

Renewable Energy Employment in Australia: Methodology

Appendices 1-5: Renewable Energy Surveys

Prepared for the Clean Energy Council By UTS Institute for Sustainable Futures

June 2020

Utility Scale Renewable Energy Employment Survey

Welcome to the CEC Jobs Survey

The Clean Energy Council (CEC) has partnered with the Institute of Sustainable Futures (ISF), University of Technology Sydney (UTS) to undertake a study to collect data on employment in Australian renewable energy.

Currently, there is a lack of quality data for workforce planning and the number of jobs in renewable energy is often under-estimated.

The aims of the study are to collect data to:

- Estimate the number of jobs in renewable energy now and out to 2030 under growth scenarios, such as AEMO's Integrated System Plan;
- Enable the mapping of jobs in declining sectors to renewable energy jobs to identify opportunities for redeployment and retraining;
- Identify and quantify employment in the key occupations for large-scale solar and wind projects and utility scale batteries;
- Identify skill shortages and priority occupations for forward planning.

Your participation

The survey will take approximately 60 minutes. The survey includes questions on the number and type of jobs for employees, contractors and apprentices across the design and development, construction, manufacturing and operation & maintenance phases. The questions cover skills shortages and recruitment issues in addition to employment numbers.

The data you provide will be aggregated with other survey responses and used in combination with other data sources in a spreadsheet model to develop overall employment estimates. Your answers will not be directly quoted or released. No commercial in confidence or personally identifiable information will be included in the study report or any other publication, and these publications will not identify you or your organisation in any way.

Outputs

The purpose of this survey is to collect data on employment for utility-scale solar and wind energy projects. A final report will be presented to the CEC which is intended to be released publicly.

UTS researchers

This evaluation is led by project director Dr Chris Briggs (+61 477 301 892). The survey is being distributed by the CEC.

Research ethics

Studies undertaken by the Institute for Sustainable Futures have been approved in principle by the University of Technology Sydney, Human Research Ethics Committee. If you have any complaints or reservations about any aspect of your participation in this research you may

contact the ISF Ethics Coordinator, Federico Davila (0403 657 124) or the ISF Responsible Academic, Dr Keren Winterford (0418 910 800).

You may also contact the UTS Ethics Committee through the Research Ethics Officer (02 9514 9772, Research.Ethics@uts.edu.au). Any complaint you make will be treated in confidence and investigated fully and you will be informed of the outcome.

By completing the survey you agree to the provisions of the research conduct as outlined above.

Thank you for participating in our survey. Your feedback is important.

Utilit	y Scale Renewable Energy Employment Survey
/larket	Sectors - Technologies
* 1. Wł	nat sectors does your company work in?
	Solar PV - Utility scale
	Solar PV - Commercial
	Solar PV - Domestic
	Solar PV - Stand Alone
	Solar Hot Water
v	Vind - Utility Scale
E	sattery Storage
	Other (Hydro, Bioenergy, Marine, Geothermal, etc.; please list any that apply)
* 2. Ple	ease select how you would describe your company (tick as many that apply)
	Developer or IPP (Independent Power Producer)
E	PC (Engineering, procurement and construction)
	Operations and Maintenance specialist
	Manufacturer Manufacturer
	Other (please specify)

Utility Scale Renewable Energy Employment Survey

Total Employees

	number of workers in your company in Australia in the 2018-19 fina uding employees and contractors)	ncial year?
(FIE equivalent, inci	during employees and contractors)	
4. Approximately wha	at proportion of employees are in each area? Please ensure that the	% adds up to
Solar PV - Utility scale		
Solar PV - Commercial		
Solar PV - Domestic		
Solar PV - Stand Alone		
Solar Hot Water		
Wind - Utility Scale		
Battery Storage		
[Insert text from Other]		
Utility Scale Renev	wable Energy Employment Survey	
oject Phase - Utility	Solar PV	
5. For your Utility Sol	ar projects, in which of the following project phases does your comp	any regularly
undertake work (plea	se tick all relevant phases)?	
Development & Fina	nce	
Preliminary Design (pre-financial close)	
Detailed design		
Construction		
Operation & Mainter	nance	
Asset management	and/or Retailing	
Other (please specif	y)	

Utility Scale Renewable Energy Employment Survey

Business Size - Utility Solar PV

6. What is the total number of full-time equivalent (FTE) workers employed in solar projects over the last financial year?
Employees
Contractors
Contractors
7. How many MW of solar did your company have under development (pre-financial close) last
financial year (2018-19)?
8. What is the total number of full-time equivalent (FTE) workers employed over the last financial year
(2018-19) in the development phase of solar projects? Note this includes preliminary design and financing.
Employees
Contractors
9. How many MW of solar did your company have under construction last financial year (2018-19)?
10. What is the total number of full-time equivalent (FTE) workers employed over the last financial year (2018-19) in the construction phase of solar projects?
Employees
Contractors
11. For how many MW of solar did your company undertake O&M last financial year (2018-19)?
12. What is the total number of full-time equivalent (FTE) workers employed over the last financial year (2018-19) in the O&M phase of solar projects?
Employees
Contractors

Utility Scale Renewable Energy Employment Survey

The next questions are about the number of workers needed to implement a typical project

13. What is a typical size of solar project your organisation implements in MW?
14. Would your typical project include battery storage?
Yes
□ No
Comment
15. What size would the battery be for your typical solar project? (please answer KW and KWh)
KW
KWh
16. How many years does your typical solar project take for development (up to financial close)?
17. How long does your typical solar project take for detailed design and construction ? (please
answer in years and months)
18. If you are a Developer / Independent Power Producer with teams working across multiple projects
you can choose whether to answer the following questions for last financial year or for your typical solar
project.
Please enter "financial year' if you prefer to answer the questions below based on the last financial year
, or 'Typical project' if you prefer to answer for a typical project.

Utility Scale Renewable Energy Employment Survey

Development phase jobs - Utility Solar

We are now going to ask questions about the number of workers engaged over the last financial year for different occupations:

- managers/administrators;
- professionals & technicians;
- trades; and
- machine operators, drivers & labourers.

Note to be classified as a manager, staff should have internal staff that report to them (eg if a finance analyst has no staff reports they are a professional, not a manager).

Again, please include both employees and contractors.

Please answer for the typical projector the last financial year depending on your answer to the last question.

19. How many Managers and Administrators in terms of full time equivalent (FTE) jobs (employees & contractors) do you engage for a typical project (or last financial year, 2018-19) during the preliminary design, development and finance phase of a solar project?		
20. For each of the following managerial and administrative jobs ple equivalent (FTE) jobs (including contractors) during the preliminar phase of your solar projects.		
General Managers / Executive Team]	
Business administration managers (HR, finance, etc.)		
Commercial / Business Development Managers		
Construction / Project Managers		
Other managers (please describe below)		
Other managers		
Accounting clerks & book-keepers		
Office managers/contract administrators		
Project Control Officer		
Other administrative staff (please describe below)		
Other administrative staff		
21. How many Professionals and Technicians in terms of full time e contractors) do you employ for a typical project (or during the last fithe preliminary design, development and finance phase of your	nancial year, 2018-19) during	

22. For each of the following professional and technicians jobs please enter the number of full time equivalent (FTE) jobs (including contractors) during the **preliminary design, development and finance phase** of your **solar** projects.

Surveyors
Civil engineers
Electrical engineers
Electrical engineers
Grid engineers
Mechanical engineers
Health and Safety professionals
SCADA engineers
- Dr. Congineero
Land developers
Community engagement
Environment assessment professionals
GIS specialist
Legal professionals
Legai professionais
Finance & accounting professionals
Human resource professionals
Other professional jobs (please describe below)
Civil engineering technicians
[]
Electrical technician support
SCADA technician support

Other technician jobs (please describe below) 23. Which, if any, of the preliminary design, development and finance phase jobs for solar projects are likely to be local to the project (i.e. within 100 km of the site)? Please make a note of which specific jobs and how long (years) they would be employed for.

Utility Scale Renewable Energy Employment Survey

Construction Jobs - Utility Solar

We are now going to ask questions about the number of workers engaged during the construction phase of projects for different occupations:

- managers/administrators;
- professionals & technicians;
- trades; and
- machine operators, drivers & labourers.

Again, please include both employees and contractors. Please enter for a typical project (EPC company) or financial year (development company).

24. How many Managers and Administrators did you engage in the	last financial year, 2018-19 (or a
typical project) during the construction phase of your solar project	s? Please answer in terms of full
time equivalent (FTE) jobs (including contractors).	

25. For each of the following managerial & administrative jobs , please enter the number of full time equivalent (FTE) jobs (including contractors) during the **construction phase** for a typical **solar** project. In the last column put the percentage, on average, that are local (within 100 km of the project).

	Total	Average % local to project
General Managers / Executive Team	\$	\$
Business administration managers (HR, finance, etc.)	\$	\$
Construction / Project Managers	\$	\$
Other managers (please describe below)	\$	\$
Accounting clerks & book-keepers	\$	\$
Project Controller	\$	\$
Office managers & contract administrators	\$	\$
Other administrative jobs (please describe below)	•	\$
Please list the other occupations if you've ticked 'other' (If there is more tween the numbers you entered above)	ore than one job type her	e, please give an approximate split
26. How many Professionals and Technicians did you e project) during the construction phase in your solar pr equivalent (FTE) jobs (including contractors).		• • •

27. For each of the following professional & technician jobs, please enter the number of full time equivalent (FTE) jobs (including contractors) during the **construction phase** for a typical **solar** project. In the last column put the percentage, on average, that are local (within 100 km of the project).

	Total	Average % local to project
Surveyors	•	\$
Civil engineers	•	\$
Electrical engineers	•	\$
Mechanical engineers	•	\$
Health and Safety professionals	•	\$
SCADA engineers	•	\$
Grid engineers	•	\$
Community engagement	•	\$
Environment assessment professionals	\$	\$
Legal professionals	•	•
Finance & accounting professionals	\$	\$
Human resource professionals	•	\$
Transport & Logistics	\$	\$
Other professional jobs (please describe below)	•	\$
Site supervisors	\$	\$
Civil engineering technicians	•	*
Electrical technician support	\$	\$
SCADA technician support	•	\$
Other technician jobs (please describe below)	•	\$
Please list the other occupations if you've ticked 'other' (If there is more the between the numbers you entered above)	nan one job type here,	please give an approximate split
28. How many trades did you engage in the last financial ye construction phase for your solar projects? Please answe (including contractors).		

29. For each of the following trades, please put in the number of full time equivalent (FTE) jobs (including contractors) during the **construction** phase for a typical **solar** project. In the last column put the percentage, on average, that are local (within 100 km of the project).

	Total	Average % local to project
Metal trades	\$	\$
Mechanical trades	\$	\$
Carpenters	\$	\$
Plumbers	\$	\$
Electricians	\$	\$
Telecommunications trades	•	\$
Other trades (please describe)	•	\$
Please list the other occupations if you've ticked 'other' (If there is mobetween the numbers you entered above)	re than one job type here	, please give an approximate split
30. How many machine operators, drivers & labourers d typical project) during the construction phase? Please jobs (including contractors).		

31. For each of the following machine operators, drivers and labourers, please put in the number of full time equivalent (FTE) jobs (including contractors) during the **construction** phase for a typical **solar** project. In the last column put the percentage, on average, that are local (within 100 km of the project).

