



# CLEAN ENERGY JOBS IN REGIONAL AUSTRALIA

## snapshot Nationwide



## 1 INTRODUCTION

Australia is in the early stages of a clean energy boom, with tens of billions of dollars set to be invested in renewable energy in regional areas over the coming decades. The national 20% Renewable Energy Target alone is expected to drive investments of around \$19 billion out to 2030. The introduction of stronger policies to cut pollution and make clean energy cheaper will drive even greater levels of investment.

Clean energy investments create jobs in regional Australia, where the best renewable energy resources are located. Modelling for The Climate Institute shows that with strong and decisive pollution and climate policies – including a price-tag on pollution – close to 34,000 new jobs could be created in Australia by 2030.

Where this clean energy investment and job creation occurs is up for grabs. States and regions with the best clean energy resources and the strongest policy settings will attract the lion's share.

The Climate Institute has prepared a series of case studies outlining the potential new clean energy jobs in regional areas of NSW, Queensland, Australia, South Australia and Western Australia. These case studies can be viewed online at [cleanenergyjobs.climateinstitute.org.au](http://cleanenergyjobs.climateinstitute.org.au).

This briefing paper outlines how Australia as a whole can benefit from the clean energy boom, with a particular focus on the employment opportunities this will create.

Some highlights include:

**A large untapped resource:** The modelling results show strong growth in Australia's electricity sector, with an additional 38,000 MW of generating capacity projected to be installed by 2030. This includes renewable energy, including wind, solar, bioenergy, and geothermal, as well as gas.

**Australia-wide employment:** Based on the modelling results it is estimated that in net terms over 33,980 new jobs will be created in Australia's electricity sector by 2030, including 7,619 permanent ongoing jobs, close to 20,700 construction jobs and 5,650 manufacturing jobs. The vast majority of these jobs will be in renewable energy.

Australia has enough clean energy potential to

- power **14,000,000** homes
- remove pollution equivalent to **11,000,000** cars
- create **32,000** new jobs



This work was undertaken to assess the clean energy potential and employment opportunities that exist in various regions across Australia. The findings for other states and regions can be downloaded from The Climate Institute's website.

Established in late 2005, The Climate Institute is a non-partisan, independent research organisation that works with community, business and government to drive innovative and effective climate change solutions.



# CLEAN ENERGY JOBS IN REGIONAL AUSTRALIA

## snapshot Nationwide

### 2 CONTEXT – JOBS GROWTH IN A LOW POLLUTION ECONOMY

This purpose of this study was to assess the prospects for employment in Australia's electricity sector as the country shifts to clean energy sources over the next two decades. While the study did not look at employment in other parts of the economy, various other studies have assessed the broader, economy-wide, impacts of policies to reduce pollution and make clean energy cheaper. Contrary to the claims of some business lobby groups, all credible studies have shown that employment will continue to grow strongly as Australia transitions to a low pollution economy. For example:

- **Commonwealth Treasury:** Modelling by Treasury found that an additional 1.7 million jobs would be created from 2008 to 2020, with an additional 4.7 million out to 2050, even while national emissions are cut by 60% by 2050.<sup>1</sup> Under the same scenario, average annual incomes are also expected to rise by \$4,300 by 2020.<sup>2</sup>
- **Access Economics:** Modelling for the Council for the Australian Federation showed employment growth of over 1.4 million jobs by 2020 under a scenario where Australia reduces its emissions by 5% below 2000 levels by 2020.<sup>3</sup>
- **CSIRO:** This study found that employment growth is expected to remain strong, even under much stronger pollution reduction policies. For example under a scenario where Australia reduces its pollution by 100% by 2050, economy-wide employment is projected to grow by 29% by 2025.<sup>4</sup>

