Review of the NEM in 2014

Green Markets Insights: 1-2015

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NEM power consumption falls 1.1 per cent in 2014
Solar and energy efficiency accounted for 89 per cent of the reduction
Renewables fall from 13.8 per cent to 11.8 per cent market share
Greenhouse emissions increase by 1.0 per cent in 2014
Three wind farms start operating and five fossil-fuel plants cease

1. Summary

Electricity consumption in the National Electricity Market (NEM) continued to fall in 2014, dropping by 1.1 per cent (2,098 GWh) compared to 2013 levels. Electricity consumption fell in all states except Queensland which increased by 0.9 per cent. Victoria experienced the biggest fall of 3.5 per cent due largely to the closure of the Point Henry aluminium smelter at the end of July 2014.

The reduction in electricity consumption masks the contribution that solar and energy efficiency activities have made. We estimate that solar installations supported by the Renewable Energy Target and energy efficiency activities supported by the various state based schemes will have contributed 1,877 GWh in 2014 or 89 per cent of the observed reduction in demand.

There was a dramatic drop in the level of renewable generation in 2014, falling from 13.8 per cent share of the market to 11.8 per cent. This drop is due to a 25 per cent reduction in hydro generation levels and was only slightly offset by a 6.4 per cent increase in wind generation. Brown coal and gas-fired generation increased their output making up for the lower hydro generation. Brown coal-fired generation increased by 4 per cent and gas-fired generation increased by 11.5 per cent in 2014.

With the increase in fossil fuel generation, the emission intensity of generation increased by 2.1 per cent with the overall level of greenhouse emissions increasing by 1 per cent.

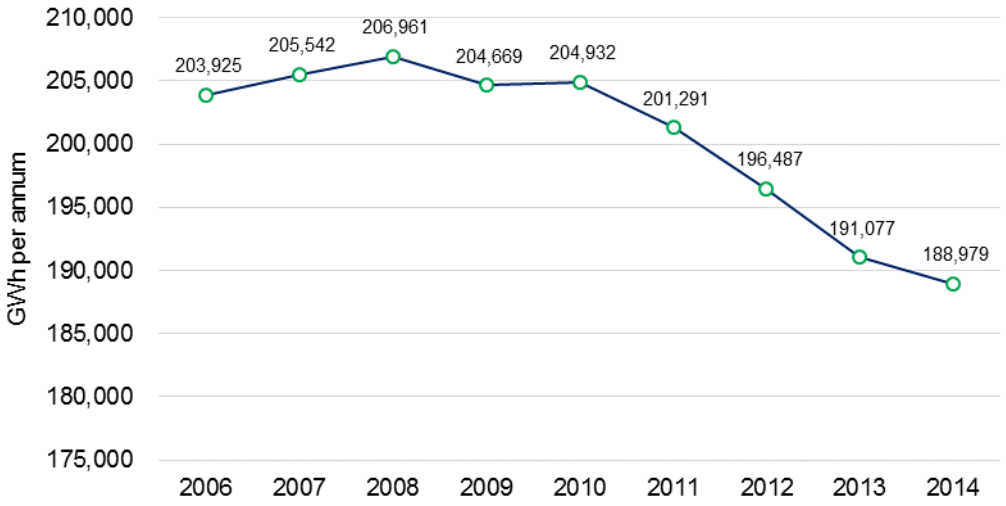
Three new wind farms started generating for the first time in 2014; Boco Rocks (NSW), Taralga (NSW) and Snowtown 2 North in South Australia. Five fossil fuel plants ceased generating in 2014.

This Green Market Insight analyses the changes in electricity generation and consumption in the NEM for the year ending 31 December 2014 and compares it to the same period in 2013. Our analysis is based on scheduled metered demand and metered generation data published by the Australian Energy Market Operator (AEMO) and provided through NEM-Review. The data does not directly measure actual consumption as it includes transmission losses, power station auxiliary use (power used in the power station) and excludes non-scheduled generation. As transmission losses, auxiliary use and non-scheduled generation have been fairly stable over the last three years it nevertheless provides a solid basis for analysing year on year changes to electricity consumption.

2. NEM electricity consumption

Electricity consumption (as measured by scheduled demand) has continued to decline. This trend started back in 2009 (refer to Figure 1). Electricity consumption fell by 2,098 GWh for the 12 months ending 31 December 2014.