Total	Average % local to project
\$	*
•	•
•	•
\$	•
\$	\$
\$	
\$	\$
\$	•
•	
•	(
•	\$
•	_
\$	
•	*
	e, please give an approximate split spent on batteries?
	100%
	design and construction of
	tion solar work is

l	Jtility Scale Renewable Energy Employment Survey		
Mar	nufacturing - Utility Solar		
34. On average, what proportion of the following inputs do you source from Australian manufacturers ? (please enter the percentage as a number between 0 & 100)			
	Racks & Mounting	Percentage	
ı	inverters	\$	
•	Cabling and electrical equipment	‡	
:	Software and control or monitoring equipment	\$	
	ther - please list any other components you purchase from Australian manufacturers, and the a ne that you source on-shore.	pproximate percentage for each	
ι	Jtility Scale Renewable Energy Employment Survey		
Орє	rations & Maintenance - Utility Solar		
th	5. How many Managers and Administrators did you engage in the last financiane O&M phase of your solar projects? Please answer in terms of full time equincluding contractors).	•	

36. For each of the following managerial & administrative jobs, please put in the number of full time equivalent (FTE) jobs (including contractors) you employ for a typical project (or during the last financial year, 2018-19) for **solar** farm **O&M**.

	Annual	Average % local to project
General Managers / Executive Team	\$	\$
Business administration managers (HR, finance, etc.)	\$	\$
Site Managers	\$	\$
Operations / Asset Managers	\$	\$
Other managers (please describe below)	\$	\$
Accounting clerks & book-keepers	\$	\$
Office managers/contract administrators	\$	\$
Other administrative jobs (please describe below)	\$	\$
Please list the other occupations if you've ticked 'other' (If there is more than one job between the numbers you entered above)	o type here, pleas	e give an approximate split
37. How many Professionals and Technicians did you engage in the O&M phase? Please answer in terms of full time equivalent (FTE) jo	_	-

38. For each of the following professional and technician jobs, please put in the number of full time equivalent (FTE) jobs (including contractors) you employ for a typical project for **solar** farm **O&M**.

	Annual	to project
Health and Safety professionals	\$	\$
Community engagement staff	\$	\$
Finance & accounting professionals	•	\$
Legal professionals	•	•
Human resource professionals	\$	\$
Electrical Technician Support	\$	\$
SCADA technician support	\$	\$
Power plant/control room operator	•	•
Sales & Trading	\$	\$
Other professionals (please describe below)	•	\$
39. How many trades did you engage in the last financial year dure terms of full time equivalent (FTE) jobs (including contractors). 40. For each of the following trade jobs, please put in the number (including contractors) you employ for a typical project for solar for	of full time equiva	
	Annual	project
Electricians	=	=
Landscape gardener	\$	\$
Other (please describe below)	•	\$
Please list the other occupations if you've ticked 'other' (If there is more than one between the numbers you entered above)	e job type here, please	give an approximate split
41. How many machine operators, drivers & labourers did you en the O&M phase? Please answer in terms of full time equivalent (I		· · ·

42. For each of the following machine operators, drivers and labourers, please put in the number of full time equivalent (FTE) jobs (including contractors) you employ for a typical project for **solar** farm **O&M**

		Annual	Average % local to project
Electrical trades assistants		*	*
General labourers		*	*
Other labourers (please describe below)	•	\$
Cleaners		*	*
Security guards		*	*
Earthmoving, grader operators		*	*
Drivers (trucks, vans)		*	*
Other drivers & operators (please desc	ribe below)	*	•
Please list the other occupations if you've between the numbers you entered above		one job type here, please giv	e an approximate split
43. What proportion of your O&M	solar work is spent on batteri	es?	
0%	50%	100%	
0			
44. Would you say the job types a differences if relevant. Yes No	are the same for batteries and	solar O&M? Please n	ote major
Please comment if the job types are very	different		

Utility Scale Renewable Energy Employment Survey

Project Phase - Utility Wind

* 45. For wind projec work (please tick al		owing project phases does	your company regularly undertake
Development & Fir	nance		
Preliminary Design	n (pre-financial close)		
Detailed Design			
Construction			
Operation & Mainte	enance		
Asset Managemen	t and/or Retailing		
Other (please spec	cify)		
Utility Scale Pen	ewable Energy Emp	Novment Survey	
		noyment Survey	
usiness Size - Utili	ty Wind		
		quivalent (FTE) workers e	mployed over the last financial year
(2018-19) in your w Employees	ina projects?		
Contractors			
* 47. How many MW financial year (2018		any have under develop n	nent (pre-financial close) last
mianolal year (2010			
		. , ,	mployed over the last financial year
,	eliminary design, de	velopment & finance pha	ase of your wind projects?
Employees			
Contractors			
* 49. How many MW	ofwind did your comp	any have under construc	tion last financial year (2018-19)?

Employees	
Contractors	
51. For how many M	MW of wind did your company undertake O&M last financial year (2018-19)?
52 What is the total	number of full-time equivalent (FTE) workers employed over the last financial ye
	M phase of wind projects?
Employees	
Contractors	
Utility Scale Rene	ewable Energy Employment Survey
	masic Energy Employment Sarvey
ical Project - Utili	
-	ty Wind
e next questions a	ty Wind re about the number of workers needed to implement a typical project
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next questions at typica 53. What is a typica 54. Would your typic	ty Wind re about the number of workers needed to implement a typical project I size of wind project your organisation implements in MW?
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next questions at prica 53. What is a typica 54. Would your typic Yes No Comment 55. What size would	ty Wind re about the number of workers needed to implement a typical project I size of wind project your organisation implements in MW? cal wind project include battery storage?
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e next questions at 53. What is a typica 54. Would your typic Yes No Comment 55. What size would KW	ty Wind re about the number of workers needed to implement a typical project I size of wind project your organisation implements in MW? cal wind project include battery storage? d the battery be for your typical wind project? (please answer KW and KWh)
e next questions at prica 53. What is a typica 54. Would your typic Yes No Comment 55. What size would kw	ty Wind re about the number of workers needed to implement a typical project I size of wind project your organisation implements in MW? cal wind project include battery storage?
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next questions at onext questions at 33. What is a typica 54. Would your typica Yes No Comment 55. What size would keep w	ty Wind re about the number of workers needed to implement a typical project I size of wind project your organisation implements in MW? cal wind project include battery storage? d the battery be for your typical wind project? (please answer KW and KWh)

58. If you are an Independent Power Producer with teams working across multiple projects , you
can choose whether to answer the following questions for last financial year or for your typical wind
project.

Please enter "financial year' if you prefer to answer the questions be	elow based on the last financial year,
or 'Typical project' if you prefer to answer for a typical project.	

Utility Scale Renewable Energy Employment Survey

Development phase jobs - Utility Wind

We are now going to ask questions about the number of workers engaged over the last financial year for different occupations:

- managers/administrators;
- professionals & technicians;
- trades; and
- machine operators, drivers & labourers.

Again, please include both employees and contractors.

Please answer for the typical project or the last financial year depending on your answer to Q36.

59. How many Managers and Administrators did you engage in the last financial year, 2018-19 (or a			
typical project) during the preliminary design, development and finance phase of your wind projects?			
Please answer in terms of full time equivalent (FTE) jobs (including contractors).			

60. For each of the following managerial and administrative jobs, please enter the number of full time equivalent (FTE) jobs (including contractors) for the last financial year, 2018-19 (or your typical project) during the preliminary design, development and finance phase of your wind projects.

Note to be classified as a manager, staff should have internal staff the	nat report to them.
General Managers / Executive Team	
Business administration managers (HR, finance, etc.)	
Commercial managers	
Construction Managers	
Other managers (please describe below)	
Other managers	
Secretaries & clerical staff	
Accounting clerks & book-keepers	
Office managers/contract administrators	
Other administrative staff (please describe below)	
Other administrative staff	
61. How many Professionals and Technicians did you engage in the project) during the project design , development and finance phas time equivalent (FTE) jobs (including contractors).	
62. For each of the following professional and technicians jobs pleas equivalent (FTE) jobs (including contractors) for your typical project 19) during the preliminary design, development and finance pha	(or in the last financial year, 2018-
Surveyors	
Civil engineers	
Electrical engineers	

Grid engineers
Wind engineers
Mechanical engineers
Health and Safety professionals
SCADA engineers
Land developers
Community engagement
Noise specialist
Environment assessment professionals
Legal and policy professionals
Finance & accounting professionals
Human resource professionals
Marketing and sales professionals
Other professional jobs (please describe below)
Other professional jobs
Civil engineering technicians
Electrical technician support
SCADA technicians
Other technician jobs (please describe below)

APPENDIX 1 UTLITY WIND AND SOLAR SURVEY Other technician jobs 63. Which, if any, of the preliminary design, development and finance phase jobs of your wind projects are likely to be local to the project (i.e. within 100 km of the site)? Please make a note of which specific jobs and how long (years) they would be employed for. 64. What proportion of your development phase wind work is spent on batteries? 0% 50% 100% 65. Would you say the job types are the same for batteries and for wind during the development phase? Please note major differences if relevant. Yes Please comment if the job types are very different Utility Scale Renewable Energy Employment Survey Construction Jobs - Utility Wind

We are now going to ask questions about the number of workers engaged during the construction phase of projects. Again, please include both employees and contractors.

66. How many Managers and Administrators did you engage in the	last financial year, 2018-19 (or a
typical project) during the construction phase of your wind project	s? Please answer in terms of full time
equivalent (FTE) jobs (including contractors).	

67. For each of the following managerial & administrative jobs , please enter the number of full time equivalent (FTE) jobs (including contractors) during the **construction** phase for a typical **wind** project. In the last column put the percentage, on average, that are local (within 100 km of the project).

	Total	Average % local to project	
General Managers / Executive Team	\$	\$	
Business administration managers (HR, finance, etc.)	\$	\$	
Construction Managers	•	•	
Other managers (please describe)	\$	\$	
Secretaries & clerical staff	\$	\$	
Accounting clerks & book-keepers	\$	\$	
Office managers & contract administrators	\$	\$	
Other administrative jobs (please describe below)	\$	\$	
Please list the other occupations if you've ticked 'other' (If there is more than one job type here, please give an approximate split between the numbers you entered above)			
68. How many Professionals and Technicians did you engage in the last financial year (or for a typical project) during the construction phase? Please answer in terms of full time equivalent (FTE) jobs (including contractors).			

69. For each of the following professional & technician jobs , please enter the number of full time equivalent (FTE) jobs (including contractors) during the **construction** phase for a typical **wind** project. In the last column put the percentage, on average, that are local (within 100 km of the project).

Surveyors Civil engineers Electrical engineers	\$	\$
	•	*
Flectrical engineers		\$
Liourous originosis	•	\$
Wind engineers	\$	\$
Mechanical engineers	\$	\$
Health and Safety professionals	\$	\$
SCADA engineers	\$	\$
Community engagement	\$	\$
Noise specialist	\$	\$
Environment assessment professionals	•	\$
Legal and policy professionals	\$	\$
Finance & accounting professionals	•	\$
Sales & marketing professionals	\$	\$
Human resource professionals	•	\$
Transport & Logistics	\$	\$
Other professional jobs (please describe below)	•	\$
Site supervisors	\$	\$
Civil engineering technicians	\$	\$
Electrical technician support	\$	\$
SCADA technicians	\$	\$
Other technician jobs (please describe below)	\$	\$
Please list the other occupations if you've ticked 'other' (If there is more that between the numbers you entered above)	n one job type here, pl	ease give an approximate split
70. How many trades did you engage in the last financial yea construction phase? Please answer in terms of full time equ		

71. For each of the following trades, please put in the number of full time equivalent (FTE) jobs (including contractors) during the **construction** phase for a typical **wind** project. In the last column put the percentage, on average, that are local (within 100 km of the project).