<sup>1</sup> Gillard, J. "Address to the Green Skills Forum - New Convention Centre – Melbourne", 23 October 2009, available online at: [http://www.deewr.gov.au/Ministers/Gillard/Media/Speeches/Pages/Article\\_091023\\_125628.aspx](http://www.deewr.gov.au/Ministers/Gillard/Media/Speeches/Pages/Article_091023_125628.aspx)

<sup>2</sup> Treasury (2009), *Australia's Low Pollution Future*, available online: <http://www.treasury.gov.au/lowpollutionfuture/>

<sup>3</sup> Access Economics (2009), *Report 2: Impacts on disadvantaged regions*, Report to the Council for the Australian Federation Secretariat, available online at: <http://www.caf.gov.au/documents/AccessEconomicsCPRSReport2.PDF>

<sup>4</sup> Hatfield-Dodds, S. et al, (2008), *Growing the Green Collar Economy: Skills and labour challenges in reducing our greenhouse*

Several studies have also looked at the regional and sectoral impacts of pollution and climate policies:

- **Regional employment:** The Access Economics study referred to above found strong employment growth at the regional level between 2008 and 2025, including in those regions currently heavily dependent on polluting industries. For example, the Hunter Valley showed a 15.7% increase in employment, Gippsland a 16.4% increase and Mackay a 14% increase.
- **Coal mining jobs:** A number of different studies have looked at the impact of a carbon price on coal mining jobs. While jobs growth is slower with a carbon price, these studies show a projection of around 10,000 – 16,000 new mining jobs, above 2008 levels. These figures contrast strongly with industry misleading claims – which rely on the same studies – that coal mining jobs will be lost because of a carbon price.

The reality is that strong climate and pollution policies will see a shift in employment from pollution intensive sectors of the economy to low pollution sectors, but overall there will continue to be strong jobs growth at the national, state and regional level. When the pro-pollution business lobby warns of job losses, they are in fact talking about fewer new jobs.

### 3 A BRIGHT FUTURE FOR AUSTRALIA'S ELECTRICITY SECTOR

Australia currently depends on coal to supply the majority of its electricity needs, with around 180 million tonnes of carbon pollution released into the atmosphere from this source each year. Yet, Australia has vast and largely untapped low pollution energy sources. This includes renewable energy options such as geothermal, solar, wind, hydro and bioenergy. Australia also has large reserves of gas, which can play an important role

*gas emissions and national environmental footprint*, CSIRO, available online at: <http://www.csiro.au/resources/GreenCollarReport.html>.



# CLEAN ENERGY JOBS IN REGIONAL AUSTRALIA snapshot Nationwide

in the transition to a clean energy economy, particularly for the rapid replacement of more polluting coal assets.

As part of this study, electricity sector modelling was undertaken by one of Australia's leading energy consultants, SKM-MMA. This modelling assessed how Australia's electricity generation mix might change over the coming two decades as Australia reduces its dependence on pollution. Specifically, the modelling assessed the combined effect of the 20% Renewable Energy Target and the introduction of a strong carbon price from 2012, consistent with the goal of reducing Australia's pollution by 25% below 2000 levels by 2020. Further details of the modelling have been published separately.<sup>5</sup>

With respect to pollution prices, our research applied, as a starting point, Treasury modelling of global pollution prices assumed for the Garnaut 25 percent pollution reduction scenario (2009 AU\$45/tonne in 2012) and (for NSW only) the CPRS 15 percent scenario which is 2009 AU\$36/tonne in 2012. However, it is crucial note that it is the Renewable Energy Target that drives most of the investments in clean energy prior to 2020. This suggests that there is some flexibility on the exact starting price. The Climate Institute has advocated for a starting pollution price of at least \$25/tonne, in combination with clean energy policies such as the Renewable Energy Target and energy efficiency policies. In the absence of the Renewable Energy Target pollution prices would need to be much higher to drive the equivalent growth in clean energy investment. That said, our research shows a 2020 price of greater than \$60 is needed if we are to be seriously switching to a cleaner, growing low carbon economy.

