ENERGY 2029 REDUX

100% RENEWABLE ENERGY PLAN:2014

The Greens' vision updated for 2014 has even more good news

In 2013 Greens showed it was possible to achieve 100% Renewable Stationary Energy by 2029 and at roughly the same cost as business as usual. Our updated figures show we can now get there for the same price or cheaper. WA is in the best position of all states in Australia to harness our sun, wind and wave resources - but under the Barnett and Abbott governments we're missing the opportunity to transition to a jobs-rich clean energy future. It's time we got started.

The debate is over. Renewable energy is proven and reliable, and it is not the technology that is lacking but the political will.

> RECAP: ENERGY 2029

In March 2013 Senator Scott Ludlam released **Energy 2029 – The Greens 100% Renewable Stationary Electricity Plan for WA.**

This study calculated three different scenarios for the South West Interconnected System (SWIS) and showed the overall cost of a planned transition to renewable energy was similar to the cost to build the electricity supply as 'business as usual'. To recap it found:

- **Scenario 1** - 100% renewable mix with strong emphasis on large scale solar thermal. Costs: $62 billion capital costs, $221/MWH Levelised Cost of Energy (LCOE)
- **Scenario 2** – 100% renewable mix with emphasis on lowest-cost renewables (wind and PV). Costs: $56.9 billion capital costs, $208/MWH LCOE
- **Scenario 3** – Business as usual fossil fuel dependence, with a carbon price of $43 per tonne by 2025. Capital costs at least $20.6 billion, $203/MWH LCOE

This study is in addition to a number of reports that have confirmed 100% renewable energy is technically achievable, including one by the Australian Energy Market Operator[i] .

Many other studies have found 100% renewable energy would produce electricity prices at an amount similar to business as usual if there is at least some global action on climate change, including reports by the independent analysis from the Centre for Energy and Environmental Markets at the University of NSW[ii] and the AEMO[iii].

> THE DIFFERENCE ONE YEAR MAKES

In just one year since we released Energy 2029 we've seen global investment in renewables rise significantly, which has in turn led to two major breakthroughs.

Firstly, the cost to construct and operate large scale renewables has fallen significantly. According to the government's own figures[iv], between 2012-2013 the average cost of electricity generation by:

- onshore wind fell by 18 %
- tracking solar PV fell by 20-30 %
- concentrating solar power (solar thermal) fell by 8 – 27%
- renewables overall saw LCoE reductions of about 20%

Secondly, we've seen renewables now becoming cheaper to install than new coal or gas fired power stations. In the same period:

- Wind and landfill gas is now cheaper than new coal and gas fired power stations *without* a carbon price
- The average costs of solar PV is now cheaper than any new fossil generation with a $24/MWh carbon price
- All renewable technologies decreased in LCOE price between 2013-2014.
- By contrast the cost of nuclear power increased significantly largely due to increased capital and construction costs (Figure 1).

A case in point is the decreasing cost of large scale concentrating solar thermal (CST) technology.

Printed and authorised by Senator Scott Ludlam, Parliament House Canberra ACT 2600.

In March 2013 CST with storage was estimated to cost AU$187/MWh in 2025, but Solar Reserve's 110MW Crescent Dunes plant currently under construction in Nevada has been announced at US$135/MWh (~AU$140/MWh at the time). Solar Reserve's Crescent Dunes plant is also the first of its size so there's strong reason to expect prices to keep decreasing as the technology scales up to mass production.

It's for these reasons Senator Ludlam and Sustainable Energy Now have updated the figures for the Energy 2029 study.

> UPDATED FIGURES: THE GOOD NEWS

Our updated 2014 study shows three good news stories for renewables and WA:.

1. **It is now cheaper to reach 100% renewable electricity than to build the generation supply with business as usual by 2029** (by LCoE).