	Total	Average % local to project
Metal trades	\$	\$
Mechanical trades	\$	\$
Carpenters	•	\$
Plumbers	\$	\$
Electricians	\$	\$
Telecommunications trades	\$	\$
Other trades (please describe)	\$	\$
Please list the other occupations if you've ticked 'other' (If there is more between the numbers you entered above)	e than one job type here	, please give an approximate split
72. How many machine operators, drivers & labourers dic typical project) during the construction phase? Please a jobs (including contractors).		• •

73. For each of the following machine operators, drivers and labourers, please put in the number of full time equivalent (FTE) jobs (including contractors) during the **construction** phase for a typical **wind** project.

In the last column put the percentage, on average, that are local (within 100 km of the project).

	Total	Average % local to project
Cranes and hoist operators	\$	*
Earthmoving, grader operators	•	*
Forklift operators	\$	
Drivers (trucks, vans)	\$	•
Other drivers & machine operators (please describe)	\$	\$
Concreters	\$	•
Riggers	\$	
Dogmen	\Delta	(
Scaffolders	\$	
Security guards	\$	
Electrical trades assistants	\$	+
Mechanical trades assistants/labourers (e.g. module assembly)	\$	\$
Civil trades assistants/ labourers	\$	
Other labourers (please describe below)	•	(
Please list the other occupations if you've ticked 'other' (If there is n between the numbers you entered above)	nore than one job type here,	please give an approximate split
74. What proportion of your detailed design and constr	uction wind work is spe	nt on batteries?
0% 50%		100%
75. Would you say the job types are the same for batter Please note major differences if relevant. Yes No Please comment if the job types are very different	ries and for wind desig	n and construction?

APPENDIX 1 UTLITY WIND AND SOLAR	SURVEY
Operations & Maintenance and / or Asset Management -	Utility Wind
77. How many Managers and Administrators did you engage the O&M / Asset Management phase of your wind projects? equivalent (FTE) jobs (including contractors).	

78. For each of the following managerial & administrative jobs, please put in the number of full time equivalent (FTE) jobs (including contractors) you employ in a typical project (or in the last financial year, 2018-19) for **wind** farm **O&M**

	Annual	Average % local to project
General Managers / Executive Team	\$	*
Business administration managers (HR, finance, etc.)	\$	\$
Site Managers	\$	\$
Operations Managers / Asset Managers	•	\$
Other managers (please describe below)	\$	\$
Secretaries & clerical staff	\$	\$
Accounting clerks & book-keepers	•	\$
Office managers/contract administrators	\$	\$
Other administrative jobs (please describe below)	\$	•

Please list the other occupations if you've ticked 'other' (If there is more than one job type here, please give an approximate split between the numbers you entered above)

79. How many Professionals and Technicians did you engage in the last financial year during the **O&M** *I* **Asset Management** phase? Please answer in terms of full time equivalent (FTE) jobs (including contractors).

80. For each of the following professional and technician jobs, please put in the number of full time equivalent (FTE) jobs (including contractors) you employ for a typical project (or in the last financial year, 2018-19) for **wind** farm **O&M** / **Asset Management**

	Annual	to project
Health and Safety professionals	\$	\$
SCADA engineers	\$	\$
Community engagement staff	\$	*
Finance & accounting professionals	\$	*
Legal and policy professionals	(\$
Human resource professionals	*	\$
Electrical Technicians	(*
SCADA technicians	*	*
Power plant/control room operator	*	*
Sales & Trading	*	*
Other professionals (please describe)	*	\$

Please list the other occupations if you've ticked 'other' (If there is more than one job type here, please give an approximate split between the numbers you entered above)

- 81. How many trades did you engage in the last financial year during the **O&M / Asset Management** phase? Please answer in terms of full time equivalent (FTE) jobs (including contractors).
- 82. For each of the following trade jobs, please put in the number of full time equivalent (FTE) jobs (including contractors) you employ for a typical projects (or in the last financial year) for **wind** farm **O&M / Asset Management**

	Annual	project
Electricians	\$	\$
Landscape gardener	\$	\$
Other (please describe below)	\$	\$

Please list the other occupations if you've ticked 'other' (If there is more than one job type here, please give an approximate split between the numbers you entered above)

83. How many machine operators, drivers & labourers did you engage in the last financial year during the **O&M/ Asset Management** phase? Please answer in terms of full time equivalent (FTE) jobs (including contractors).

84. For each of the following machine operators, drivers and labourers, please put in the number of full time equivalent (FTE) jobs (including contractors) you employ for a typical projects (or in the last financial year, 2018-19) for **wind** farm **O&M / Asset Management**

	Annual	Average % local to project
Electrical trades assistants	\$	\$
Civil labourers	\$	\$
Other labourers (please describe below)	\$	\$
Cleaners	\$	\$
Security guards	\$	\$
Earthmoving, grader operators	\$	•
Drivers (trucks, vans)	\$	\$
Other drivers and operators (please describe below)	\$	\$

Please list the other occupations if you've ticked 'other' (If there is more than one job type here, please give an approximate split between the numbers you entered above)

Recruitment

* 85. In which states did you recruit staff during financial year 2018/19?

None Tasmania

NSW or ACT Victoria

Northern Territory Western Australia

Queensland South Australia

Skills Shortages - NSW & ACT

For each of the following jobs, please indicate if you have attempted to recruit workers into these positions in the past 12 months and your experience with recruitment

Low Difficulty: Able to find the workers we need in Australia within 4 weeks or less Medium Difficulty: Able to find the workers we need in Australia within 5 - 8 weeks High Difficulty: Unable to find workers we need in Australia within 2 months

Note: the time period applies to search (i.e. doesn't mean physical placement which may take longer due to notice requirements etc).

* 86. Please fill in for all jobs you recruited in the last financial year

	Low difficulty	Medium difficulty	High difficulty
Construction managers			
Operations manager (O&M)			
Surveyors			
Civil engineers	\circ	\bigcirc	
Electrical engineers	\circ	\bigcirc	
Grid engineers	\bigcirc	\bigcirc	\circ
Healh & Safety professionals			
Scada engineers	\circ	\bigcirc	\circ
Community engagement professionals		\bigcirc	
Environmental assessment professionals	\circ	\bigcirc	
Site supervisors			
Civil engineering technicians	\circ		
Electrical technicians	\circ	\bigcirc	
Scada technicians	\circ	\bigcirc	
Power plant/control room operators	\circ	\bigcirc	
Carpenters	\circ		\circ
Plumbers	\circ	\bigcirc	
Electricians	\circ	\bigcirc	\circ
Steel fixers	\circ	\bigcirc	
Crane & Hoist Operators	\bigcirc	\bigcirc	\circ
Earthmoving operators	\bigcirc		
Forklift operators		\bigcirc	
Truck drivers	\bigcirc	\bigcirc	
Concreters	\bigcirc	\bigcirc	\circ
Riggers			
Landscape gardeners			
Other (please describe below)			

Skill Shortages - NSW & ACT

87. What was the reason for the difficulty in recruitment (choose all that apply)?

Construction managers (O&M) Surveyors Civil engineers Electrical engineers Electronic engineers Electronic engineers Community Community Community Environmental assessesment professionals Site supervisors Civil engineering technicians Electrical technicians Electronic engineers Civil engineering technicians Electronic engineering technicians Electrical technicians		Not enough candidates with the right qualifications / licenses	Not enough candidates with general experience	Not enough candidates with specific experience in solar or renewable energy projects	Suitable candidates but they wanted higher pay	Difficulty attracting suitable candidates for projects in regional or remote locations	Suitable candidates but they wanted longer-term employment
Cowmyors Civil engineers Electrical engineers Cirid engineers Electronic engineers Electronic engineers Healh & Safety professionals Scada engineers Community engagement professionals Environmental assessment professionals Civil engineering technicians Civil engineering technicians Electronic engineering technicians Scada technicians Electronic engineering technicians Scada technicians Electronic engineering technicians Scada technicians Scada technicians Scada technicians Scada technicians Scada technicians Scada technicians Carpenters Plumbers Electrical technicians Steel fixers Crane & Hoist Operators Earthmoving operators Forklift operators							
Civil engineers Electroic engineers Electronic engineers Healn & Safety professionals Scada engineers Community engagement professionals Environmental assessment professionals Site supervisors Civil engineering technicians Civil engineering technicians Electroicans Scada technicians Power plant/control room operators Electrical Electricales Steel fixers Crane & Hoist Operators Earthmoving operators Earthmoving operators Errorical engineering technicians Forkilit operators							
Electrical engineers Grid engineers Electronic engineers Electronic engineers Healh & Safety professionals Scada engineers Community engagement professionals Environmental assessment professionals Site supervisors Civil engineering technicians Civil engineering technicians Electrical technicians Scada technicians Power plant/control room operators Carpenters Plumbers Electricales Steel fixers Crane & Hoist Operators Earthmoving operators Earthmoving operators Earthmoving operators Eorklift operators	Surveyors						
Grid engineers Electronic engineers Healn & Satety professionals Scada engineers Community engagement professionals Environmental assessment professionals Site supervisors Civil engineering technicians Civil engineering technicians Electrical technicians Scada technicians Power plant/control room operators Carpenters Plumbers Electricians Steel fixers Crane & Hoist Operators Earthmoving operators Forklift operators	Civil engineers						
Electronic engineers Healn & Safety professionals Scada engineers Community engagement professionals Environmental assessment professionals Site supervisors Civil engineering technicians Civil engineering technicians Electrical technicians Scada technicians Power plant/control room operators Electricians Steel fixers Crane & Hoist Operators Earthmoving operators Earthmoving operators Earthmoving operators Error manual control room operators Forklift operators	Electrical engineers						
Healh & Safety professionals Scada engineers Community engagement professionals Environmental assessment professionals Site supervisors Civil engineering technicians Electrical technicians Electrical technicians Power plant/control room operators Carpenters Plumbers Electricians Steel fixers Crane & Hoist Operators Earthmoving operators Earthmoving operators	Grid engineers						
professionals Scada engineers Community engagement professionals Environmental assessment professionals Site supervisors Civil engineering technicians Civil engineering technicians Electrical technicians Scada technicians Scada technicians Power plant/control room operators Carpenters Plumbers Electricains Steel fixers Crane & Hoist Operators Earthmoving operators Earthmoving operators Earthmoving operators Earthmoving operators	Electronic engineers						
Community engagement professionals Environmental assessment professionals Site supervisors Civil engineering technicians Civil engineering technicians Electrical technicians Scada technicians Power plant/control room operators Carpenters Plumbers Electricians Steel fixers Crane & Hoist Operators Earthmoving operators Earthmoving operators Earthmoving operators							
engagement professionals Environmental assessment professionals Site supervisors Civil engineering technicians Civil engineering technicians Electrical technicians Scada technicians Power plant/control room operators Carpenters Plumbers Electricians Steel fixers Crane & Hoist Operators Earthmoving operators Enthit operators Enthit operators Enthit operators	Scada engineers						
assessment professionals Site supervisors Civil engineering technicians Civil engineering technicians Electrical technicians Scada technicians Power plant/control room operators Carpenters Plumbers Electricians Steel fixers Crane & Hoist Operators Earthmoving operators Forklift operators	engagement						
Civil engineering technicians Civil engineering technicians Electrical technicians Electrical technicians Power plant/control room operators Carpenters Plumbers Electricians Steel fixers Crane & Hoist Operators Earthmoving operators Forklift operators	assessment						
technicians Civil engineering technicians Electrical technicians Scada technicians Power plant/control room operators Carpenters Plumbers Electricians Steel fixers Crane & Hoist Operators Earthmoving operators Forklift operators	Site supervisors						
technicians Electrical technicians Scada technicians Power plant/control room operators Carpenters Plumbers Electricians Steel fixers Crane & Hoist Operators Earthmoving operators Earthmoving operators Forklift operators							
Scada technicians Power plant/control room operators Carpenters Plumbers Electricians Steel fixers Crane & Hoist Operators Earthmoving operators Forklift operators							
Power plant/control room operators Carpenters Plumbers Electricians Steel fixers Crane & Hoist Operators Earthmoving operators Forklift operators	Electrical technicians						
room operators Carpenters Plumbers Electricians Steel fixers Crane & Hoist Operators Earthmoving operators Forklift operators	Scada technicians						
Plumbers Electricians Steel fixers Crane & Hoist Operators Earthmoving operators Forklift operators							
Electricians Steel fixers Crane & Hoist Operators Earthmoving operators Forklift operators	Carpenters						
Steel fixers Crane & Hoist Operators Earthmoving operators Forklift operators	Plumbers						
Crane & Hoist Operators Earthmoving operators Forklift operators	Electricians						
Operators Earthmoving operators Forklift operators	Steel fixers						
Forklift operators							
	Earthmoving operators						
Truck drivers	Forklift operators						
	Truck drivers						