Figure 1. Metered scheduled demand from 2006 to 2014



All states other than Queensland experienced a reduction in electricity consumption with Victoria experiencing the biggest reduction of 3.5 per cent (Table 1). The closure of the Point Henry aluminium smelter at the end of July 2014 was responsible for more than 70 per cent of the decline.

Table 1 – Metered electricity demand by state - GWh (2014 cf: 2013)

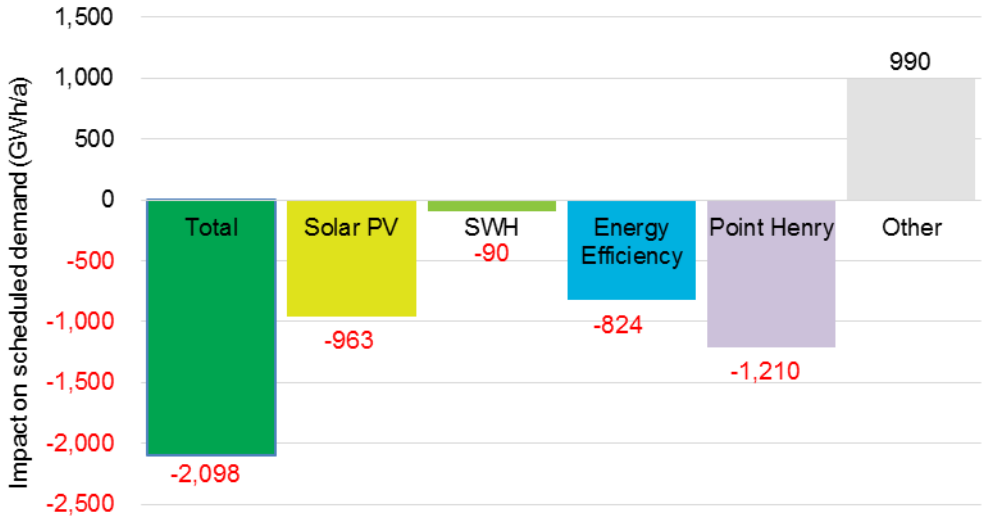
	NSW	QLD	SA	VIC	TAS	Total
2014 Consumption	69,588	50,403	12,304	47,020	9,664	188,979
2013 Consumption	70,067	49,952	12,521	48,724	9,813	191,077
Difference	-480	451	-217	-1,704	-148	-2,098
% Change	-0.7%	0.9%	-1.7%	-3.5%	-1.5%	-1.1%

Nearly 700 MW a year of roof-top solar PV was installed in NEM states and created certificates under the Renewable Energy Target over the 2013 and 2014 period. This is estimated to have generated an additional 963 GWh in 2014 and accounts for 46 per cent of the reduction in overall consumption. The contribution of solar hot water and an array of energy efficiency activities supported by state based energy savings schemes have also contributed to lower electricity consumption.

There are now four energy efficiency schemes operating in the NEM; in NSW, Victoria, South Australia and the ACT. We have analysed the number of certificates or abatement that has been generated by a range of approved activities over the 2013 and 2014 period to estimate the full year impact. In total, identifiable energy efficiency activities could reasonably account for more than 824 GWh of demand reduction in 2014 equivalent to 39 per cent of the total reduction (Figure 2).

We estimate that solar installations supported by the Renewable Energy Target and energy efficiency activities supported by the various state based schemes will have contributed 1,877 GWh in 2014 or 89 per cent of the observed reduction in demand.

Figure 2. Reduction in electricity demand (2014 cf: 2013)



