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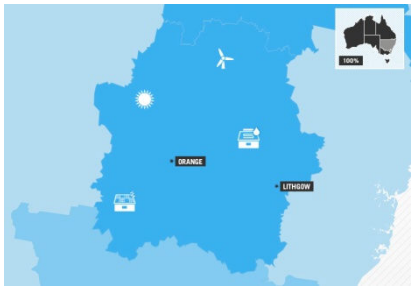
CLEAN ENERGY JOBS IN REGIONAL NEW SOUTH WALES

snapshot Central Tablelands



The Central Tablelands region has enough clean energy potential to:

- power **1,340,000** homes
- remove pollution equivalent to **1,500,000** cars
- create **1,715** new jobs

This work was undertaken with funding from the **NSW Department of Environment, Climate Change and Water** to assess the clean energy potential and employment opportunities that exist in various regions across NSW. In addition to this snapshot, The Climate Institute worked with regional and industry stakeholders to produce a clean energy jobs roadmap for six NSW regions. These roadmaps 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.

1 INTRODUCTION

Efforts to reduce Australia's dependence on pollution have sparked a clean energy revolution, with billions of dollars set to be invested in renewable and low-pollution energy sources over the coming decades. The Climate Institute has estimated that this investment in clean energy infrastructure will create close to 34,000 new permanent and temporary jobs across the country by 2030.

New South Wales has the potential to play a leading role in Australia's shift to a clean energy economy. Over the coming decades, this will generate billions of dollars of investment in the state, particularly in those regions with strong renewable energy resources.

To facilitate this shift to renewable energy sources, the NSW Government has established six renewable energy precincts on which to focus support. The precincts are: New England Tablelands, Upper Hunter, Central Tablelands, NSW-ACT Border Region, South Coast and Snowy-Monaro.

As part of the renewable energy precinct initiative, The Climate Institute was awarded a grant from the Department of Environment, Climate Change and Water to assess the employment opportunities associated with renewable energy in each of the precincts. Through this project, The Climate Institute worked with regional and industry stakeholders to produce a clean energy jobs roadmap for each of the precincts. These roadmaps assess the opportunities and challenges for each precinct and identify strategies to maximise employment in the clean energy sector.

This is a snapshot of the findings for the Central Tablelands, including an assessment of the renewable energy potential of the precinct and an estimate of the number of clean energy jobs that will be created between 2010 and 2030.

2 KEY FINDINGS

The Central Tablelands region has a significant renewable energy resource, and there is good potential to expand wind generation, as well as solar and bioenergy.

Clean energy resource: The Central Tablelands precinct has a significant renewable energy resource, including large-scale solar, wind and hydro. Currently, the region has nine proposed commercial-scale renewable energy projects in the pipeline, with a total capacity of close to 1,500 MW. It estimated that at least another 3,000 MW of renewable energy potential exists in the region, but has yet to be earmarked for development. Strong uptake of solar PV and solar hot water is also expected amongst the precinct's residents.

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New employment opportunities: It is estimated that up to 1,715 new jobs could be created through the development of the region's full renewable energy resource. This includes 895 new permanent ongoing jobs, and a peak construction workforce of 818 people.

Regional strengths and challenges: From an industry perspective, the Central Tablelands precinct has strong agricultural, forestry, mining and manufacturing industries. Employment in these sectors requires similar capabilities and occupations that could be transferred or expanded to service the renewable energy industry. There is also significant competition for the demand of skilled employees from the local mining industry, which will present a challenge for the renewables industry.

3 THE CENTRAL TABLELANDS' CLEAN ENERGY RESOURCE

The Central Tablelands precinct covers nine local government areas in the central west of NSW and is home to around 134,000 people.[i] The region's main town centres are Orange, Bathurst and Lithgow.

The Central Tablelands precinct has a very large renewable energy potential, dominated by a hitherto untapped solar energy resource. In total, it is estimated that the region could support over 4,500 MW of renewable energy.