Difficulty attracting Not suitable enough candidates candidates for Not enough Suitable Not enough Suitable candidates but candidates with with specific projects in candidates with experience in solar candidates but the right regional or they wanted general qualifications / they wanted remote longer-term or renewable higher pay licenses experience energy projects locations employment Concreters Riggers Landscape gardeners Other (please describe below) Other (please specify)

Skills Shortages - Victoria

For each of the following jobs, please indicate if you have attempted to recruit workers into these positions in the past 12 months and your experience with recruitment

Low Difficulty: Able to find the workers we need in Australia within 4 weeks or less Medium Difficulty: Able to find the workers we need in Australia within 5 - 8 weeks High Difficulty: Unable to find workers we need in Australia within 2 months

NOTE: SKILL SHORTAGES QUESTIONS REPEAT FOR THOSE STATES WHERE RESPONDENT RECRUITED DURING THE LAST FINANCIAL YEAR

Apprenticeships & Traineeships
* 100. Did you employ apprentices or trainees during 2018-19 financial year?
Yes
○ No
Apprenticeships & Traineeships
* 101. How many apprentices did you have during financial year 2018/19? (FTE equivalent)
Civil labourers
Electrician
Engineering ElectricalTrade
Electrical Supply Industry - Power systems
Electrical Supply Industry - Wind Generation
Electrical/electro-technology - Renewable Energy
Electrical - PV
Other (please specify)

L02. How many trainees did your company have during financial year 2018/19? (FTE equivale	ent)
Concreter	
Dogger	
Rigging	
Scaffolder	
Business Administration	
Other - please specify	
L03. What market sectors did they work in (please tick all that apply)?	
Solar PV - Utility scale	
Solar PV - Commercial	
Solar PV - Domestic	
Solar PV - Stand Alone	
Solar Hot Water	
Wind - Utility Scale	
Battery Storage	
[Insert text from Other]	
port	
L04. Would you like a copy of the report on wind and solar employment when it comes out?	
Yes	
No	
Please enter your email if you would like a report emailed to you	

APPENDIX 1 UTLITY WIND AND SOLAR SURVEY

105. To win two full conference tickets to the Australian Clean Energy Summit 2020 as well as a table for 10 people at the Australian Clean Energy Summit gala dinner (total value \$7,315 inc. GST), tell us in 25 words or less what your ultimate Australian Clean Energy Summit session includes

(name of session/speakers/panel/content/you decide)
Response
Name
Organisation
Email address
Phone number

Thank You

Thank you for completing the survey, we know it's a lot of work and really appreciate your time and the contribution you've made to getting better information out there about renewable energy.

If you have any queries or would like further information please contact: Maryanne Coffey, Policy and Project Manager at the Clean Energy Council on mcoffey@cleanenergycouncil.org.au or call 0419 493 519.

Thank you for participating, but this may not be the right survey!

Thank you for participating but this may not be the right survey - this one is for utility scale wind

and utility scale solar, and in question 1 you didn't tick either of those.

If you do work on utility wind or solar, please go back and tick those boxes in Question 1 and then you'll see all the other questions.

If you don't work on those sectors but do work in renewable energy, we'd really appreciate you filling in a different survey, so please drop us a line.

If you have any queries or would like further information please contact: Maryanne Coffey, Policy and Project Manager at the Clean Energy Council on mcoffey@cleanenergycouncil.org.au or call 0419 493 519.

Welcome to the CEC Jobs Survey

Welcome to the CEC Distributed Solar Energy Jobs Survey

The Clean Energy Council (CEC) has partnered with the Institute of Sustainable Futures (ISF), University of Technology Sydney (UTS) to undertake a survey to collect data on employment in Australian renewable energy.

The survey will usually take 30 - 45 minutes to complete, and completing it will enter you into a prize draw to win 2 * \$500 Jetstar Vouchers.

Currently, there is a lack of quality data for workforce planning and the number of jobs in renewable energy is often under-estimated.

The aims of the study are to collect data to:

- Estimate the number of jobs in renewable energy now and out to 2030 under growth scenarios, such as AEMO's Integrated System Plan;
- Enable the mapping of jobs in declining sectors to renewable energy jobs to identify opportunities for redeployment and retraining;
- Identify and quantify employment in the key occupations for large-scale solar and wind projects and utility scale batteries;
- Identify skill shortages and priority occupations for forward planning.

Your participation

The survey will take approximately 30-45 minutes. The survey includes questions on the number and type of jobs for employees, contractors and apprentices across the development, installation, manufacturing and operation & maintenance phases for distributed solar energy (residential/commercial & industrial PV, solar hot water, battery storage). The questions cover skills shortages and recruitment issues in addition to employment numbers.

The data you provide will be aggregated with other survey responses and used in combination with other data sources in a spreadsheet model to develop overall employment estimates. Your answers will not be directly quoted or released. No commercial in confidence or personally identifiable information will be included in the

study report or any other publication, and these publications will not identify you or your organisation in any way.

Outputs

The purpose of this survey is to collect data on employment for utility-scale solar and wind energy projects. A final report will be presented to the CEC which is intended to be released publicly.

UTS researchers

This evaluation is led by project director Dr Chris Briggs (+61 477 301 892). The survey is being distributed by the CEC.

Research ethics

Studies undertaken by the Institute for Sustainable Futures have been approved in principle by the University of Technology Sydney, Human Research Ethics Committee. If you have any complaints or reservations about any aspect of your participation in this research you may contact the ISF Ethics Coordinator, Federico Davila (0403 657 124) or the ISF Responsible Academic, Dr Keren Winterford (0418 910 800).

You may also contact the UTS Ethics Committee through the Research Ethics Officer (02 9514 9772, Research. Ethics@uts.edu.au). Any complaint you make will be treated in confidence and investigated fully and you will be informed of the outcome.

By completing the survey you agree to the provisions of the research conduct as outlined above. Thank you for participating in our survey. Your feedback is important.

Market Sectors - Technologies

What sectors did your company work in during the financial year 2018-19? Please click all that apply

Solar PV - Utility Scale
Solar PV - Commercial & Industrial
Solar PV - Residential

Solar PV - Stand Alone	SOLAR SURVEY
Solar Hot Water	
Battery Storage - Commercial & Indus	trial
☐ Battery Storage - Residential	
Other (Wind, Hydro, Bioenergy, Marine	e, Geothermal, etc.; please list any that apply)
Are you able to answer a survey about your organisation?	the number of workers and the jobs they do for
O Yes	
O No	
Total Employment	
FTE) in the last financial year (2018-19)	employed in your business (Full time equivalent, in Australia? Please include both employees & ployed a part-time worker 3 days a week for the
	Number (FTE)
Employees	
Contractors	
On average, what proportion (%) of yo 2018-19 financial year? Please include Please ensure the total adds up to 100	
	Workerforce time (%)
» Solar PV - Utility Scale	0
» Solar PV - Commercial & Industrial	0
» Solar PV - Residential	0
» Solar PV - Stand Alone	0
» Solar Hot Water	0

		Workerforce time (%)		
» Battery Storage - Commercial & Industrial		0		
» Battery Storage - Residential		0		
 Other (Wind, Hydro, Bioenergy, Marine, Geothermal, etc.; please list any that apply) 		0		
#Conjoint, Total#		0		
Business Size				
Approximately how mu 2018/19?	ch Solar PV has your	company installed in th	ne last financial year	
Solar PV - Commercial & Industrial	KW in 2018-	19 Number o	of systems in 2018-19	
Solar PV - Residential				
Approximately how mu	ch Solar PV has your	company installed sind	ce inception?	
	Cumulative KW since company	•	ve number of systems ince inception	
Solar PV - Commercial & Industrial				
Solar PV - Residential				
Approximately how ma last financial year 2018.	-	/stems has your compa	any installed in the	
	KW in 2018-19	Square meters in 2018 -19	Number of systems in 2018 - 19	
Flat Plate Systems				

Square meters in 2018 Number of systems in KW in 2018-19 2018 - 19 **Evacuated Tube** Systems Approximately how many Solar Hot Water systems has your company installed since inception? Cumulative KW since Cumulative area (sq. Cumulative numbers inception m) since inception) since inception Flat Plate Systems **Evacuated Tube** Systems Approximately, how much battery storage has your company installed in the last financial year 2018/19? Number of Average size KW installed in systems installed Average size (KWH) in 2018-2018-19 in 2018-19 (KW) in 2018-19 19 Battery Storage -Commercial & Industrial Battery Storage -Residential Approximately, how much battery storage has your company installed since inception? Cumulative KW installed since Cumulative number of systems inception since inception Battery Storage -Commercial & Industrial Battery Storage -Residential What proportion of your workforce time was engaged on post installation or operations & maintenance activities for the last financial year 2018/19? Please include all employees & contractors. % Workforce time

APPENDIX 2 - DISTRIBUTED SOLAR SURVEY

Approximately, what proportion of post-installation time (%) was spent in each area? (please ensure your answers total 100%)

	%
» Solar PV - Utility Scale	0
» Solar PV - Commercial & Industrial	0
» Solar PV - Residential	0
» Solar PV - Stand Alone	0
» Solar Hot Water	0
» Battery Storage - Commercial & Industrial	0
» Battery Storage - Residential	0
» Other (Wind, Hydro, Bioenergy, Marine, Geothermal, etc.; please list any that apply)	0
#Conjoint, Total#	0

Job Types

We are now going to ask questions about the number of workers engaged over the last financial year for different occupations:

- managers & administrators;
- professionals & technicians;
- trades; and
- machine operators, drivers & labourers.

Please read through the full list of jobs below before answering as it will make it easier to place jobs, and please include both employees and contractors.

On average, how many Managers and Administrators did you engage in the last financial year, 2018-19 Please answer in terms of full time equivalent (FTE) jobs (including contractors).

APPENDIX 2 - DISTRIBUTED SOLAR SURVEY
Note to be defined as a manager they should usually have internal staff that report to them.