Some industry commentators have criticised The Climate Institute's approach for not looking beyond the electricity sector to assess the employment impacts of a pollution and climate policies in other sectors of the economy. This, however, has been done by a number of other studies, all of which show strong economic and employment growth across the Australian economy even with the introduction of a price-tag on pollution

<sup>5</sup> The methodology can be downloaded from The Climate Institute's website.

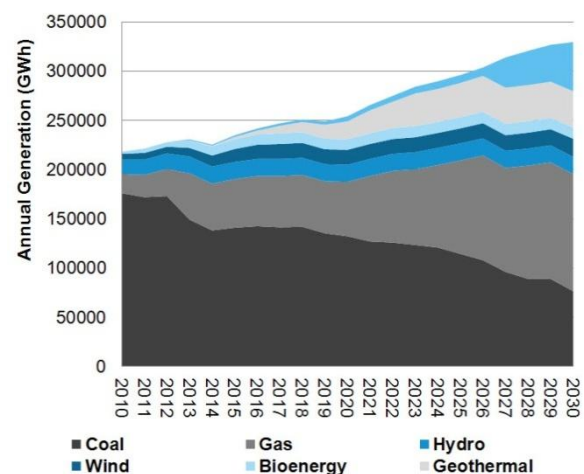
(see discussion above). The Climate Institute saw no reason to replicate these studies. Instead, the purpose of this study was to look more closely at one part of the Australian economy – the electricity sector – where the biggest structural change will occur as Australia reduces its dependence on pollution.

Critics have also argued that every dollar spent on clean energy is a dollar that could be spent in other parts of the economy where employment growth would be even greater. However this assumes that we have a choice about the need to reduce pollution, and therefore a choice about whether or not to invest in clean energy. The reality is that the electricity sector accounts for largest share of Australia's pollution and the only way to change that is by shifting away from pollution intensive energy sources and investing in clean energy. In other words, if we are serious about reducing pollution we have no choice but to invest in a modern electricity sector, powered by clean energy. As demonstrated in the following sections of this report, this will generate billions of dollars of investment and create tens of thousands of jobs in regional Australia.

## AUSTRALIA'S FUTURE ENERGY MIX

As illustrated in Figure 1, strong government policies to cut pollution and make clean energy cheaper will drive significant changes in Australia's energy mix over the coming decades.

Figure 1: Australia's electricity generation by technology 2010 to 2030





# CLEAN ENERGY JOBS IN REGIONAL AUSTRALIA snapshot Nationwide

Table 1: Projected growth in small scale solar technologies - National

Technology	Unit	2010	2020	2030
PV	MW	300	641	2,093
Solar hot water	MW	1,609	2,783	5,793
<b>TOTAL</b>	<b>MW</b>	<b>1,909</b>	<b>3,424</b>	<b>7,886</b>

By 2030, over 40% of Australia's electricity could be produced from renewable energy sources, up from around 8% today. Regional analysis shows that greater proportions of renewable electricity are attainable with extra policies and focus. The modelling also illustrates that gas is likely to play a significant, transitional role in Australia.

Figure 2 illustrates the projected growth in the amount of renewable energy installed in Australia out to 2030. Particularly strong growth is projected for wind and solar energy, with smaller, but still substantial growth projected for geothermal energy.

A combination of consumer preferences and government policies have seen strong growth in small scale solar technologies over recent years, including rooftop solar PV and solar hot water units. It is