As shown in Table 1, the region's main renewable energy resource is solar energy, with an estimated potential in excess of 2,500 MW. However, solar is a relatively expensive resource to develop and has yet to be proven on large-scale in Australian conditions. To date, investors have shown significantly more interest in bioenergy and wind energy, and a number of projects have been proposed for each of these energy sources. For full renewable energy project details see the appendix.

There may be some potential for direct use of the region's geothermal resource (i.e. for heat, not for electricity generation), but this requires further investigation. There is also likely to be significant opportunities for co-generation, but this has not been assessed as part of this study.

Table 1: Commercial-scale renewable energy potential in the Central Tablelands

Resource type	Existing Capacity (MW)	Additional Potential Capacity (MW)			Total (MW)
		Committed Projects*	Proposed Projects	Additional Inferred Potential**	
Bioenergy	0.6	-	480	>200	681
Hydro	0.4		-		0.4
Large-scale solar	-	-	53	>2,500	2,553
Wind	11	-	920	400	1,331
TOTAL	**12**	**-**	**1,453**	**>3,100**	**4,565**

Notes:

* Committed projects are those which are currently under development, while proposed projects are those which have been announced but have yet to begin development.

**The additional inferred potential is based on best available information. In reality this likely to be a conservative estimate of the region's full renewable energy capacity.

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Table 2: Projected uptake of small-scale solar and solar hot water in the Central Tablelands

	Unit	2010	2015	2020	2025	2030
Solar PV (small-scale)	Total installed capacity (MW)	4	6	7	8	10
Solar hot water	Total installed units	3,125	5,206	8,379	13,254	20,788

UPTAKE OF SMALL-SCALE TECHNOLOGIES

In addition to the commercial-scale renewable energy potential, a significant increase in the uptake of small-scale technologies in the Central Tablelands precinct is expected. By 2030 there are expected to be around 20,000 solar hot water units installed in the region, up from around 3,000 today. Electricity generated from small-scale solar PV in the Central Tablelands is expected to increase from 4 MW in 2010 to 10 MW by 2030. A methodology has been published separately explaining how these estimates were made.[ii]

4 HOW MUCH OF THE REGION'S RENEWABLE ENERGY RESOURCE WILL BE DEVELOPED?

As shown above, the Central Tablelands 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 NSW and Australia as a whole. Indeed, given the competitive dynamics of Australia's electricity market, not all of the renewable energy opportunities identified in the precinct 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, McLennan Magasanik Associates (MMA) to provide an indication of how much of the Central Tablelands' renewable energy resource might be developed over the next two decades, if left to market forces. This modelling is based on a set of policies and other assumptions that are outlined in a detailed methodology that is published separately.

The modelling does account for existing state and federal policies, but does not assess the impact of potential future local efforts to promote renewable energy investments. Instead, it provides a baseline scenario of how the precinct's renewable energy resource might be deployed in the absence of a concerted local effort to promote renewable energy. The challenge for local stakeholders, and the state government, is to ensure that even more of the Central Tablelands renewable energy potential is developed.

The modelling results shown in Figure 1, suggest that in the absence of additional policies to fast-track local renewable energy investments, much of the Central Tablelands renewable energy resource will not be developed until after 2030. This is due to the relatively high cost of large-scale solar energy projects, as well as the higher costs associated with the precinct's wind resource, compared to other regions.

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Figure 1: MMA's projection of renewable energy capacity in the Central Tablelands precinct, in the absence of additional policies to fast-track the development of the precinct's renewable energy resource