	Managers & administ	rative jobs
Commercial & Industrial		
Residential		
	nagerial & administrative jobs, plass (including contractors) in the las	
	Commercial & Industrial	Residential
Executives/General Mangers		
HR, Finance & Business administration managers (etc)		
Commercial & Sales Managers		
Project managers		
Business Development Managers		
Other management jobs (please specify)		
Office managers/contract administrators		
Accounting clerks & book-keepers		
Other administrative jobs (please specify)		
	essionals did you engage in the la Il time equivalent (FTE) jobs (inclu	
	Professiona	S
Commercial & Industrial		
Residential		

For each of the following professional jobs, please put in the number of full time equivalent (FTE) jobs (including contractors) in the last financial year (2018-19)

	Commercial & Industrial	Residential
Financial and accounting professionals		
Human resource professionals		
Marketing and sales		
Legal & planning assessment professionals		
Accredited PV system designer		
Electrical engineers		
Health & safety professionals		
Site supervisors		
Estimators		
Other professionals (please specify)		
On average, how many trades	s & technicians did you engag	e in the last financial vear.
	erms of full time equivalent (FT	
contractors).		
	Trades	
Commercial &	Trades	
Industrial		
Residential		
For each of the following trade	es & technicians jobs, please p	out in the number of full time
_	g contractors) in the last finance	
	Commercial & Industrial	Residential
SCADA technician		
Electrical technician (e.g. grid commissioning)		

APPENDIX 2 - DISTE	RIBUTED SOLAR SURVEY Commercial & Industrial	Residential
Other technicians (please specify)		
Electricians		
Plumbers		
Carpenters		
Metal trades		
Other trades (please specify)		
	chine operators, drivers & laboure Please answer in terms of full ting	
	Machine operators, drive	ers & labourers
Commercial & Industrial		
Residential		
_	achine operators, drivers & labouint (FTE) jobs (including contractor	
	Commercial & Industrial	Residential
Warehouse assembly		
Solar roofers & labourers		
Electrical trades assistants (or apprentices)		
Elevated Work Platform Operators		
Drivers (trucks, vans)		
Cranes and hoist operators		
Security guards		
Other (please specify)		

you undertake relative to solar PV	?	
	Yes	No
Commercial & Industrial	0	0
Residential	0	0
Please list the major differences in	job mix and FTI	E between hot water and PV projects
On average, what proportion of the suppliers? (please enter the perce know, please enter don't know in the suppliers)	entage as a num	ts do you source from Australian aber between 0 & 100). If you don't
		%
Racks & Mounting		
Solar Modules		
Inverters		
Cabling and electrical equipment		
Batteries		
Other - please list any other components you purchase from Australian suppliers and the approximate percentage for each one that you source on-shore.		

Would you say that the job mix is roughly the same for the solar hot water projects that

https://utsau.au1.qualtrics.com/Q/EditSection/Blocks/Ajax/GetSurveyPrintPreview

Contractors

What proportion (%) of the following functions did you regularly contract out to other companies in the last financial year (2018-2019)?

		% contracted out	
Installations			
Warehousing			
Other (please specify)			
For those areas you contraction		esses, did you include	e the number of
obs in the previous questio	ns?		
	None of them	Some of them	All of them
» Installations	0	0	0
» Warehousing	0	0	0
» Other (please specify)	0	0	0
Recruitment			
n which states did you recr	ruit staff during financ	cial year 2018/19?	
None			
NSW or ACT			
■ Victoria			
South Australia			
Queensland			
Tasmania			
Western Australia			
Northern Territory			

For each of the following jobs, please indicate if you have attempted to recruit workers into these positions in the past 12 months and your experience with recruitment in Australia.

Please fill in for all roles, skills and qualifications you recruited for in the last financial year.

Low Difficulty: Able to find the workers we need in Australia within 4 weeks or less

Medium Difficulty: Able to find the workers we need in Australia within 5 - 8 weeks

High Difficulty: Unable to find workers we need in Australia within 2 months

Note: the time period applies to search (i.e. doesn't mean physical placement which may take longer due to notice requirements etc).

	Low difficulty	Medium difficulty	High difficulty
Commercial & Sales Managers	0	0	0
Project managers	0	0	0
Accredited PV system designers	0	0	0
Solar roofers/labourers	0	0	0
Site supervisors	0	0	O
Electricians	0	0	O
Health & safety professionals	0	0	0
Electrical engineers	0	0	0
Scada engineer	0	0	0
Scada technician	0	0	0
Electrical TA's	0	0	0
Plumbers	0	0	0
Crane & Hoist Operators	0	0	O
Elevated work platform operators	0	0	0
Other (please specify)	O	0	0

What was the reason for the difficulty in recruitment in Australia (choose all that apply)?

	Not enough candidates with the right qualifications / licenses	Not enough candidates with general experience	enough candidates with specific experience in renewable energy projects	Suitable candidates but they wanted higher pay	Difficulty attracting suitable candidates for projects in regional or remote locations	Suita candid but t wan longer employ
Commercial & Sales Managers						С
Project managers						С
Accredited PV system designers						С
Solar roofers/labourers						С
Site supervisors						С
Electricians						С
Health & safety professionals						С
Electrical engineers						
Scada engineer						С
Scada technician						С
Electrical TA's						
Plumbers						С
Crane & Hoist Operators						С
Elevated work platform operators						С
Other (please specify)						С
Did you have the same exp narder or easier to recruit s O Yes O No			ese jobs acr	ross all stat	es or was it	
For which states was it har	der or easier'	?				

» APPENDIX 2 - DISTRIE	BUTED SOLAR	SURVEY						
» Victoria								
South Australia								
Queensland								
☐ » Tasmania								
www.western Australia								
Northern Territory	Northern Territory							
For each of the following jobs,	•							
into these positions in the past in NSW/ACT .	. 12 months and	your expenence with r	ecruitment					
1111000/// (01.								
Please fill in for all roles, skills a	and qualifications	you recruited for in the	e last financial year.					
Low Difficulty: Able to find the	workers we need	d in Australia within 4 v	weeks or less					
Medium Difficulty: Able to find	the workers we	need in Australia within	n 5 - 8 waaks					
Mediam Difficulty. Able to find	THE WORKERS WE	riced iii Adstralia Withii	TO - O WEEKS					
High Difficulty: Unable to find	workers we need	l in Australia within 2 m	nonths					
Note: the time period applies t	·	esn't mean physical pla	acement which may					
take longer due to notice requ	irements etc).							
	Low difficulty	Medium difficulty	High difficulty					
Commercial & Sales Managers	0	0	0					
Project managers	0	0	0					
Accredited PV system designers	0	0	0					
Solar roofers/labourers	0	0	0					
Site supervisors	O	0	0					
Electricians	O	O	O					
Health & safety professionals	0	0	0					

Electrical engineers

Scada engineer

Scada technician

Electrical TA's

APPENDIX 2 - DIS	STRIBUTED S Low diffic		RVEY Medium diffic	culty F	High difficulty	/
Plumbers	0		0		0	
Crane & Hoist Operators	0		0		0	
Elevated work platform operators	0		0		0	
Other (please specify)	0		0		0	
What was the reason for apply)?	the difficulty in	recruitment	: in NSW / A	ACT (choos	e all that	
	Not enough candidates with the right qualifications / licenses	Not enough candidates with general experience	Not enough candidates with specific experience in renewable energy projects	Suitable candidates but they wanted higher pay	Difficulty attracting suitable candidates for projects in regional or remote locations	Suita candid but t wan longer employ
Commercial & Sales Managers						С
Project managers						С
Accredited PV system designers						С
Solar roofers/labourers						
Site supervisors						
Electricians						
Health & safety professionals						С
Electrical engineers						
Scada engineer						
Scada technician						С
Electrical TA's						С
Plumbers						С
Crane & Hoist Operators						С
Elevated work platform operators						С
Other (please specify)						С

-	ISSUES	INTE	Not enough candidates		Difficulty attracting	
REPEAT FOR ALL STATES WHE RECRUITED	RE RESPONDE	ZN.T.	with		suitable	
	Not enough candidates with the right qualifications / licenses		specific experience in renewable energy projects	Suitable candidates but they wanted higher pay	candidates for projects in regional or remote locations	Suita candid but t wan longer employ
Electricians						С
Health & safety professionals						С
Electrical engineers						
Scada engineer						
Scada technician						
Electrical TA's						
Plumbers						
Crane & Hoist Operators						
Elevated work platform operators						С
Other (please specify)		П		П		Г
Apprentices & Traineeship Did you employ apprentice O Yes O No How many apprentices / traineeship	s or trainees				/19? (FTE	
		Click to	write Scale	Point 1		
Electrician						
Electrical/electro- technology - Renewable Energy						
Plumber						

APPENDIX 2 - DISTRIBUTED SOLAR SURVEY 1/10/2020 Click to write Scale Point 1 Business administration Others What market sectors did they work in (please tick all that apply)? Solar PV - Utility Scale Solar PV - Commercial & Industrial Solar PV - Residential Solar PV - Stand Alone Solar Hot Water » Battery Storage - Commercial & Industrial » Battery Storage - Residential O » Other (Wind, Hydro, Bioenergy, Marine, Geothermal, etc.; please list any that apply) Wrap Up Are there any other workforce recruitment, skills or training issues you would like to highlight?

Would you like a copy of the report on solar employment when it comes out?

O Yes

O No

Would you like to enter a lucky draw to win 2 x \$500 Jetstar vouchers?

Please tell us what you would like to see in next year's Clean Energy Summit - panels,

APPENDIX 2 - DISTRIBUTED SOLAR SURVEY speakers, themes, etc., and also your name, organisation and email address

	Click to write Scale Point 1
Response	
Name	
Organisation	
Email Address	
Email:	
Can we contact you again if we have follo	ow up questions?
Yes	No
O	0
Please give us your contact details (fill in	whichever you would prefer)
	Click to write Scale Point 1
Name	
Email	
Telephone	

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Welcome to the CEC Jobs Survey

Welcome to the CEC Renewable Energy Jobs in the Supply Chain Survey

The Clean Energy Council (CEC) has partnered with the Institute of Sustainable Futures (ISF), University of Technology Sydney (UTS) to undertake a survey to collect data on employment in Australian renewable energy.

Currently, there is a lack of quality data for workforce planning and the number of jobs in renewable energy is often under-estimated.

The aims of the study are to collect data to:

- Enable the mapping of jobs in declining sectors to renewable energy jobs to identify opportunities for redeployment and retraining;
- Identify and quantify employment in the key occupations for large-scale solar and wind projects and utility scale batteries;
- Identify skill shortages and priority occupations for forward planning.

Your participation

The survey will take approximately 30-45 minutes. The survey includes questions on the number and type of jobs for employees, contractors and apprentices across the supply-chain for renewable energy. The questions cover skills shortages and recruitment issues in addition to employment numbers.

The scope of the survey includes manufacturing, warehousing, distribution and supply. There is another survey for the development, construction/installation and operation and maintenance of renewable energy projects so please do not include these jobs in your answers. If your company does undertake work in development, construction/installation and/or operation and maintenance please contact us at the number below to participate in this survey.

The data you provide will be aggregated with other survey responses and used in

combination with other data sources in a spreadsheet model to develop overall employment estimates. Your answers will not be directly quoted or released. No commercial in confidence or personally identifiable information will be included in the study report or any other publication, and these publications will not identify you or your organisation in any way.

Outputs

The purpose of this survey is to collect data on renewable energy employment. A final report will be presented to the CEC which is intended to be released publicly.

UTS researchers

This evaluation is led by project director Dr Chris Briggs (+61 477 301 892). The survey is being distributed by the CEC.

Research ethics

Studies undertaken by the Institute for Sustainable Futures have been approved in principle by the University of Technology Sydney, Human Research Ethics Committee. If you have any complaints or reservations about any aspect of your participation in this research you may contact the ISF Ethics Coordinator, Federico Davila (0403 657 124) or the ISF Responsible Academic, Dr Keren Winterford (0418 910 800).

You may also contact the UTS Ethics Committee through the Research Ethics Officer (02 9514 9772, Research. Ethics@uts.edu.au). Any complaint you make will be treated in confidence and investigated fully and you will be informed of the outcome.

By completing the survey you agree to the provisions of the research conduct as outlined above.

Thank you for participating in our survey. Your feedback is important.

Renewable Energy Supply-Chain and Technologies

In which parts of the supply chain does your business operate in Australia for each of the following renewable energy technologies?

Note the survey is only collecting data on manufacturing which occurs in Australia. For warehousing, distribution, supply, installation and maintenance, the survey covers imported products and those that are locally produced.