   The LCoE for Scenario 2 is almost 22% cheaper than business as usual ($163/MWh), while for Scenario 1 is the same cost as business as usual (172/MWh)

2. **In just one year the cost ($LCoE) of renewables fell by almost one quarter.**

   The LCoE for both scenarios fell by 22% . Scenario 1 fell from $221 to $172; Scenario 2 fell from $206 to $163.

3. **In just one year capital costs for renewables fell significantly.**
   The cost to build Scenario 1 fell by 10% from $48.2 billion to $43.5 billion. The cost to build Scenario 2 costs fell by almost 26% from $42.9 billion to $38.2 billion

   Table 1 (below) summarises the findings

It's important to note a number of externalised costs are not included in this study, but would make fossil fuels even more uncompetitive with renewables.

These include replacing the Dampier to Bunbury pipeline (estimated to be around $6 billion), the costs from pollution which affects health and environment, which are estimated to add an extra $55/MWh, which would raise the current wholesale price of coal fired generation from $94/MWh to $149/MWh; and the cost and impact of environmental degradation, tourism, farming communities, and productive agricultural land from fracking and gas and coal mining.

> A JOBS-RICH FUTURE

Our report estimates the following jobs are created:

- **89,000 to 91,000 job years in construction and installation** over the construction lifetime in WA. (If we assume an equal installation rate for the 15 years between now and 2029, 6000 -7000 jobs per year)

- **6000 to 7000 permanent, ongoing jobs in operation and management** ramping up to service the whole renewable electricity generation system over its lifetime

This totals 12,000-14,000 Jobs per year to 2029[v]

- **Another 46,000 to 52,000 manufacturing jobs** created over the construction period - with the number in WA dependent on whether we move quickly to support a manufacturing sector here. The number of course would rise significantly we factor in an export industry.

These figures do not include storage or energy efficiency, nor the indirect business and employment benefits.

Table 1: Summary of findings: Updated costs of Energy 2029

	LCoE ($/MWh)			Capital costs excluding transmission ($billion)			Transmission costs ($b)
	2013 study	2014 study	Difference LCoE	2013 study	2014 study	Difference $cost	2013 & 2014 study
Scenario 1 – 100% Renewable, solar rich	221	**172**	- 49 (-22%)	48.2	43.5	-4.7 (-10%)	14
Scenario 2 – 100% Renewable, lowest cost	208	**163**	- 45 (-21.6%)	42.9	38.2	-11 (-25.6%)	14
Scenario 3 – **BAU –** no carbon price, no renewables	203	**-**		14.5	-		3.7 + gas pipeline infrastructure upgrades
Scenario 3a - BAU - 9% renewable energy + carbon price $24/tonne	-	**172**	-31	-	15.9	+1.4 (+9.7%)	19.7

For **Scenario 1** the jobs figures can be broken down as follows:

Technology	MW	Construction & Installation Jobs	Operation & Maintenance Jobs
Roof-top PV	960	10,560	288
Solar Thermal	3,500	31,150	1,750
Fixed Solar PV Farm	340	3,740	102
Tracking PV Farm	0	0	0
Wind Farm	2,500	6,250	500
Geothermal Station	10	68	4
Wave	50	450	16
Biomass	2,800	39,200	4,200
Storage	0	n/a	n/a
Energy Efficiency	0	n/a	n/a
Total	**10,160**	**91,418**	**6,860**

Many studies – including Energy 2029 - have shown that renewable energy technologies create more jobs per unit of energy and by dollar investment than coal and natural gas[vi].

Jobs in renewables can generate almost three times more jobs than coal, oil and gas. In WA right now there are even a number of gas-fired power stations in WA that have no staff at all.

In WA jobs in coal, oil and gas mining are very low in WA There are about 1020 jobs in coal (1% of WA's total mining employment) and another 7145 in oil and gas mining in WA[vii].