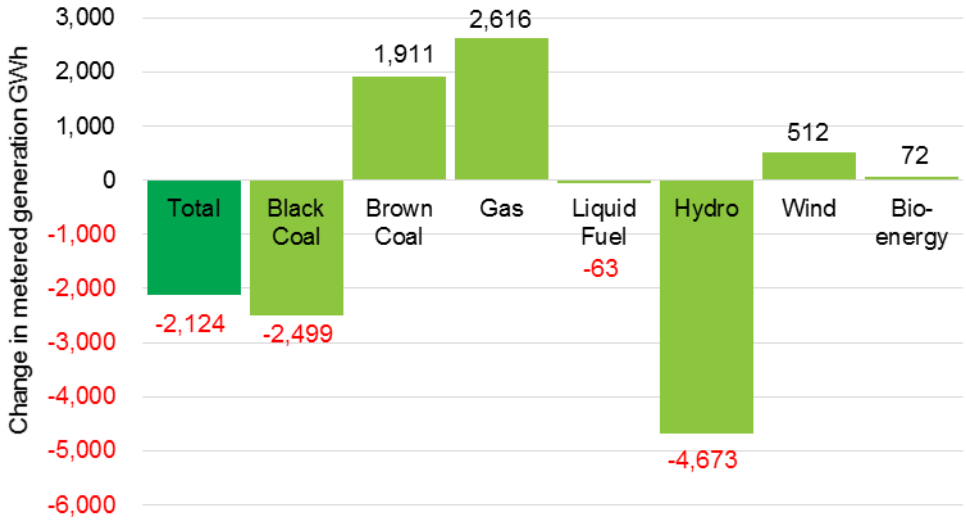
3. Power generation in the NEM

In analysing metered generation we have included all generators for which AEMO publishes generation data. This includes all scheduled generation and also larger non-scheduled generators which are predominantly hydro and wind generators. The total metered generation figures are thus slightly higher than the scheduled demand.

Figure 3 below shows clearly how the fuel mix has changed over the last 12 months. Hydro generation has dropped a massive 25 per cent on 2013 levels. Hydro generation in 2013 was well above average as water storages were run down in response to higher power prices (due to the carbon price). In 2014 hydro generation levels returned to more normal levels (Figure 4) although Snowy Hydro generation remained well below average generation levels.

Black coal-fired generation reduced by 2.5 per cent in 2014, largely due to lower generation in NSW following the closure the Wallerawang power station. Gas-fired generation (predominantly in Queensland) was 11.5 per cent higher and brown coal-fired generation (up 4 per cent) picked up the slack.

Figure 3. Differences in metered generation by fuel (2014 cf: 2013)



Wind generation increased by 6.4 per cent largely due the commencement of three new wind farms and a full year's output of several wind farms that commenced

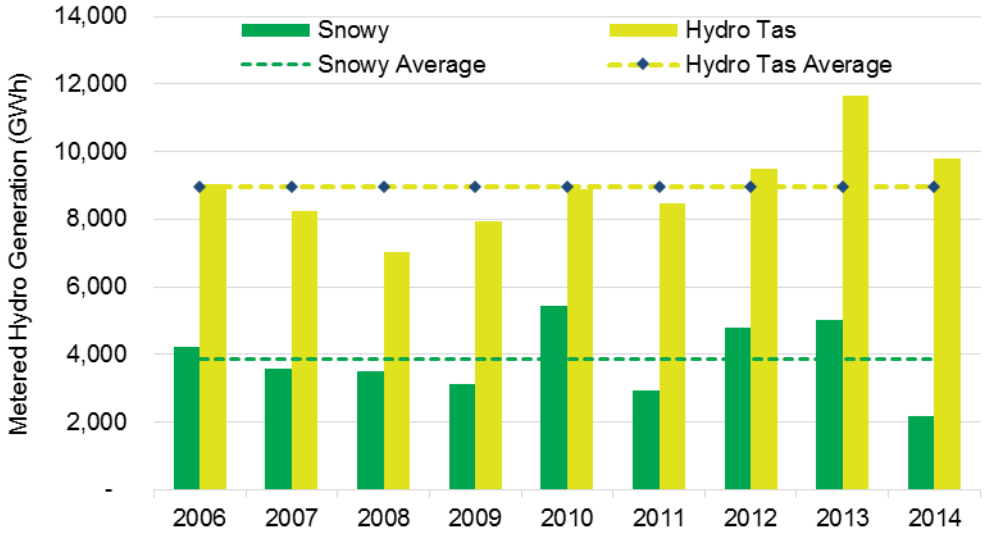
operating late in 2013. Overall 2014 was less windy than 2013 with those wind farms that were fully operational on 1 January 2013 producing 11 per cent less in 2014 than in 2013. The average capacity factor for these wind farms dropped from 35.1 per cent in 2013 to 31.1 per cent in 2014. Wind accounted for 34 per cent of South Australia's total generation in 2014, slightly higher than the 32 per cent achieved in 2013.