	Solar PV	Solar Hot Water	Wind	Battery Storage	Other (Hydro, Bioenergy, Marine, Geothermal, etc.)
Manufacturing					
Warehousing, distribution & supply					
Installation					
Maintenance					
RE Project Development (IPP)					
RE project construction					
RE project operation (including asset management)					
Please tell us what "Ot	her" includes				
Total Employment					
On average, what was equivalent, FTE) in the people were employed	last financial y	year (2018-19)	in Australia	? (so for exar	
Please include both er	nployees & co	ontractors.			
			Number (FTE)	
Employees					
Contractors					

What is the percentage (%) of your overall workforce that works on renewable energy
activities (or percentage of workforce time if staff work on renewables and non-
renewables work)?

Approximately, what proportion of your Australian renewable energy workforce's time was used in each of these technologies and sectors? (please include employees and contractors)

Please put a percentage in each box that applies, ensuring the total for the whole question adds up to 100% (not just a row).

	» Solar PV	» Solar Hot Water	» Wind	» BatteryStorage	» Other (Hydro, Bioenergy, Marine, Geothermal, etc.)	#Conjoint, Total#
» Manufacturing	0	0	0	0	0	0
» Warehousing, distribution & supply	0	0	0	0	0	0
» Installation	0	0	0	0	0	0
» Maintenance	0	0	0	0	0	0
» RE Project Development (IPP)	0	0	0	0	0	0
» RE project construction	0	0	0	0	0	0
» RE project operation (including asset management)	0	0	0	0	0	0

Products

Of your workforce time in Solar PV in Australia, approximately what was the proportion used for each of the **solar PV** products you manufactured, supplied, installed or maintained during financial year 2018/19?

Please ensure that each column total adds up to 100%.

Note the survey is only collecting data on manufacturing which occurs in Australia. For warehousing, distribution, supply and installation, the survey covers imported products and those that are locally produced.

	Warehousing, distribution &					
	Manufacturing	supply	Installation	Maintenance		
Solar modules	0	0	0	0		
Solar frames	0	0	0	0		
Inverters	0	0	0	0		
Cabling	0	0	0	0		
Transformers	0	0	0	0		
Software	0	0	0	0		
Other (please specify)	0	0	0	0		
#Conjoint, Total#	0	0	0	0		

Of your workforce time in wind energy in Australia, approximately what was the percentage used for each of the **wind** products during financial year 2018/19?

Please ensure the total for each column is equal to 100%.

Note the survey is only collecting data on manufacturing which occurs in Australia. For warehousing, distribution, supply and installation, the survey covers imported products and those that are locally produced.

	Warehousing, distribution &					
	Manufacturing	supply	Installation	Maintenance		
Steel for towers	0	0	0	0		
Wind tower	0	0	0	0		
Blades	0	0	0	O		
Generators	0	0	0	0		
Nascelle	0	0	0	0		
Inverters	0	0	0	0		
Transformers	0	0	0	0		
Cabling	0	0	0	0		
Software	0	0	0	0		
Transformers Cabling	0	0	0	0		

Warehousing, distribution & Manufacturing Installation supply Maintenance Other (please specify) 0 0 0 0 #Conjoint, Total# 0 0 0 0

Of your workforce time in solar hot water, approximately what was the proportion used for each of the **solar hot water** products you manufactured, supplied and/or installed during financial year 2018/19 in Australia?

Please ensure that each column adds up to 100%.

Note the survey is only collecting data on manufacturing which occurs in Australia. For warehousing, distribution and supply, the survey covers imported products and those that are locally produced.

		Warehousing, distribution &		
	Manufacturing	supply	Installation	Maintenance
Solar flat plat collector	0	0	0	0
Solar evacuated tubes	0	0	0	0
Other (please specify)	0	0	0	0
#Conjoint, Total#	0	0	0	0

Approximately how many MW did you manufacture or supply products for each of these sectors during the last financial year (2018-19)

If you do not know the capacity in MW, leave it blank and you'll get the option to use a different measure in the next question.

Note the survey is only collecting data on manufacturing which occurs in Australia. For warehousing, distribution and supply, the survey covers imported products and those that are locally produced.

	MW			MW
	(Manufacturing)	MW (Supply)	MW (Installation)	(Maintenance)
Solar PV				

	APPENDIX 3: SUPPLY CHAIN SURVEY					
	(Manufacturing)	MW (Supply)	MW (Installation)	MW (Maintenance)		
Solar Hot Water						
Battery Storage						
Wind						
Please provide us an a example, number of ir		_	-	n MW (for		
	Unit / M	easure	Num	iber		
» Solar PV						
» Solar Hot Water						
» Battery Storage						
» Wind						
Recruitment In which states did yo None NSW or ACT Victoria South Australia Queensland Tasmania Western Australia Northern Territory	u recruit staff durir	ng financial year	2018/19?			

For each of the following jobs, please indicate if you have attempted to recruit workers into these positions in the past 12 months and your experience with recruitment in Australia

Low Difficulty: Able to find the workers we need in Australia within 4 weeks or less

Medium Difficulty: Able to find the workers we need in Australia within 5 - 8 weeks

High Difficulty: Unable to find workers we need in Australia within 2 months

Note: the time period applies to search (i.e. doesn't mean physical placement which may take longer due to notice requirements etc).

	Low difficulty	Medium difficulty	High difficulty
Commercial & Sales Managers	0	0	0
Project managers	0	0	0
Production managers	0	0	0
Production engineers	0	0	0
Electrical engineers	0	0	0
Mechanical engineers	0	0	0
Transport & logistics professionals	0	0	0
IT Technicians	0	0	0
Structural steel and welding trades	0	0	0
Metal machinists & fitters	0	0	0
Other metal trades	0	0	0
Construction trades	0	0	0
Electricians	0	0	0
Telecommunications trades	0	0	0
Other	0	0	0

٧

Commercial & Sales						
What was the reason for t	Not enough candidates with the right qualifications / licenses	Not enough candidates with general experience	Not enough candidates with specific experience in renewable energy projects	Suitable candidates but they wanted higher pay	Difficulty attracting suitable candidates for projects in regional or remote locations	Suita candia but the war longer emplo

	Not enough candidates with the right qualifications / licenses	Not enough candidates with general experience	enough candidates with specific experience in renewable energy projects	Suitable candidates but they wanted higher pay	Difficulty attracting suitable candidates for projects in regional or remote locations	Suita candia but 1 war longer emplo
Project managers						
Production managers						L
Production engineers						L
Electrical engineers Machanical engineers						_
Mechanical engineers Transport & logistics	_	_	_	_		_
professionals						
IT Technicians						С
Structural steel and welding trades						С
Metal machinists & fitters						С
Other metal trades						С
Construction trades						С
Electricians						
Telecommunications trades						С
Other						С
Did you have the same expexperiences in recruitment Yes No			s all states o	or were the	re different	
For which states did you hat which states and you hat which states are which states are states as well	ave a differen	t experience	e?			

APPENDIX 3: SUPPLY CHAIN SURVEY enough Difficulty candidates attracting with suitable Not specific candidates Suita Not enough enough experience Suitable for candi candidates candidates in candidates projects in but 1 with the right with renewable but they regional or war qualifications general wanted remote energy Ionger experience / licenses projects higher pay locations emplo¹ Telecommunications trades Other Apprentices & Traineeships Did you employ apprentices or trainees during 2018-19 financial year? O Yes O No How many apprentices / trainees did you have during financial year 2018/19? (FTE equivalent) Number Electrician Structural steel and welding trades Metal machinists & fitters Mechanical trades Business administration Others

Job Types

We are now going to ask questions about the number of workers in renewable energy activities over the last financial year for different occupations:

- managers & administrators;		
- professionals;		
- technicians & trades; and	Righaurare	
- machine operators, drivers &	x labourers.	
Please read through the full list place jobs, and include both	•	wering as it will make it easier to s.
On average, how many Manarenewable energy work in the		support staff were engaged in 19.
Please answer in terms of full work on renewable and non-r	. , , , ,	(including contractors) so if staff sed on percentage of time.
Note to be defined as a mana them.	nger they should usually hav	ve internal staff that report to
	Total managers & a	administrative jobs
Manufacturing		
Warehousing, distribution & supply		
For each of the following man	agerial & administrative job	os, please enter
the average number of full tim financial year (2018-19)	ie equivalent (FTE) jobs (inc	cluding contractors) in the last
	Manufacturing	Warehousing, distribution & supply
Executives/General Mangers		
HR, Finance & Business administration managers (etc)		
Commercial & Sales Managers		
Project managers		
Production managers		
Operations managers		

APPENDIX 3: SUPPLY CHAIN SURVEY Warehousing, distribution &

Manufacturing supply Transport & logistics managers Supervisors Other management jobs (please specify) Office managers/contract administrators Accounting clerks & bookkeepers Other administrative jobs (please specify) On average, how many Professionals did you have in the last financial year, 2018-19? Please answer in terms of full time equivalent (FTE) jobs (including contractors). Total professionals Manufacturing Warehousing, distribution & supply For each of the following professional jobs, please enter the average number of full time equivalent (FTE) jobs (including contractors) in the last financial year (2018-19) Warehousing, distribution & Manufacturing supply Financial and accounting professionals Human resource professionals Marketing and sales Legal professionals Production engineers **Electrical Engineers** Mechanical Engineers Other engineers

APPENDIX 3: SUPPLY CHAIN SURVEY Warehousing, distribution & Manufacturing supply IT professionals Health & safety professionals Transport & logistics Other professional (please specify) On average, how many trades and technicians did you have in the last financial year, 2018-19? Please answer in terms of full time equivalent (FTE) jobs (including contractors). Total trades & technicians Manufacturing Warehousing, distribution & supply For each of the following trades & technician jobs, please enter the average number of full time equivalent (FTE) jobs (including contractors) in the last financial year (2018-19) Please include any installation and / or maintenance jobs below. Warehousing, distribution & Manufacturing supply Electrical technicians Mechanical technicians IT Technicians Other technicians

Structural steel and welding trades

Other metal trades

apprentices

Metal machinists & fitters

Metal trades assistants /

APPENDIX 3: SUPPLY CHAIN SURVEY Warehousing, distribution & Manufacturing supply Electricians Telecommunications trades Construction trades blasters/painters Other trades (please specify)

On average, how many machine operators, drivers & labourers did you have in the last financial year, 2018-19? Please answer in terms of full time equivalent (FTE) jobs (including contractors).

Total machine operators, drivers & labourers

Manufacturing

Warehousing,
distribution & supply

For each of the following machine operators, drivers & labourers jobs, please enter the average number of full time equivalent (FTE) jobs (including contractors) in the last financial year (2018-19)

Please include any installation and / or maintenance jobs below.

	Manufacturing	Warehousing, distribution & supply
Process workers & labourers		
Product quality controllers		
Storeperson & packers		
Drivers (trucks, vans)		
Cleaners		
Security guards		
Other (please specify)		

Contractors

What functions, if any,	do you contract out or	source from	another bu	ısiness?	Please
answer in terms of the	percentage of volume	or value depe	ending on v	which is	easiest.