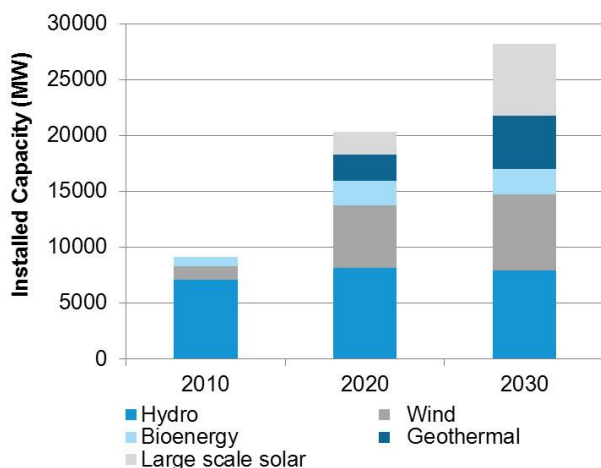
estimated that there are currently around 200,000 solar PV units and over 570,000 solar hot water units installed in Australia, with a combined capacity equivalent to around 1,900 MW.<sup>6</sup> As illustrated in Table 1, between now and 2030, it is projected that demand for these technologies will continue to grow.<sup>7</sup>

## 4 OUTLOOK FOR EMPLOYMENT

As part of this study, The Climate Institute commissioned University of Technology, Sydney to assess the employment impacts across the sector as a whole, including both conventional and renewable technologies, as well as the number of jobs created by renewables alone. The results are summarised below.

Three key job categories were assessed: (i) permanent workers employed to operate, maintain and supply fuel to electricity generators; (ii) construction and installation workers employed to build and install a new generation plant; and (iii) manufacturing workers employed in the manufacturing sectors that supply components for new electricity installations. Details of the methodology used have been published separately.<sup>8</sup>

Figure 2: Projected growth in renewable energy in Australia with strong pollution reduction policies (commercial scale capacity only)



<sup>6</sup> Clean Energy Council (2010), *Clean Energy Australia 2010*.

<sup>7</sup> Projections for these small scale technologies were done separately to SKM-MMA's modeling. See methodology for full documentation.

<sup>8</sup> The methodology can be downloaded from The Climate Institute's website.



# CLEAN ENERGY JOBS IN REGIONAL AUSTRALIA snapshot Nationwide

## SECTOR-WIDE EMPLOYMENT

As shown in Figure 3, the total annual workforce – including all three employment categories for both conventional and renewable technologies – is projected to increase significantly between 2010 and 2030, with an estimated 33,984 new jobs created during this period. This includes 7,619 new permanent and a peak construction and installation workforce of close to 20,707 people. At its peak, the number of manufacturing jobs across Australia is expected to exceed 5,650 people.

## RENEWABLE ENERGY JOBS

Estimates of the number of new jobs associated with renewable energy technologies are presented in Table 2. In total, it is estimated that 31,742 new jobs could be created as a result of a shift to renewable energy in Australia. This includes over 6,817 new permanent, ongoing jobs, a peak construction phase workforce of over 19,200 people and a peak manufacturing workforce of around 5,650 people.