Table 2 – AEMO metered electricity generation by state and fuel (2014 cf: 2013)

GWh	Black Coal	Brown Coal	Gas	Liquid Fuel	Hydro	Wind	Bio-energy	Total
2013								
NSW	57,516	-	4,328	44	2,945	802	-	65,635
QLD	41,072	-	9,715	42	714	-	306	51,850
SA	-	1,908	5,973	4	-	3,774	-	11,659
VIC	-	45,340	1,730	-	3,266	2,588	-	52,924
TAS	-	-	949	-	11,643	833	-	13,425
Total	**98,588**	**47,247**	**22,696**	**90**	**18,568**	**7,997**	**306**	**195,493**
Market Share	50.4%	24.2%	11.6%	0.0%	9.5%	4.1%	0.2%	100.0%
2014								
NSW	54,396	-	3,835	0	1,405	942	-	60,579
QLD	41,693	-	13,260	25	816	-	378	56,173
SA	-	2,592	5,258	2	-	4,079	-	11,930
VIC	-	46,567	2,204	-	1,889	2,539	-	53,199
TAS	-	-	756	-	9,784	948	-	11,488
Total	**96,089**	**49,158**	**25,312**	**27**	**13,895**	**8,508**	**378**	**193,369**
Market Share	49.7%	25.4%	13.1%	0.0%	7.2%	4.4%	0.2%	100.0%
Change (GWh)	-2,499	1,911	2,616	-63	-4,673	512	72	-2,124
% Change	-2.5%	4.0%	11.5%	-69.7%	-25.2%	6.4%	23.5%	-1.1%

Snowy Hydro generators accounted for 2,843 GWh of the 4,673GWh reduction in hydro output in 2014 with Hydro Tasmania's generators accounting for 1,858 GWh.

Figure 4. Snowy and Tasmanian Hydro historical generation levels



4. New generation projects

Three large metered renewable generators came on line in 2014 these were all wind farms and are summarised in Table 3. These projects were all committed in earlier years. There were no new wind farms committed in 2014.

Table 3 – New power projects that started operating in 2014

	State	Fuel Source	First Generation	Capacity (MW)
Snowtown 2 North	SA	Wind	Feb-14	144
Boco Rock	NSW	Wind	Sep-14	114
Taralga	NSW	Wind	Dec-14	107

Note: Mt Mercer and Gullen Range wind farms started operating in late 2013

5. Generators that were closed or mothballed

A number of fossil fuel power stations ceased operating during 2014 (Table 4). Some of these may come back on-line at a future time.

Table 4 – Power projects that ceased operating in 2014

	State	Fuel Source	Last Generation	Capacity (MW)
Redbank	NSW	Black coal	Nov-14	150
Wallerawang	NSW	Black coal	Mar-14	500
Morwell (Enegry Brix)	VIC	Brown coal	Sep-14	195
Tamar Valley	TAS	Gas	Jun-14	208
Swanbank E	QLD	Gas	Dec-14	385

6. Greenhouse gas emissions

Greenhouse gas emissions increased by 1 per cent in 2014, notwithstanding a 1.1 per cent reduction in electricity consumption.

The average emission intensity of electricity generation increased by 2.1 per cent rising from 0.792 tonnes/MWh in 2013 to 0.809 tonnes/MWh in 2014. This was largely due to the significant reduction in hydro generation which was replaced by an increase in brown coal and gas-fired electricity generation.

Table 5 – NEM Greenhouse gas emissions by fuel (2014 cf 2013)

'000 tonnes	Black Coal	Brown Coal	Gas	Liquid Fuel	Total
2013					
NSW	49,966	-	1,730	40	51,736
QLD	35,434	-	4,411	39	39,884
SA	-	1,908	3,002	4	4,913
VIC	-	57,096	903	-	58,000
TAS	-	-	396	-	396
Total	**85,399**	**59,004**	**10,442**	**83**	**154,928**
2014					
NSW	47,215	-	1,586	0	48,802
QLD	36,008	-	6,067	23	42,098
SA	-	2,592	2,673	2	5,266
VIC	-	58,774	1,149	-	59,923
TAS	-	-	313	-	313
Total	**83,223**	**61,366**	**11,788**	**25**	**156,402**
2014 Increase	-2.5%	4.0%	12.9%	-69.3%	1.0%

Notes and references:

- Electricity consumption data has been sourced from AEMO (NEM-Review) and reflects the level of scheduled generation required to meet that demand. This therefore includes power station auxiliaries and losses;
- The AEMO metered generation data includes scheduled generators and some of the larger non-scheduled generators. Smaller non-scheduled renewables are excluded and we estimate that this amounts to at least 3,500 GWh (1.8 per cent of total generation);
- Roof-top solar PV is not included as a generation source and is included as lower electricity consumption;
- Emissions intensity data by NEM generator has been sourced from the ACIL Allen Report to AEMO dated 11 April 2014 “Emission Factors – Review of Emission Factors for use in the CDEII”; and
- State and fuel source classifications for generators has also been based on the ACIL Allen Report dated 11 April 2014.

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