		%			
Manufacturing					
Production inputs or componentry					
Warehousing					
Distribution & supply					
Other (please specify)					
For those areas you contract jobs in the previous question		esses, did you include	the number of		
	None of them	Some of them	All of them		
» Manufacturing	0	0	0		
» Production inputs or componentry	0	0	0		
» Warehousing	0	0	0		
» Distribution & supply	0	0	O		
» Other (please specify)	0	0	0		
Please provide any information you can on the type and/or amount of work you contract out or supply from other Australian businesses.					
(e.g. "there is a ratio of 2:1 joworkforce")	bs for the supply o	f x, y, z components r	elative to our		

Wrap Up

APPENDIX 3: SUPPLY CHAIN SURVEY

Are there any other workforce recruitment, s highlight?	kills or training issues you would like to
Can we contact you again if we have follow Yes No	up questions?
Would you like a copy of the report on renevout? O Yes O No	vable energy employment when it comes
To win 2 * \$500 Jetstar vouchers tell us what Summit session includes	t your ultimate Australian Clean Energy
(name of session/speakers/panel/content/yo	ou decide)
Please give us your contact details	
Name	Details
Organisation	

APPENDIX 3: SUPPLY CHAIN SURVEY Details

Email
Telephone

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Welcome to the CEC survey of Batteries Jobs in Australia

The Clean Energy Council (CEC) has partnered with the Institute of Sustainable Futures (ISF), University of Technology Sydney (UTS) to undertake a survey to collect data on employment in Australian renewable energy. There is currently a lack of quality data for workforce planning and the number of jobs in renewable energy is often underestimated.

The survey will usually take 30 - 45 minutes to complete, and completing it will enter you into a prize draw to win two \$500 Jetstar vouchers.

This survey is for battery storage (solar, wind and hydro are covered in different surveys) and the scope includes:

- manufacturing;
- technology & product distribution and supply;
- · development, construction and
- operations & maintenance.

The aims of the study are to:

- Identify and quantify employment in the key occupations
- Identify skill shortages and priority occupations for forward planning, and
- Enable the mapping of jobs in declining sectors to renewable energy jobs to identify opportunities for redeployment and retraining.

Your participation

The survey will take approximately 30-45 minutes. The survey includes questions on the number and type of jobs for employees, contractors and apprentices across the supply-chain for battery storage. The questions cover skills shortages and recruitment issues in addition to employment numbers.

The data you provide will be aggregated with other survey responses and used in combination with other data sources in a spreadsheet model to develop overall employment estimates. Your answers will not be directly quoted or released. No commercial in confidence or personally identifiable information will be included in the study report or any other publication, and these publications will not identify you or your organisation in any way.

Outputs

The purpose of this survey is to collect data on renewable energy employment. A final report will be presented to the CEC which is intended to be released publicly.

This evaluation is led by project director Dr Chris Briggs (+61 477 301 892). The survey is being distributed by the CEC.

Research ethics

Studies undertaken by the Institute for Sustainable Futures have been approved in principle by the University of Technology Sydney, Human Research Ethics Committee. If you have any complaints or reservations about any aspect of your participation in this research you may contact the ISF Ethics Coordinator, Federico Davila (0403 657 124) or the ISF Responsible Academic, Dr Keren Winterford (0418 910 800).

You may also contact the UTS Ethics Committee through the Research Ethics Officer (02 9514 9772, Research. Ethics@uts.edu.au). Any complaint you make will be treated in confidence and investigated fully and you will be informed of the outcome.

By completing the survey you agree to the provisions of the research conduct as outlined above. Thank you for participating in our survey. Your feedback is important.

Market Sectors

What battery types and sectors did your company work on in Australia during the last financial year 2018-19? Please tick all that apply.

		APPENDIX 4 BATTERIES SURVEY Utility batteries (grid connected						
	Residential batteries	Commercial & Industrial batteries	or located at solar or wind farms)	Electric vehicle batteries				
Lead acid								
Lithium ion								
Sodium nickel								
Vanadium								
Zinc bromide								
Other (please specify)								
What parts of the battery								

Australia during the last financial year 2018-19? Please tick all that apply.

Research & development				
Manufacturing				
Warehousing, distribution & supply				
Installation (including design)				
Operation & Asset Management				
Maintenance				
Other (please specify)				

Total Employment

How many employees and contractors did you engage on average during the last financial year (2018-19) in Australia on a full time equivalent (FTE) basis?

For example, someone employed full time for 6 months would be 0.5 FTE.

In case you did not engage any contractors, please enter zero.

					ENDIX 4 ber (FTE)	BATTER	IES SURV	'EY
Employees								
Contractors								
On average, w last financial ye		•		e time wa	is spen	t on batte	ery storaç	ge in the
	0 10) 20	30 40	50	60 7	0 80	90 1	00
Emplo	oyees							
Contra	actors							
							_	
different activit Please put a p question adds	ercentage in	each box t						
	» Research&development	: » Manufa		Warehous distribution supply	-	Installatior including design)	» Zinc	» Mainten
» Residential batteries								
» Commercial& Industrialbatteries								
» Utility batteries (grid connected or located at solar or wind farms)								
» Electric								

vehicle batteries

In which states did you recru	uit staff during finan	cial year 2018/19?	
None NSW or ACT Victoria South Australia Queensland Tasmania Western Australia Northern Territory			
Which of the following jobs / 12 months? What was your		•	•
Please fill in only for roles, sk year.	cills and qualification	ns you recruited for in	the last financial
Low Difficulty: Able to find the	ne workers we nee	d in Australia within 4	weeks or less
Medium Difficulty: Able to fin	nd the workers we	need in Australia withi	n 5 - 8 weeks
High Difficulty: Unable to fin	d workers we neec	I in Australia within 2 n	nonths
Note: the time period applies take longer due to notice rec	•	esn't mean physical pla	acement which may
	Low difficulty	Medium difficulty	High difficulty
Commercial & sales Managers	0	0	0
Project Managers	O	0	0
Production Managers	0	0	0
Battery system designer or engineer	0	0	0
Grid Engineers	0	0	0
Electrical Engineers	0	0	0
Scada Engineers	0	0	0
Transport & logistics professionals	0	0	0

	Low difficulty	APPENDIX 4 BATTE Medium difficulty	ERIES SURVEY High difficulty
Environment, Health & safety professionals	0	0	0
Battery technicians	0	0	0
Grid technicians	0	0	0
SCADA technicians	0	0	0
Construction trades	0	0	0
Electricians	O	0	0
Other (please specify)	0	0	0

What was the reason for the difficulty in recruitment in Australia (choose all that apply)?

	Not enough candidates with the right qualifications / licenses	Not enough candidates with general experience	Not enough candidates with specific experience in renewable energy or hydro projects	Suitable candidates but they wanted higher pay	Difficulty attracting suitable candidates for projects in regional or remote locations	Suit candi but war longe emplo
Commercial & sales manager						
Project manager						
Production manager						
Battery system designer or engineer						C
Grid Engineers						
Electrical engineers						
SCADA Engineers						
Transport & logistics professionals						C
Environmental, Health & Safety professionals						
Battery technicains						
Grid technicians						
SCADA technicians						
Construction trades						
Electricians						

APPENDIX 4 BATTERIES SURVE					SSURVEY	
	Not enough candidates with the right qualifications / licenses		enough candidates with specific experience in renewable energy or hydro projects	Suitable candidates but they wanted higher pay	Difficulty attracting suitable candidates for projects in regional or remote locations	Suita candia but t war longer emplo
Other (please specify)						С
States or were there difference Yes No						
For which states did you h	nave a differen	t experience	э?			
■ » NSW or ACT						
» Victoria	NC	TE: SURVE	V DEDEATC		(IZNIT)	
South Australia		FFICULTY				
» Queensland» Tasmania		TATES IF R			ES	
" lasmania" western Australia	DI	IFFERENT E	YPEKIENCE			
Northern Territory						

For each of the following jobs, please indicate if you have attempted to recruit workers into these positions in the past 12 months and your experience with recruitment in NSW / ACT.

Please fill in for all roles, skills and qualifications you recruited for in the last financial year.

Low Difficulty: Able to find the workers we need in Australia within 4 weeks or less

APPENDIX 4 BATTERIES SURVEY enough Difficulty candidates attracting with suitable Not specific candidates Suita Not enough enough Suitable for experience candi candidates candidates in candidates projects in but 1 with the right with renewable but they regional or war qualifications wanted remote general energy Ionger experience / licenses projects higher pay locations emplo¹ » Electrical Engineers » Scada Engineers » Transport & logistics professionals » Environment, Health & safety professionals » Battery technicians » Grid technicians » SCADA technicians » Construction trades » Electricians » Other (please specify) Apprentices & Traineeships Did you employ apprentices or trainees during 2018-19 financial year? O Yes O No How many apprentices / trainees did you have during financial year 2018/19? (FTE equivalent) Numbers Electrician

Engineering

Mechanical

Power systems

	Numbers						
Electro-technology or renewable energy							
Business administration							
Others (please specify)							
What market sectors did th	ney work i	n (please t	ick all that	apply)?			
 » Residential batteries » Commercial & Industria » Utility batteries (grid cor » Electric vehicle batteries 	nnected or	located at s	solar or winc	l farms)			
Supply chain Which of the following elemapply.	nents doe	s your bus	iness man	ufacture? Ple	ease tick a	III that	
	» Lead acid	» Lithium ion	» Sodium nickel	» Vanadium	» Zinc bromide	» Other (please specify)	
Completed battery packs							
Cell materials (electrolyte, cathode / anode active material, electrode binders, solvents, additives, separators)							
Battery cells							
Battery modules							
Inverters							
Software & control systems							
Other (please specify)							

Which of the following elements does your business warehouse, distribute or supply?

Please tick all that apply.

APPENDIX 4 BATTERIES SURVEY » Other » Lead » Lithium » Sodium » Zinc (please bromide acid ion nickel » Vanadium specify) Completed battery packs Cell materials (electrolyte, cathode / anode active material, electrode binders, solvents, additives, separators) Battery cells Battery modules Inverters Software & control systems Other (please specify) Approximately what capacity of batteries did you manufacture during the last financial year (2018-19)? Note the survey is only collecting data on manufacturing which occurs in Australia. Number of systems MW MWh » Residential batteries » Commercial & Industrial batteries » Utility batteries (grid connected or located at solar or wind farms) » Electric vehicle batteries Approximately what capacity of batteries did you warehouse, distribute or supply during

the last financial year (2018-19)?

Note the survey is collecting data on both local and imported batteries.

	MW	MWh	Number of systems
» Residential batteries			
» Commercial & Industrial batteries			

	MW	APPENDIX 4 B MWh	ATTERIES SURVEY Number of systems
» Utility batteries (grid connected or located at solar or wind farms)			
» Electric vehicle batteries			
Approximately what capa last financial year (2018-		ects did you design a	and/or install during the
Note the survey is only c	ollecting data on pro	ojects which occur ir	n Australia.
	MW	MWh	Number of systems
Residential batteries - installed			
Commercial & industrial batteries - projects under development			
Commercial & industrial batteries - installed			
Utility scale batteries - project under development			
Utility scale batteries - installed			
Approximately what capa financial year (2018-19)? Note the survey is only c			
	MW	MWh	Number of systems
» Residential batteries			
Commercial & Industrial batteries			
» Utility batteries (grid connected or located at solar or wind farms)			
» Electric vehicle batteries			

Job Types

We are now	going to	ask questions	about the	occupations	of workers	who	worked	on
batteries in	the 2018	-19 financial y	ear:					

- managers & administrators;
- professionals;
- technicians & trades; and
- machine operators, drivers & labourers.

Please read through the full list of jobs below before answering as it will make it easier to place jobs, and include both employees and contractors.

On average, how many Managers and Administrative support staff did you engage in the 2018-19 financial year working in battery storage (including contractors)

Please answer in terms of full time equivalent (FTE) jobs so if a staff member worked half-time on battery storage that would be 0.5.

Note to be defined as a manager they should usually have internal staff that report to them.

Managers & administrative jobs

Manufacturing & R&D

Warehousing & supply

Installation

Operation and/or
maintenance

On average, how many Managers & Administrative support staff did you engage in the 2018-19 financial year in battery storage. Please enter the number of full time equivalent (FTE) jobs (including contractors).