A study by the University of Massachusetts found fossil fuels created the lowest number of jobs for every $1m invested compared to renewable energy, building retrofits and mass transit and freight rail[viii]. (Table 1)

Table 1: Job creation for every $1million investment	
Industry	**Jobs created per $m invested**
Mining	1.4[ix]
Natural gas	5
Coal	7
Smart grid	12
Wind	13
Solar	14
Biomass	16
Building Retrofits	17

> BENEFITS TO THE REGIONS

Because our clean energy resources are in rural and regional areas and our plan would bring investment and thousands of jobs to our regions, many of which are struggling with the decline in the number of people employed in agriculture.

The number of farmers in Australia has been declining for many decades as small farmers sell up to larger scale operations, and fewer young people take over family farms. Since the 2006 census there were 19,700 fewer farmers in Australia – a fall of 11% in just five years. In the 30 years to 2011 the number of farmers declined by an average of 294 farmers every month[x].

Around 11,000 Western Australians worked in agriculture in 2009-10.

The farming population in Western Australia is ageing with the median age now being 53. There is also a growing skill shortage with fewer young people choosing to stay in farming or related skill areas. In addition, mining and onshore gas extraction is threatening important agricultural areas, either directly or by damage to water sources. This has put additional strain on farming communities.

WA needs a resilient agricultural sector that supports farmers to remain on the land and earn a healthy return on their produce. That's why the Greens are campaigning for renewables to be part of the mix, and for safeguarding of prime agricultural land from extractive industries including unconventional coal and gas mining.

Renewable energy is another crop in rotation. It provides a new source of income for WA farmers struggling with low farm-gate prices, rising costs of fuel and fertilisers, competition form imported produced, and a drying climate and a series of poor seasons.

> THE OTHER PARTIES

Under the Barnett Government, power bills have skyrocketed, partly because of unnecessary expenditure on infrastructure to deal with peak demand. Around a quarter of any power bill you pay goes to infrastructure that caters to peak demand for just 40 hours a year[xi]. Huge opportunities to save energy and reduce peak electricity demand have been ignored. People who choose to pay a premium for 'green power' are being charged the carbon price.

The situation has been made worse by the Barnett Government blowing $330 million on the Muja coal debacle – a colossal waste of taxpayers' money that is yet to deliver one unit of electricity. For the same investment the government could have installed solar panels on 165,000 roof tops, generating the equivalent of 247 MW at peak times, exactly when needed. This is as much as a coal or gas fired power station[xii].

At the federal level both parties have repeatedly undermined the renewable energy sector. They have back flipped on promises, failed to implement programs, tinkered with existing measures and refused to introduce stable, long-term nationally

Printed and authorised by Senator Scott Ludlam, Parliament House Canberra ACT 2600.

consistent support policies. The result has been a boom and bust rollercoaster for renewable energy investors.

This is why during the negotiations on the carbon pricing mechanism and associated policies, the Greens insisted on the creation of two independent statutory authorities – the $10 billion Clean Energy Finance Corporation and the $3.2 billion Australian Renewable Energy Agency (ARENA). Their task is to depoliticise support for renewable energy research, development and commercialisation. The Greens are pleased that both agencies are already proving their worth, but we were angry to see in the last budget the Government broke its agreement with the Greens by cutting $159 million from ARENA's budget and deferring $370 million of funding until after 2020. Labor has also never said no to a coal mine expansion or coal seam gas project, and has no plan to increase the Renewable Energy Target beyond 2020.

The ALP promised to implement a $1 billion Connecting Renewable Energy program at the 2010 election but it appears not a dollar was spent by the time this funding was rolled into the newly established Australian Renewable Energy Agency in 2011.

As bad as Labor has been, the Coalition is far worse.

The 20% Renewable Energy Target is a successful tripartisan policy that provides investment certainty and is helping investors build wind, solar and more. But it runs out in 2020, and Tony Abbott's Coalition has refused to commit to retaining the original target of 41,000 Gigawatt hours and worse, he now has a climate sceptic 'reviewing' the RET.