Figure 3: Projected total annual workforce in Australia's electricity sector

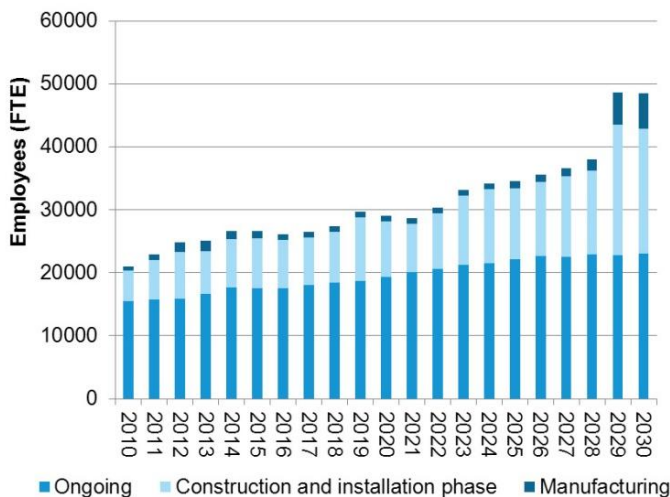


Table 2: Summary of renewable energy jobs estimates out to 2030 - National

Renewable Technology	Ongoing jobs	Construction and Installation Phase employment	Manufacturing jobs supported	Total
Hydro	22	286	33	342
Wind	635	9,097	4,549	14,281
Bioenergy	1,175	711	5	1,891
Geothermal	2,881	1,686	179	4,745
Large-scale solar	1,469	3,240	216	4,925
Small-scale solar	634	5,191	161	5,986
Solar hotwater	0	3,575	886	4,461
<b>TOTAL</b>	<b>6,817</b>	<b>19,271<sup>^</sup></b>	<b>5,655<sup>^</sup></b>	<b>31,742</b>

<sup>^</sup> This is the peak annual workforce for all technologies, not the sum of individual peaks for each technology

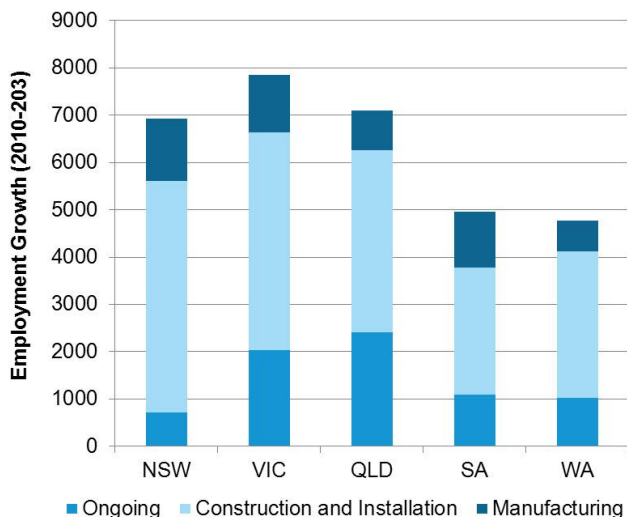


# CLEAN ENERGY JOBS IN REGIONAL AUSTRALIA snapshot Nationwide

## 5 SUMMARY OF STATE LEVEL RESULTS

Detailed analysis of state and regional employment opportunities has been published in a series of reports available to download from The Climate Institute's [website](#). A brief summary of the state-wide results is presented in Figure 4.

Figure 4: Net growth in power sector employment



## 6 POLICY IMPLICATIONS

Australia has a world-class and largely untapped potential to shift to clean energy sources and reduce the economy's dependence on pollution. Through the Federal Government's 20 percent Renewable Energy Target, this transition to clean energy sources can now begin in earnest.

While the Renewable Energy Target is a key interim driver of clean energy investments, it will not do the job of shifting Australia to a clean energy economy on its own.

To unlock Australia's full clean energy potential additional policies are needed at federal, state and local levels. Key priorities are outlined below.

### A LIMIT AND PRICE-TAG ON POLLUTION

The most important step Australia can take towards a low pollution economy is to introduce a limit and price-tag on carbon pollution. A credible pollution price that increases over time will level the playing field between renewable energy and conventional polluting sources, providing investors with greater long-term confidence to invest in clean energy sources.

Without long, loud and legal price signals businesses will lack the confidence to scale-up investments in clean energy from the research and development through to large-scale commercial deployment phases. As more investment flows, innovation in communities, businesses and technology will occur. This will accelerate the cost reductions and make clean energy cheaper.

The modelling undertaken for this study also demonstrates that a strong price-tag on pollution will create a net improvement in jobs across the electricity sector in Australia, particularly in regional Australia and stimulate billions of dollars of investment in those regional areas.

The Climate Institute welcomes the emerging multi-party commitments to have a price-tag on pollution in place in 2012. To maximise pollution savings and job creation, Parliament should ensure this carbon pricing mechanism, in conjunction with other policies, has the potential to reduce pollution by 25 percent or more below 2000 levels by 2020.

Australia has made an international commitment to reducing up to the 25% target and needs to demonstrate it has the national policies to deliver it.