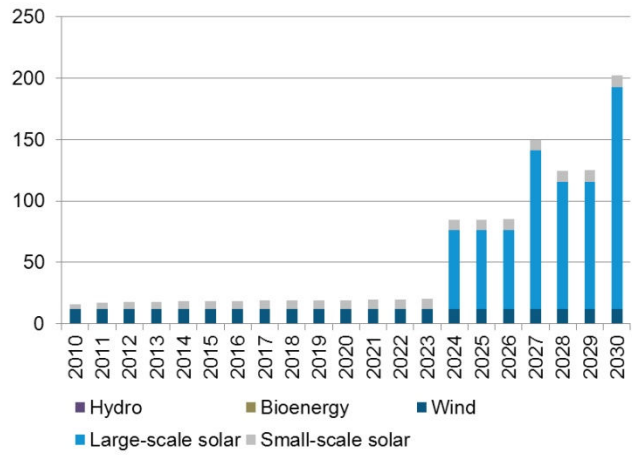
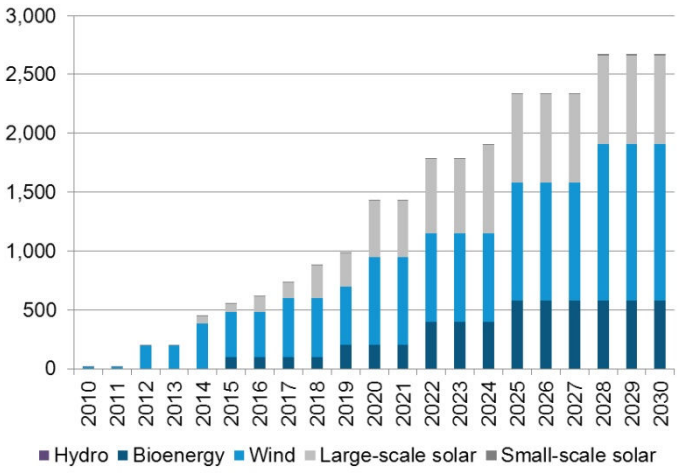


Figure 2: Projected renewable energy development in the Central Tablelands under the 'enhanced renewables' scenario



Interestingly, the modelling shows none of the precinct's bioenergy resource being developed. This suggests that compared to bioenergy opportunities in other precincts, the Central Tablelands' bioenergy resource is more expensive. However, further analysis is required to better understand the costs associated with developing bioenergy in the Central Tablelands.

MMA was not asked to model an alternative scenario where the development of precinct's renewable energy resource is more rapidly developed over the next two decades. However, using the modelling results for the period post-2030 it is possible to develop a hypothetical 'enhanced renewables' scenario for the Central Tablelands precinct between now and 2030. This enhanced scenario is illustrated in Figure 2.

Under the enhanced scenario it is assumed that the bioenergy and wind resource is developed over the next two decades. However, it was decided to cap the amount of large-scale solar at 750 MW. While the region's solar resource is significantly larger than this, there is significant uncertainty about the technical and commercial viability of the resource.

5 EMPLOYMENT IMPACTS

The development of the Central Tablelands' renewable energy resources will create new employment opportunities in the precinct, including permanent operations and maintenance jobs, as well as 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.

A full methodology for the estimate of the employment impacts has been published separately.[iii]

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Table 3: New permanent renewable energy jobs - upper and lower estimates

Technology	Number of Permanent Employees (full-time equivalent) by 2030	
	Lower estimate	Upper estimate
Bioenergy*	-	498
Large-scale solar	49	204
Wind	-	191
Small-scale solar	2	^2
TOTAL	51	895

Notes:
*Includes fuel supply workers
^assumed to be the same as lower estimate

ONGOING EMPLOYMENT

Ongoing employment includes all workers employed on a permanent, ongoing basis to operate and maintain the electricity generation plant.

Table 3 an upper and lower estimate of the number of ongoing jobs that could be created by the expansion of renewable energy in the Central Tablelands precinct. The lower estimate is based on an assumption that the region's renewable energy resource is developed in a manner consistent with the modelling results presented in Figure 1. The upper employment estimate is based on an assumption that the enhanced renewables scenario (as shown in Figure 2) eventuates.

Under the lower estimate, it is projected that 51 new jobs will be created by 2030. The upper estimate, which is based on the enhanced renewable energy scenario described above, projects that 895 new jobs will be created. The majority of these jobs will be supported by the development of the precinct's large bioenergy resource.

