

# Response to Pat Conroy

Federal Member for Shortland

Hearing into Modernising Australia's Electricity Grid

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## Executive Summary

- There is significant evidence that many countries already have more jobs in renewables than in fossil fuel based power generation
- However, a distinction needs to be made between jobs in the construction phase and continuing jobs in operations
- Nevertheless, given that the transition to a zero carbon economy will take several decades, jobs in construction should continue for some time
- Overall, there is evidence for a higher level of employment intensity (jobs/MWh over the lifetime of the plant) in renewables compared to fossil fuels

- Therefore, if renewables do provide a cheaper source of electricity than fossil fuels (allowing for the cost of carbon), then the higher job creation benefit can be considered a bonus

## Preface

Members of ERICA (the Energy Research Institutes Council for Australia) gave evidence at the House of Representatives Standing Committee on Environment and Energy public hearing on Modernising Australia’s Electricity Grid, on Thursday, 17 August 2017. During the hearing, Mr Conroy, Federal Member for Shortland, asked if “you are aware of any good studies around the actual jobs involved per megawatt installed in either construction or maintenance for the various technologies, just out of interest? Has anyone seen any work in that domain - actual jobs?”

We have undertaken a literature search and present here some preliminary findings.

## Response

Internationally, there are a number of reports analysing the jobs created by renewable energy, particularly for the USA and Europe, however data for Australia is more limited.

Recent reports for Europe and the USA include:

1. Renewable Energy and Jobs: Annual Review 2017. International Renewable Energy Agency (IRENA) (2017) [1].
2. United States Energy and Employment Report (USEER), US Dept of Energy 2017 [2].
3. Low carbon jobs: The evidence for net job creation from policy support for energy efficiency and renewable energy UK Energy Research Centre (2014) [3].

4. Perspectives for the energy transition investment needs for a low-carbon energy system. OECD/IEA and IRENA 2017 [4]
5. Global Green Growth: Clean Energy Industrial Investments and Expanding Job Opportunities, United Nations Industrial Development Organization and Global Green Growth Institute, 2015 [5].
6. Jobs in Renewable Energy and Energy Efficiency - Environmental and Energy Study Institute, 2017 [6]

A significantly older but useful study is that by Wei et.al. in 2010 [7]:

1. Putting renewables and energy efficiency to work: How many jobs can the clean energy industry generate in the US?, Energy Policy, 38.

Some limited data for Australia is provided by the Australian Bureau of Statistics. Annual direct FTE employment in renewable energy activities in Australia was estimated at 11,150 in 2015-16, down from a peak of 19,220 in 2011-12 [8]. Employment in roof-top solar systems (which also includes solar hot water systems) made up the largest component of total direct annual FTE employment in 2015-16 with 5,570 or 50% of all such employment. The ABS data is shown in Figure 1.

In Australia and in most other countries, most jobs are created in the construction phase, especially in solar and wind technologies, as operation does not require a significant workforce except in some biomass power plants. Bloomberg New Energy Finance notes:

- “Estimates are that 11-13 man-years are required to install 1 MW of small-scale solar, although it does depend greatly on whether the systems are household rooftops of 3 kW or so, or commercial-scale arrays of many tens of kilowatts” [9]
- “In the operating phase, there are many fewer jobs per MWh in wind and solar plants than there are in fossil-fuel generation. For instance, the giant 2 GW, \$4.5 billion