A price-tag on pollution is a necessary, but not sufficient component of reforms needed.



# CLEAN ENERGY JOBS IN REGIONAL AUSTRALIA

## snapshot Nationwide

### EMISSIONS PERFORMANCE STANDARD

A key finding from this study is that for the foreseeable future a pollution price and the renewable energy target will not be sufficient to drive a complete transition to clean energy in Australia. Even with relatively high pollution prices, a large share of electricity will still come from gas. Gas is an important transition fuel, providing relatively quick and low cost pollution savings, in the long term we need to shift to zero, or near zero, pollution energy sources.

The most appropriate way to facilitate a complete transition to clean energy is for an emissions performance standard to operate alongside a pollution price and the renewable energy target. Specifically, The Climate Institute is calling for an emissions performance standard that achieves the following:

- Between 2010-2019 the standard excludes any coal that does not have CCS rates of less than 30 percent of emissions
- All coal plants built this decade and beyond must meet at least 200 kgCO<sub>2</sub> e/MWh after 2020
- All non-peaking gas plants built must retrofit to at least 200 kgCO<sub>2</sub> e/MWh 15 years after construction
- Peaking plants that run less than 10 percent of the time would be exempt

### SUPPORTING INNOVATION AND DEPLOYMENT

The 20 percent Renewable Energy Target and a carbon price are key to unlocking Australia's clean energy resources, but support for innovation will also be crucial.

A number of the technologies included in this study, particularly large-scale solar and geothermal, are at the early stages of commercialisation in Australia. Other emerging clean energy technologies, such as wave energy, hold great potential, but are in the research and development phase. A supportive policy and investment environment will be needed to facilitate and accelerate the deployment of these technologies.

Specifically, to drive early deployment of new emerging clean energy options, above the Renewable Energy Target, governments need to:

- Put in place targeted policies to support clean technology development in each phase of the commercialisation process (for example loan guarantees, tax credits and seed funds co-investment or grant programs, such as the Solar Flagships, revenue subsidies and accelerated depreciation). These policies remove upfront and ongoing barriers to investments in emerging technologies, such as large scale solar, marine and geothermal and;
- Support the development of effective venture capital markets in Australia to attract private clean tech investment; and
- Support the deployment of clean energy technologies by removing infrastructure and regulatory barriers (for example, smart grids supporting distributed generation, streamlined state planning policies, National Energy Market regulatory reform, CCS pipelines and storage hubs, and additional electricity network infrastructure).



# CLEAN ENERGY JOBS IN REGIONAL AUSTRALIA

## snapshot Nationwide

### ENERGY EFFICIENCY

To help households and businesses manage energy bills and to stimulate broader technical and skills development additional policies and programs are needed to overcome barriers that have ensured Australia's poor performance in energy efficiency. Key recommendations in the Prime Ministers Energy Efficiency Task Group such as the Energy Savings Initiative should be adopted.

### REGIONAL TRANSITIONS, SKILLS AND INDUSTRY DEVELOPMENT

Broader experience and Ernst and Young studies prepared for NSW renewable energy precincts in this research have highlighted the need for a number of other regional and local initiatives necessary to convert the clean energy technical potential to investment and employment reality. These include:

- Raise awareness, understanding and buy-in in the local business and wider community – with local demonstrations, industry focus groups, community engagement.
- Skilling up and engaging local work forces – identifying training paths, providing workshops and on-line training opportunities, education and training programs and reaching out to part time or semi-retired trainers and tradespeople.
- Skills attraction – programs to attract people with extra skills not available in the region, including assessments of social infrastructure and communications strategies.
- Further understanding of clean energy opportunities – further analysis and comparison of different technologies, greater analysis of local manufacturing potential.
- National/regional industry development – broader analysis of potential for, and barriers to, existing industries expansion to cleaner employment and investment opportunities and linkages to training opportunities in training programs such as the Productivity Places Program.