CONSTRUCTION-PHASE EMPLOYMENT

Construction-phase employment includes the total temporary workforce supported during the

Table 4: Peak renewable energy construction-phase workforce - upper and lower estimates

Technology	Peak Construction-Phase Workforce over period 2010-2030	
	Lower estimate	Upper estimate
Bioenergy*	-	190
Large-scale solar	130	540
Wind	-	382
Small-scale solar	27	^27
Solar hot water	49	^49
TOTAL PEAK#	162	818

Notes:
*Includes fuel supply workers
^assumed to be the same as lower estimate
this is the peak annual workforce for all technologies, not the sum of individual peaks for each technology

construction and installation phase, including trades people (e.g. construction workers, electricians, etc.), engineers, consultants and other workers involved during the construction phase.

Table 4 shows the projected peak construction-phase workforce by renewable technology for the Central Tablelands precinct. The projected peak annual construction workforce for the region over the period 2010 - 2030 varies significantly between the two estimates. Based on the modelling, it is projected that the construction-phase workforce will peak at around 160 jobs, largely due to the development of the precinct's solar resource. However, under the enhanced scenario, it is estimated that the construction-phase workforce will peak at approximately 820 jobs.

MANUFACTURING EMPLOYMENT

The deployment of clean technologies creates an opportunity for local manufacturers to supply the necessary components. Lower costs overseas make it unlikely that all of the necessary components will be produced locally. However, the state of the current market suggests that a significant share can be supplied by Australian manufacturers. Indeed, it is estimated that around 10% of components are already manufactured in Australia for most clean energy technologies, with a much higher share for some technologies (e.g. solar hot water).

Obviously, it is very difficult to accurately estimate how many clean energy manufacturing jobs can be supported in the Central Tablelands precinct, as this will depend on commercial decisions by individual companies and their ability to compete with producers elsewhere in Australia and overseas. It will also depend on the region's ability to supply components to other parts of Australia.

For the purposes of this study it is assumed that the precinct does have the potential to produce secondary components for each renewable energy source, for example, brackets for solar panels; handrails for wind turbines; concrete blocks for foundations and pipes for solar hot water units. Given its relatively strong manufacturing base and existing industries, the Central Tablelands precinct is in a strong position to take advantage of these opportunities.

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APPENDIX

Commercial scale renewable energy projects identified for the Central Tablelands

Status	Owner	Technology	Location	Size MW
Existing	Country Energy	Bioenergy (Landfill Gas)	Bathurst	0.63
	Delta Electricity	Hydro	Mt Piper	0.35
	Eraring Energy	Wind	Blayney	9.9
	Hampton Wind Park Company	Wind	Hampton	1.3
Committed (under development)				
Proposed	Wind Corporation	Wind	Black Springs	40
	Infigen	Wind	Flyers Creek	140
	Infigen	Wind	Bodangora	100
	Union Fenosa	Wind	Paling Yard (near Oberon)	140
	Wind Prospect	Wind	not specified	500
	Delta Electricity	Biomass (Mallee)*	Wallerawang	200
	Delta Electricity	Bioenergy (Mallee)*	Mt Piper	280
	Graphite Energy	Solar thermal	Lake Cargelligo	3
	Infigen	Solar / PV	Manildra	50
Additional inferred capacity	-	Bioenergy (Agricultural waste) **	-	>200
	-	Large-scale solar***	-	>2,500
	-	Wind	-	400

* Note: this involves replacing coal with Mallee in an existing coal-fired generator
**Note: cap at 100
***Note: cap at 750

ENDNOTES

[i] The precinct includes nine local government areas including Bathurst, Blayney, Cabonne, Cowra, Lithgow, Mid-Western Regional, Oberon, Orange and Wellington.
[ii] The methodology can be downloaded from The Climate Institute's website: www.climateinstitute.org.au.
[iii] The methodology can be downloaded from The Climate Institute's website: www.climateinstitute.org.au.