are now three NEM connected solar farms, Nyngan, Broken Hill and Moree, all in NSW, with combined total capacity of 212 MW. All three projects were supported by grants for part of the cost from ARENA, and two also received support from the NSW government. Being so new, they are as yet making only a small contribution to total annual generation. In the month of March, however, their output equalled 0.7% of total NSW NEM generation, 2.2% of total NEM renewable generation and 0.2% of total NEM generation. Their output contributed to total renewable generation in the year to March 2016 reaching 13.2% of NEM generation, the highest level for several decades, outside the period affected by the carbon price.

#### A closer look at the Tasmanian electricity crisis

The last two *Electricity Updates* have written about Tasmania at some length. However, with the announcement, by the Basslink operator, that repairs to the cable may not be completed until early June, by which time cold weather will have well and truly arrived, the risks continue to mount.

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FIGURE 5

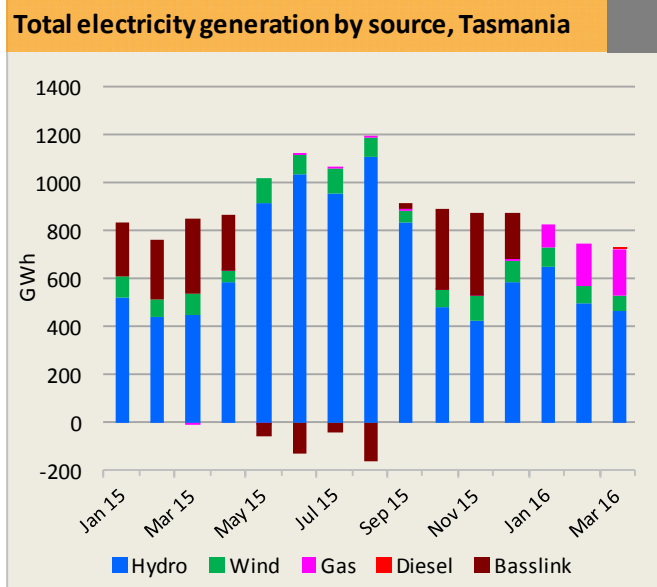


FIGURE 6

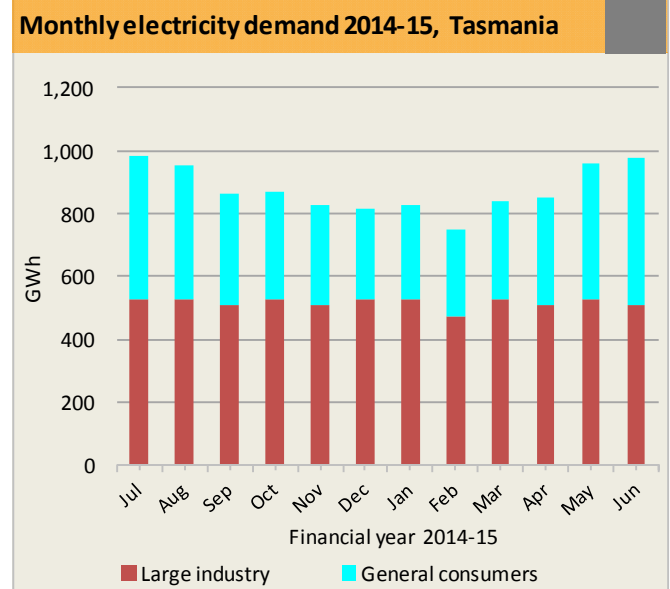


Figure 5 shows the dramatic change in the supply mix since the Basslink failure, with gas generation substituting for imports from Victoria during the past three months, together with a small contribution from diesel generation during March. Negative flows on Basslink during May, June, July and August last year are net exports of hydro electricity from Tasmania to Victoria. It is also interesting to see that total supply, and therefore demand, during January and February this year was almost the same as in January and February 2015. However, supply and demand in March were significantly lower than in March 2015. The difference may in part be the result of unusually mild weather during March. According to the Bureau of Meteorology, the average temperature in Tasmania during March was the sixth highest on record and the average daily minimum temperature was the fourth highest on record. Another large part of the difference is presumably the result of agreed reductions in supply to major industrial users, which account for nearly 60% of total Tasmanian electricity consumption. The large user share of consumption is much higher in Tasmania than in any other Australian state, presenting both challenges and opportunities for managing the supply crisis and its aftermath.

The challenge can be clearly seen in Figure 6. This figure has been created by allocating the total consumption by large industrial uses, as reported by AEMO, uniformly to every day in the year. The resultant month by month estimate of major industrial consumption is then subtracted from total monthly consumption, also taken from AEMO data, as compiled in the CEDEX data system. The subtraction gives month by month estimates of consumption by general business and residential consumers. The dramatic increase in monthly consumption by general consumers as colder weather comes in May and June is clear to see. While there has been an earlier-than-expected return to production of a 57MW gas unit at Bell Bay, the balance of this expected growth in demand will need to be met by the 200MW of emergency diesel generator sets, together with any inflows into hydro system and wind.



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The main reason for the dramatic increase in these months is of course the use of electricity for space heating during the winter. There are many opportunities to upgrade the electrical energy efficiency of buildings and equipment used for winter heating by Tasmanian residential and business consumers. It will obviously not be possible for such upgrades to make any significant contribution to meeting the current crisis. But such programs should be an important part of any plan to improve the future electricity supply security of the state.

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