

Research Note: 3-2014

What does a real 20 per cent renewables market share look like?

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5 August 2014

Modelling by ACIL Allen for the Renewable Energy Target (RET) Review Panel has estimated the Mandatory RET, to achieve a 20 per cent renewables market share by 2020 to be 25,500 GWh. Given that renewables projects that have already been committed amount to 14,500 GWh, there are another 11,000 GWh of projects to be built to meet a 25,500 GWh target by 2020.

The RET Review Panel may be significantly understating the level of renewables required to meet a 20 per cent or a 30 per cent renewable energy target. ACIL Allen, the consultants used by the RET Review Panel has significantly overestimated the level of pre-existing renewables which is equivalent to that level of renewable generation that does not produce certificates under the RET.

ACIL Allen has used a figure of 16,148 GWh for existing baseline generation which is at least 2,669 GWh higher than the actual renewable generation figure of 13,479 GWh. Using actual renewable generation for pre-existing projects would arrive at a target in excess of 28,000 GWh by 2020. This has a material impact, equivalent to an additional 871 MW of renewable generation projects operating at a 35 per cent capacity factor.

ACIL Allen methodology to calculate 20 per cent market share

ACIL Allen has determined that, to achieve a real 20 per cent market share for renewables by 2020, the currently legislated 41,000 GWh target should be reduced to 25,500 GWh (refer to Figure 1).

Figure 1 – ACIL Allen Formula for calculating 20% Renewables

(RET Review Modelling Workshop 23 June 2014)

▲ LRET target reset to achieve 20% renewables share of energy mix in 2020

- Calculated through the following formula:

$$\% \text{ RE (ACTUAL 2020)} = \frac{\text{RE}_{\text{LRET ELIGIBLE}} + \text{RE}_{\text{SRES PV}} + \text{RE}_{\text{PRE-RET}}}{\text{E}_{\text{NEM}} + \text{E}_{\text{SWIS}} + \text{PV}_{\text{NEM\&SWIS}} + \text{E}_{\text{OTHER \& OFF GRID}}}$$

- $\text{RE}_{\text{SRES PV}} = 9,272$ GWh (energy generated from behind the meter solar PV systems)
- $\text{RE}_{\text{PRE-RET}} = 16,148$ GWh (existing baseline generation)
- $\text{E}_{\text{NEM}} + \text{E}_{\text{SWIS}} + \text{PV}_{\text{NEM\&SWIS}} + \text{E}_{\text{Other\&Offgrid}} = 255,376$ GWh
- $\% \text{RE}_{2020} = 20\%$

- Solving for $\text{RE}_{\text{LRET Eligible}} = 25,655$ (rounded to **25,500 GWh**)

ACIL Allen has assumed that pre-existing generators (RE PRE-RET) will be generating 16,148 GWh of electricity. It is not clear from where ACIL Allen has derived their estimate. It could well have been derived from the 1997 Baseline generation figure that is published by the Clean Energy Regulator (refer to Table 1). The ACIL Allen figure is not too dissimilar from the aggregate 1997 Baseline in Table 1, with the difference potentially explained by removing some generators that may no longer be operational.

Table 1 – Summary of Renewable Generator Baselines (Clean Energy Regulator)

Fuel Type	1997 Baseline (MWh)	Share
Black Liquor	154,445	0.9%
Hydro	15,624,679	94.1%
Landfill Gas	263,701	1.6%
Other Biomass	37,841	0.2%
Other	5,470	0.0%
Sewage Gas	18,755	0.1%
Bagasse	492,870	3.0%
Total	16,597,761	100.0%

In simple terms, to determine the level of the mandated target we need to exclude renewable generation that does not create Large-scale Generation Certificates (LGCs) under the scheme, the so called 'pre-existing' renewables. This is not as simple as it first seems and we need to be extremely careful in using the 1997 Baseline generation figures as these will overstate the actual level of generation due to:

- a number of pre-existing generators have ceased operation (specifically a number of bagasse and land fill gas generators);
- a number of these generators while still operating, do not produce anywhere near their baseline (this could be due to factors such as declining methane in the case of landfill gas, lower cane harvest in the case of bagasse projects); and
- a number of hydro generators will exceed their baselines in some years and will be well under in other years. We have witnessed high levels of hydro generation in recent years (and high LGC creation) due to the build-up in water storages due to higher than average rainfall and then higher than normal generation due to maximising output due to the carbon price.

Hydro generation accounts for 94 per cent of 1997 registered baselines (refer to Table 1) and so is worth examining in some detail.

Hydro Generation in the NEM

Actual generation data is available from AEMO for most of the pre-1997 generators (sourced from NEM Review). AEMO data is available for hydro generators whose LGC baseline represents 96.2 per cent of the 1997 baseline hydro level. AEMO does not publish data for the smaller baseline hydro generators (these are not material accounting for less than 4 per cent of the total). Comprehensive data is however available for the larger hydro generators.

Generation data as reported through NEM Review is summarised in the first section of Table 2.

