Western Australia has enough clean energy potential to:
- power 1,500,000 homes
- remove pollution equivalent to 1,700,000 cars
- create 4,380 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.

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.

This briefing paper – part of a larger nation-wide study – assesses Western Australia’s potential to benefit from the clean energy boom, with a particular focus on the employment opportunities this will create. Both state-wide and regional employment opportunities have been assessed.

Some highlights of the Western Australian study include:

A large untapped resource: The modelling results show strong growth in WA’s electricity sector, with an additional 4,900 MW of generating capacity projected to be installed by 2030. This includes renewable energy, including bioenergy, wind and solar, as well as gas.

State-wide employment: Based on the modelling results it is estimated that over 4,700 new jobs will be created in Western Australia’s electricity sector by 2030, including 1,024 permanent ongoing jobs, more than 3,000 construction jobs and over 660 manufacturing jobs. The vast majority of these jobs will be in renewable energy.

Regional clean energy jobs: Thousands of new clean energy jobs are up for grabs in regional Western Australia, including over 1,460 in South West WA, including 939 ongoing jobs and 523 during the construction phase.
A BRIGHT FUTURE FOR WESTERN AUSTRALIA’S ELECTRICITY SECTOR

Like other Australian states Western Australia currently depends on coal and gas to supply the majority of its electricity needs, with around 19 million tonnes of carbon pollution released into the atmosphere from these sources each year. Yet, Western Australia has vast and largely untapped low pollution energy sources, including solar, wind and bioenergy.

As part of this study, electricity sector modelling was undertaken by one of Australia’s leading energy consultants, SKM-MMA. This modelling assessed how Western 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. Further details of the modelling have been published separately.¹

WESTERN 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 Western Australia’s energy mix over the coming decades. By 2030, close to 37% of Western 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 Western Australia.

Figure 2 illustrates the projected growth in the amount of renewable energy installed in Western Australia out to 2030. Particularly strong growth is projected for wind, bioenergy and large scale solar.

Consumer preferences and government policies have seen strong growth in small scale solar in recent years, including rooftop PV and solar hot water units. There are currently approximately 28,000 solar PV units and over 86,000 solar hot water units installed in WA.² Table 1 shows strong growth out to 2030.³

¹ The methodology can be downloaded from The Climate Institute’s website.
² Clean Energy Council (2010), Clean Energy Australia 2010.
³ Projections for these smaller scale technologies were done separately to SKM-MMA’s modeling. See methodology for full documentation.
As part of this study, The Climate Institute commissioned the 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.\(^4\)

### 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. In total an estimated 4,776 new jobs will be created over this period, including 1,024 new permanent, ongoing jobs, a peak construction and installation workforce of 3,089 people. At its peak, the number of manufacturing jobs across the state is expected to reach 663 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 4,386 new jobs could be created as a result of a shift to renewable energy in Western Australia. This includes 860 new permanent ongoing jobs, a peak construction phase workforce of 2,864 people and a peak manufacturing workforce of 662 people.

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\(^4\) Methodology can be downloaded from The Climate Institute’s website.

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**Table 1: Projected growth in small scale solar technologies in Western Australia**

<table>
<thead>
<tr>
<th>Technology</th>
<th>Unit</th>
<th>2010</th>
<th>2020</th>
<th>2030</th>
</tr>
</thead>
<tbody>
<tr>
<td>PV</td>
<td>MW</td>
<td>42</td>
<td>69</td>
<td>230</td>
</tr>
<tr>
<td>Solar hot water</td>
<td>MW</td>
<td>241</td>
<td>390</td>
<td>950</td>
</tr>
<tr>
<td>Total</td>
<td>MW</td>
<td>283</td>
<td>459</td>
<td>1,180</td>
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**Figure 3: Projected total annual workforce in Western Australia’s electricity sector**
The South West WA region stretches from Perth down to Albany and along the south coast close to Esperance, covering over 200,000 square kilometres, and has a population of just over 1.8 million people. REGIONAL CLEAN ENERGY POTENTIAL

As outlined in Table 3, South West WA has significant renewable energy resources, which to date remain largely untapped. While around 60 MW of renewable energy is currently installed, there is approximately 880 MW of additional capacity proposed for development. On top of this, it is estimated another 715 MW could be developed in the region.

Note, the true potential of the region’s bioenergy and solar resources may be significantly higher than listed in Table 3, but a comprehensive assessment was beyond the scope of this study.

HOW MUCH OF THE REGION’S CLEAN ENERGY RESOURCE WILL BE DEVELOPED?

South West WA has a significant renewable energy resource, which to date has yet to be fully developed. The extent to which this resource will be developed over the coming decades will depend on how attractive the region is to investors, relative to other regions across the rest of the state and Australia as a whole. Indeed, given the competitive dynamics of Australia’s electricity market, not all of the renewable energy opportunities identified in South West WA will necessarily be developed over the next two decades. Other project opportunities in other regions or states may work out to be more cost effective, factoring in regional policy support and other commercial drivers.
The Climate Institute commissioned modelling by leading energy sector consultants, SKM-MMA, to provide an indication of how much of the South West WA renewable energy resource might be developed over the next two decades, based on the results of the state-wide modelling described above. In addition to the modelling results, The Climate Institute developed a hypothetical ‘enhanced renewables’ scenario, in which a much greater proportion of the region’s renewable energy potential is developed over the next two decades.

The amount of renewable energy developed under each of these scenarios is shown in Figure 4. Based on the modelling results, it is projected that more than 500 MW will be developed, including around 420 MW of bioenergy and around 100 MW of wind. Under the enhanced renewables scenario, 1,000 MW of bioenergy is developed, along with over 500 MW of wind.

In addition to commercial scale renewable energy, significant demand for small scale solar technologies is also projected. By 2030, it is estimated that approximately 57 MW of small scale solar PV will be installed in the South West WA region, along with the equivalent of 179 MW of solar hot water.

### REGIONAL EMPLOYMENT IMPACTS

The expansion of renewable energy in South West WA will create new employment opportunities for local residents, including permanent operations and maintenance jobs, and supporting jobs during the construction and installation phase. There may also be potential for the region to support new manufacturing jobs in the clean energy sectors, but it is very difficult to predict the regional distribution of these jobs.

Using the same approach as for the state-wide employment estimates described above, The Climate Institute has estimated the number of jobs that could be created in South West WA between now and 2030. The results are presented in Table 4.

If the region’s renewable energy resource is developed in line with the modelling results, it is predicted that more than 740 new jobs will be created in the region. This includes around 355 permanent, ongoing jobs and a peak construction phase workforce of around 384 new jobs. If the region’s renewable energy resources are developed in line with the enhanced scenario, over 1,460 new jobs could be created. This includes close to 940 ongoing jobs and over 520 construction phase jobs.
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.

### 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

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Table 4: Estimate of new renewable energy jobs in South West WA (2030)

<table>
<thead>
<tr>
<th></th>
<th>Lower estimate (Based on Modelling)</th>
<th>Upper estimate (Enhanced Scenario)</th>
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<tbody>
<tr>
<td>New ongoing jobs (FTE)</td>
<td>356</td>
<td>939</td>
</tr>
<tr>
<td>Construction phase (FTE, peak workforce)</td>
<td>384</td>
<td>524</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>741</strong></td>
<td><strong>1,463</strong></td>
</tr>
</tbody>
</table>
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).

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.