Coalition MPs have also attended extreme anti-wind power rallies, and their major donors include coal, gas and mining giants.

The renewable energy industry is now warning of massive job losses that will be incurred if the Coalition reduces the target. Investment in large scale renewables projects has been virtually stalled for many months as investors wait for policy certainty. The Coalition has no policy on expanding the electricity grid to facilitate renewable energy, and is in complete denial about the economic benefits strong action on a safe climate brings.

Here in WA there has been a long history of similar betrayals.

- In 2009, the Liberal Barnett Government slugged customers of Synergy's NaturalPower, EasyGreen and Earth Friendly power with a price rise over and above general price rises, claiming without justification that green power had become more costly.
- In 2012, the Liberal Barnett Government imposed a carbon price charge on NaturalPower, EasyGreen and EarthFriendly customers, despite Synergy previously claiming these products were carbon-free.
- In July 2013, Liberal Energy Minister and now Treasurer Mike Nahan announced he planned to increase electricity supply charge, unfairly penalising Western Australians embracing solar panels and energy efficiency.
- In August 2013 as described earlier, as part of the 2013-14 Budget, the Liberal Barnett Government tried to terminate the 40 cent/kWh, 10 year solar feed-in tariff for early adopters of PV but were forced by popular demand to reinstate it.

The debate is over. Renewable energy is reliable and the argument that it is intermittent and unreliable has always been a gross over-simplification peddled by those with vested interests in slowing investments in renewable. Our state government is the worst offender, hell bent on pursuing a polluting, environmentally destructive pathway to fracking and oil drilling rather than embracing the clean job rich renewable pathway that is possible in WA.

The question the Greens are asking is if it's no more expensive than business as usual, why wait any longer?

The Australian Greens are the only party you can trust to drive the rollout of 100% renewable electricity in Australia – the only party with the political will to drive and develop the policy frameworks to make it happen.

A full technical paper outlining the models, costs and assumptions used in this summary is available at http://www.greenswa.net.au/energy2029.html

---

[i] http://www.climatechange.gov.au/reducing-carbon/aemo-report-100-renewable-electricity-scenarios

[ii] Dr Jenny Riesz, Ben Elliston, Assoc. Prof Iain MacGill, Assoc. Prof Mark Diesendorf (2013). Submission on 100 per cent Renewables Study – Draft Modelling Outcomes Report. Centre for Energy and Environmental Markets University of NSW.

[iii] http://www.climatechange.gov.au/reducing-carbon/aemo-report-100-renewable-electricity-scenarios

[iv] The Bureau of Resources and Energy Economics (BREE) *Australian Energy Technology Assessment* (AETA) 2012 provides the best available and most up-to-date cost estimates for 40 electricity generation technologies under Australian conditions. http://www.bree.gov.au/publications/australian-energy-technology-assessments

[v] Figures calculated by SEN using Table 6.2: summary of employment factors used in global analysis 2012, p190 Greenpeace 4th edition 2012 world energy scenario http://www.greenpeace.org/international/Global/international/publications/climate/2012/Energy%20Revolution%202012/ER2012.pdf.

[vi] Wei, M., Patadia, S. & Kammen, D.M. "Putting Renewables and energy efficiency to work: How many jobs can the Clean Energy industry generate in the US?" Energy Policy 38 (2010): 919-931.

[vii] May 2011 Report from DMP: http://www.dmp.wa.gov.au/documents/StatsDigest2010a.pdf

[viii] Political Economy Research Institute at the University of Massachusetts at http://www.peri.umass.edu/136/

[ix] The Australia Institute (2012) The use and abuse of economic modelling in Australia

[xi] http://www.greens.org.au/sites/greens.org.au/files/energy_savings_agency_-_briefing.pdf

[xii] Based on 1.5kW systems costing $2000 each; Cockburn gas power station is 240 MW; Collies's coal fired power station is 300MW and the Collgar Wind Farm is 206 MW with 111 wind turbines.