Table 2 – Summary of Hydro generation (AEMO Data) and LGC Creation by state (MWh)

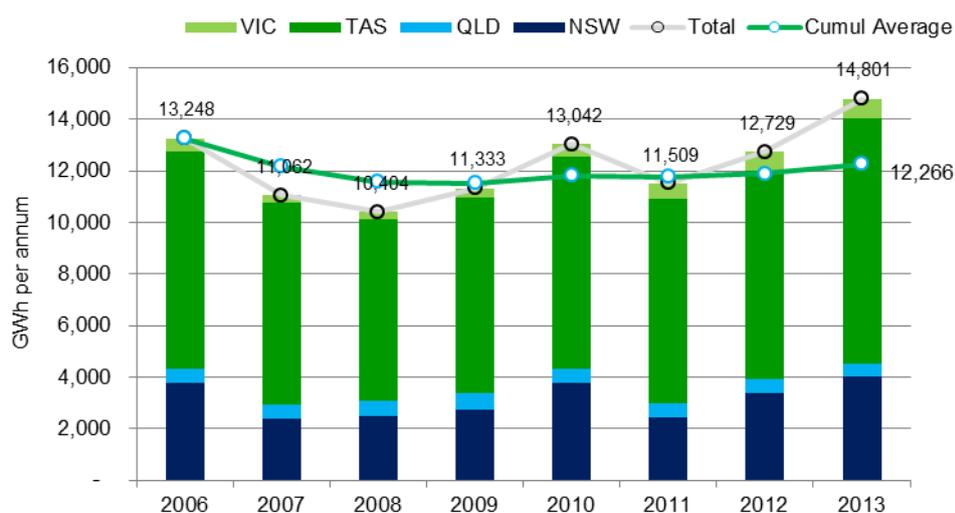
Note: LGC creation figures for 2013 are GEM estimates based on actual recorded generation levels

MWh	2006	2007	2008	2009	2010	2011	2012	2013
Hydro Generation by State (All Snowy units included in NSW)								
NSW	3,782,377	2,390,835	2,486,844	2,764,599	4,786,116	2,611,445	4,117,782	4,500,167
QLD	675,532	748,771	765,151	735,233	687,291	946,239	622,247	692,164
TAS	9,038,868	8,232,700	7,031,596	7,957,028	8,891,695	8,481,190	9,487,471	11,642,513
VIC	692,031	309,539	285,202	351,770	598,367	628,820	786,291	878,261
Total	14,188,809	11,681,845	10,568,793	11,808,631	14,963,469	12,667,694	15,013,791	17,713,105
Baseline Projects - LGCs Created (all Snowy units included in NSW)								
NSW	7,991	2,135	4,493	1,178	998,006	172,270	732,322	484,009
QLD	103,665	185,628	160,174	103,000	124,790	372,998	88,268	176,442
TAS	634,492	432,465	-	371,090	712,629	565,959	1,381,030	2,131,827
VIC	194,918	20	55	-	86,093	47,813	83,004	119,663
Total	941,066	620,248	164,722	475,268	1,921,518	1,159,040	2,284,624	2,911,941
Hydro Not Creating LGCs (all Snowy units included in NSW)								
NSW	3,774,386	2,388,700	2,482,351	2,763,421	3,788,110	2,439,175	3,385,460	4,016,158
QLD	571,867	563,143	604,977	632,233	562,501	573,241	533,979	515,722
TAS	8,404,376	7,800,235	7,031,596	7,585,938	8,179,066	7,915,231	8,106,441	9,510,686
VIC	497,113	309,519	285,147	351,770	512,274	581,007	703,287	758,598
Total	13,247,743	11,061,597	10,404,071	11,333,363	13,041,951	11,508,654	12,729,167	14,801,164
Cumul Average	13,247,743	12,154,670	11,571,137	11,511,693	11,817,745	11,766,230	11,903,792	12,265,964

Record levels of hydro generation were achieved in 2013 (17,713 GWh), particularly in Tasmania where storages were significantly reduced in 2013 to maximise generation whilst the carbon price was still in place. Significant levels of LGCs were created in 2012 and 2013 (refer to second section of Table 2). As an example Tasmania will produce record levels of LGCs in 2013, predominantly from the Gordon and Poatina power stations which have dramatically run-down storage levels.

When we consider that level of hydro generation that does not create LGCs the average level of generation over the last eight years is 12,266 GWh (refer to last section of Table 2). This is also shown graphically in Figure 2.

Figure 2 – NEM Pre-existing hydro generation not creating LGCs



NEM hydro generation where dispatch data is published by AEMO, accounts for nearly 91 per cent of total 1997 renewables baseline from all fuel types. If we were to simply pro-rata the 12,266 GWh from baseline hydro projects (covered in Table 2) to all renewable generation then the total becomes

13,479 GWh. This figure represents the average annual level of renewable generation over the last eight years that did not generate LGCs.

So, to correctly calculate the level of LGCs that need to be created in order to achieve a 20 per cent market share by 2020, we need to use 13,479 GWh as the estimate for pre-existing renewables generation. This figure is 2,669 GWh less than the figure that ACIL Allen used in their modelling for the RET Review Panel. This is a material over-statement and is equivalent to an additional 871 MW of renewable generation (assuming 35 per cent capacity factor).

This means that to achieve a 20 per cent market share in 2020, the Mandated Renewable Energy Target would need to be 28,324 GWh. As renewable generation projects that have already been built or are under construction, will account for 14,500 GWh, this leaves at least another 13,824 GWh worth of projects to be built by 2020 to meet a 20 per cent target.