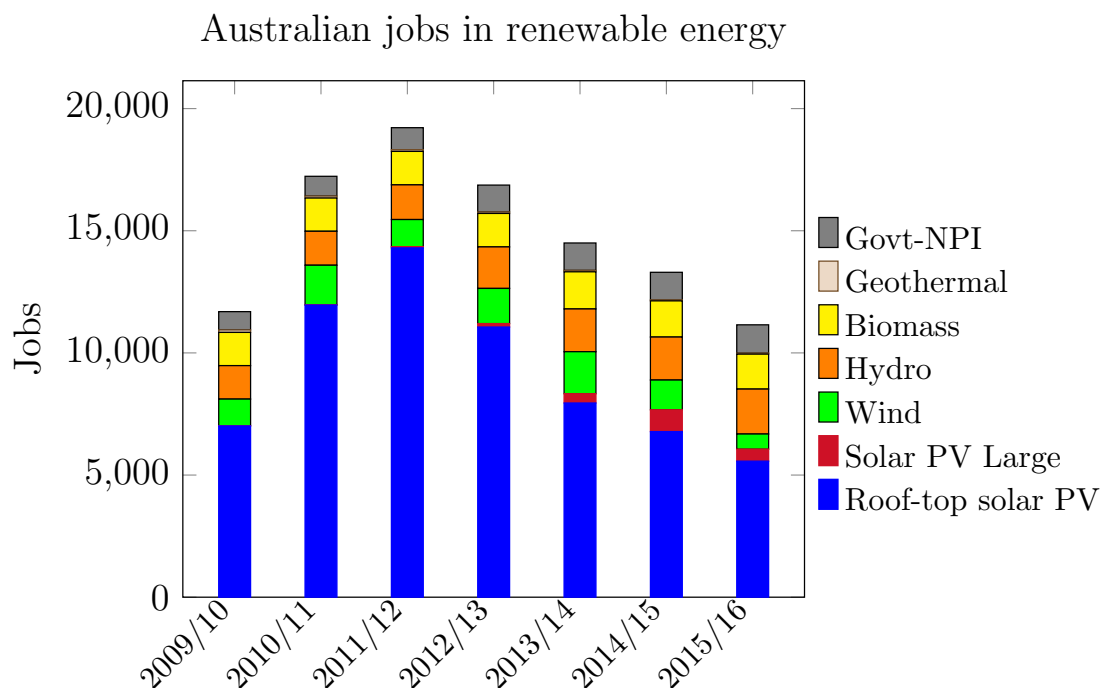


Figure 1: Renewable energy jobs by source, from ABS [8]

onshore wind project in the Oklahoma Panhandle announced this summer by American Electric Power, is slated to create 4,000 jobs during the construction phase but only 80 during operation (a ratio of just 0.04 per MW). By comparison, AEP’s 600 MW John W Turk Jr coal-fired power station in Arkansas employs 109 people directly, plus those in the coal mining and transport chain, to produce about half, at most, of the electricity that is due to come from the Oklahoma wind complex” [9].

The UK Energy Research Centre looked at the question: *“What is the evidence that policy support for investment in renewable energy and energy efficiency leads to net job creation in the implementing regions”* [3]. They compare the jobs impact of investing in renewables and energy efficiency with the jobs impact of investing in an equivalent amount of fossil-fuel plant and find a difference of approximately 1 job per GWh produced. That is, compared to fossil fuels, there is a marginal increase in labour intensity from the annual production of 1 GWh of energy by renewable sources. But they do warn that

“...‘job creation’ is not a meaningful concept. In this context, high labour intensity is not in itself a desirable quality, and “green jobs” is not a particularly useful prism through which to view the benefits of renewable energy and energy efficiency investment. What matters in the long-term is overall economic efficiency, taking into account environmental externalities, the desired structure of the economy, and the dynamics of technology development pathways. In other words, the proper domain for the debate about the long-term role of renewable energy and energy efficiency is the wider framework of energy and environmental policy, not a narrow analysis of green job impacts.”

The most detailed report we found is the 2015 study called “GLOBAL GREEN GROWTH: Clean Energy Industrial Investments and Expanding Job Opportunities”, from The Global Green Growth Institute & UN Industrial Development Organization [5]. An interesting finding is the great variability in job creation per dollar investment depending on the country, viz. “Overall, we find that, per \$1 million in spending in each country (converted at current exchange rates), clean energy investments generate, on average, about 37 jobs in Brazil, 10 jobs in Germany, 100 jobs in Indonesia, 70 jobs in South Africa, and 15 jobs in the ROK”. This report has sections on each of these countries.

The OECD/IEA 2017 report “Perspectives for the energy transition investment needs for a low-carbon energy system” has a detailed economic analysis.

In addition to quantitative analysis of job creation, some studies have looked at job characteristics. A 2016 article titled “Do green jobs differ from non-green jobs in terms of skills and human capital”, in the journal *Research Policy*, concluded that “green” jobs require a higher level of cognitive and interpersonal skills than more established jobs [10]. This could be interpreted to imply that green jobs are also more rewarding and challenging.

In a recent (2017) paper - “Environmental Jobs and Growth in the United States” [11] the authors analysed products and services in the green sector but concluded (albeit tentatively

as the data only covered 2010-11) that governments cannot take it for granted that the greening of a sector will lead to higher productivity in the production of goods.

A US study [2] suggests that skills shortages are also emerging. They also note that “Almost three-quarters of employers across these sectors (i.e. Electric Power Generation and Fuels, Transmission, Distribution and Storage, Energy Efficiency, and Motor Vehicles) reported difficulty hiring qualified workers over the last 12 months; 26 percent noted it was very difficult.”

As Blyth noted [3] - “As such, the single largest potential driver of economic development benefits is local manufacturing ” which applied particularly to wind turbines. Given that Australia doesn’t manufacture all that much in the way of renewable technology, it will be installation and O&M employment that dominate. Interestingly, with progressively larger capacity wind turbines having blade tip heights approaching 150 m, on-site manufacturing is now a cost effective option compared to transporting large blades and towers, increasing the economic advantages for domestic construction [12].

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