Manufacturing and/or R&D

Warehousing, Sales & Distribution

Installation

Operation & Maintenance

APPENDIX 4 BATTERIES SURVEY Warehousing, Manufacturing Sales & Operation & and/or R&D Distribution Installation Maintenance Executives/General Mangers HR, Finance & Business administration managers (etc) Commercial & Business Development Managers **Production Managers** Project managers Site Managers Operations & Asset Managers Other management jobs (please specify) Office managers/contract administrators Accounting clerks & bookkeepers Other administrative jobs (please specify) On average, how many Professionals did you engage in the 2018-19 financial year in battery storage. Please answer in terms of full time equivalent (FTE) jobs (including contractors). Professionals » Manufacturing & R&D » Warehousing & supply

On average, how many **Professionals** did you engage in the **2018-19 financial year** in **battery storage**. Please enter the number of full time equivalent (FTE) jobs

» Installation

maintenance

» Operation and/or

(including contractors).

	Manufacturing and/or R&D	Warehousing, Sales & Distribution	Installation	Operation & Maintenance
Business professionals (finance, accounting, Human Resources etc)				
Sales and marketing professionals				
Research/Science Professionals				
Battery system designer or engineer				
Electrical engineers				
Grid Engineer				
Scada Engineers				
Transport & Logistics professionals				
Environment, Health & Safety professionals				
Control room operator				
Trading				
Other professionals (please specify)				
On average, how many Tra year in battery storage. Pla (including contractors).		_		
» Manufacturing &		Trades & Tec	hnicians	
R&D				
» Warehousing & supply				
» Installation				
» Operation and/or maintenance				

How many Trades & Technicians did you engage in the 2018-19 financial year in battery storage? Please enter the number of full time equivalent (FTE) jobs (including contractors).

	Manufacturing and/or R&D	Warehousing, Sales & Distribution	Installation	Operation and/or Maintenance
SCADA technician				
Battery technician				
Research/Science Technicians				
Site supervisors				
Other technicians (please specify)				
Electricians				
Construction trades				
Metal trades				
Mechanical trades				
Telecommunications trades				
Other trades (please specify)				
On average, how many N the 2018-19 financial yea equivalent (FTE) jobs (incl	in battery storag	e. Please answ	_	
	Macl	hine operators, dr	ivers & labourers	S
» Manufacturing & R&D				
» Warehousing & supply				
» Installation				
» Operation and/or maintenance]	

How many Machine Operator, Driver and Labourers did you engage in the 2018-19 financial year in battery storage? Please enter the number of full time equivalent (FTE)

jobs (including contractors).

	Manufacturing and/or R&D	Warehousing Sales & Distribution	l, Installation	Operation and/or Maintenance
Forklift operators				
Drivers (trucks, vans)				
Other drivers & machine operators (please specify)				
Concreters				
Mechanical labourers				
Civil labourers/trades- assistants				
Electrical trade assistants				
Other labourers (please specify)				
Please let us know if you	u contracted out s	ome of your b		18/19?
	» Residential batteries	Commercial & Industrial batteries	» Utility batteries (grid connected or located at solar or wind farms)	» Electric vehicle batteries
» Research & development				
» Manufacturing				
Warehousing,distribution & supply				
» Installation (including design)				
» Zinc bromide				
» Maintenance				
» Other (please specify)				

Which proportion (%) of each function did you contract out to another business?

		APPENDIX 4 BATI %	ERIES SURVEY
» Research & development			
» Manufacturing			
» Warehousing, distribution & supply			
» Installation (including design)			
» Zinc bromide			
» Maintenance			
» Other (please specify)			
For those areas you con obs in the previous ques		sinesses, did you includ Some of them	de the number of All of them
» Research & development	0	0	0
» Manufacturing	0	0	0
» Warehousing, distribution & supply	0	0	0
» Installation (including design)	0	0	0
» Zinc bromide	0	0	0
» Maintenance	0	O	0
» Other (please specify)	0	Ο	0
Please add any descripti	on or comment abou	ut the jobs you weren't	able to include .

Typical Project

Please now consider a "typical" project under design or installation. If there is no such thing as typical, choose whatever size and type you are most familiar with.

What is the capacity of a typical project	t for your con	npany?	
MW MWh		Capacity	
What battery chemistry is it?			
 » Lead acid » Lithium ion » Sodium nickel » Vanadium » Zinc bromide » Other (please specify) 			
Is it grid connected? Yes No			
How long did the project take?			
Development (pre- construction) phase Installation phase	Years		Months
Other (please specify)			

How many people (FTE) would you expect to be employed in each phase on average?

APPENDIX 4 BATTERIES SURVEY Development (preconstruction) phase Installation phase Other (please specify) Wrap Up Are there any other workforce recruitment, skills or training issues you would like to highlight? Can we contact you again if we have follow up questions? O Yes O No Would you like a copy of the report on Renewable Energy employment when it comes out? O Yes O No To win 2 * \$500 Jetstar vouchers tell us what your ultimate Australian Clean Energy Summit session includes (name of session/speakers/panel/content/you decide)

Dlagge give us vour contact details		
Please give us your contact details		
Please give us your contact details	Details	
Name	Details	
	Details	
Name	Details	
Name Organisation	Details	

Powered by Qualtrics

Welcome to the CEC survey of Hydro Jobs in Australia

The Clean Energy Council (CEC) has partnered with the Institute of Sustainable Futures (ISF), University of Technology Sydney (UTS) to collect data on employment in Australian renewable energy. There is currently a lack of quality data for workforce planning and the number of jobs in renewable energy is often under-estimated.

The survey will usually take 30 - 45 minutes to complete, and completing it will enter you into a prize draw to win two full conference tickets to the Australian Clean Energy Summit 2020 as well as a table for 10 people at the Australian Clean Energy Summit gala dinner (total value \$7,315 inc. GST).

This survey is for hydro generation and storage (solar, wind and battery storage are covered in different surveys) and the scope includes:

- manufacturing;
- technology & product distribution and supply;
- development, construction and operations & maintenance.

The aims of the study are to:

- Identify and quantify employment in the key occupations
- Identify skill shortages and priority occupations for forward planning, and
- Enable the mapping of jobs in declining sectors to renewable energy jobs to identify opportunities for redeployment and retraining.

Your participation

The survey will take approximately 30-45 minutes. The survey includes questions on the number and type of jobs for employees, contractors and apprentices across the supply-chain for hydro energy and storage. The questions cover skills shortages and recruitment issues in addition to employment numbers.

APPENDIX 5 HYDRO SURVEY

The data you provide will be aggregated with other survey responses and used in combination with other data sources in a spreadsheet model to develop overall employment estimates. Your answers will not be directly quoted or released. No commercial in confidence or personally identifiable information will be included in the study report or any other publication, and these publications will not identify you or your organisation in any way.

Outputs

The purpose of this survey is to collect data on renewable energy employment. A final report will be presented to the CEC which is intended to be released publicly.

This evaluation is led by project director Dr Chris Briggs (+61 477 301 892). The survey is being distributed by the CEC.

Research ethics

Studies undertaken by the Institute for Sustainable Futures have been approved in principle by the University of Technology Sydney, Human Research Ethics Committee. If you have any complaints or reservations about any aspect of your participation in this research you may contact the ISF Ethics Coordinator, Federico Davila (0403 657 124) or the ISF Responsible Academic, Dr Keren Winterford (0418 910 800).

You may also contact the UTS Ethics Committee through the Research Ethics Officer (02 9514 9772, Research. Ethics@uts.edu.au). Any complaint you make will be treated in confidence and investigated fully and you will be informed of the outcome.

By completing the survey you agree to the provisions of the research conduct as outlined above. Thank you for participating in our survey. Your feedback is important.

Market Sectors

In which parts of the supply chain are you able to answer questions on typical project capacities, employee numbers and roles? Please tick all that apply.

				APPEND	X 5 HYDRO S	SURVEY Operation & Maintenance	
	Manufacturing	Development (pre-financial close)	Construction (civil work)	Construction (electrical)	Construction (mechanical)	(including asset management)	
Large hydro (>50 MW)							
Small hydro (< 50 MW)							
Large pumped hydro (>50 MW)							
Small pumped hydro (<50 MW)							
Total Employment On average, what was the total number of workers currently engaged in hydro activities n your business (Full time equivalent, FTE) in the last financial year (2018-19) in Australia?							
So for exa	mple if 3 peop	ole were empl	oyed for 6 m	onths each, i	t would be 1	.5 FTE.	
Please inc	lude both emp	oloyees & cor	ntractors.				
Employees Contractor				Number (FTE)			
	ately what proports			s engaged in	hydro activit	ies? (please	

rı

0 10 20 30 40 50 60 70 80 90 100 Hydro activities How many MW of hydro did your organisation have under development, construction or operating and maintaining in the last financial year 2018-19? Operating & Development Construction Maintaining » Large hydro (>50 MW) » Small hydro (< 50 MW) » Large pumped hydro (>50 MW) » Small pumped hydro (<50 MW) Recruitment Did you recruit any hydro staff during 2018/19? No Yes In which states did you recruit staff during financial year 2018/19? None NSW or ACT Victoria South Australia

Queensland

Western Australia

Northern Territory

Tasmania

APPENDIX 5 HYDRO SURVEY

For each of the following jobs, please indicate if you have attempted to recruit workers into these positions in the past 12 months and your experience with recruitment in Australia.

Please fill in for all roles, skills and qualifications you recruited for in the last financial year.

Low Difficulty: Able to find the workers we need in Australia within 4 weeks or less

Medium Difficulty: Able to find the workers we need in Australia within 5 - 8 weeks

High Difficulty: Unable to find workers we need in Australia within 2 months

Note: the time period applies to search (i.e. doesn't mean physical placement which may take longer due to notice requirements etc).

	Low difficulty	Medium difficulty	High difficulty
Construction Managers	0	0	0
Operations Manager	0	0	0
Surveyors	0	0	0
Civil Engineers	0	0	0
Grid Engineers	O	O	0
Mechanical Engineers	O	O	0
Electrical Engineers	O	O	0
SCADA Engineers	O	O	0
Community engagement professionals	0	0	0
Environmental health and safety assessment professionals	0	0	0
Site supervisors	0	0	0
Civil engineering technicians	0	0	0
Electrical technicians	0	0	0
SCADA technicians	0	0	0
Power plant / control room operators	0	0	0
Carpenters	0	0	0
Plumbers	0	0	0
Electricians	0	0	0

	Low difficulty	APPENDIX 5 HY Medium difficulty	YDRO SURVEY High difficulty
Steel fixers	0	0	0
Truck drivers	0	0	0
Concreters	0	0	0
Riggers	0	0	0
Other (please specify)	0	0	0

What was the reason for the difficulty in recruitment in Australia (choose all that apply)?

	Not enough candidates with the right qualifications / licenses	Not enough candidates with general experience	Not enough candidates with specific experience in renewable energy or hydro projects	Suitable candidates but they wanted higher pay	Difficulty attracting suitable candidates for projects in regional or remote locations	Suita candia but the war longer emplo
Construction Managers						С
Operations Manager						
Surveyors						
Civil Engineers						
Grid Engineers						
Mechanical Engineers						
Electrical Engineers						
SCADA Engineers						
Community engagement professionals						С
Environmental health and safety assessment professionals						С
Site supervisors						
Civil engineering technicians						С
Electrical technicians						
SCADA technicians						
Power plant / control room operators						С
Carpenters						

	Not enough candidates with the right qualifications / licenses	Not enough candidates with general experience	Not enough candidates with specific experience in renewable energy or hydro projects	Suitable candidates but they wanted higher pay	Difficulty attracting suitable candidates for projects in regional or remote locations	Suita candia but 1 war longer emplo
Plumbers						Ē
Electricians						F
Steel fixers						L
Truck drivers						L
Concreters						L
Riggers Other (please specify)						L
Other (please specify)						
States or were there differ Yes No	ent experience	es in recruitr	nent for on	e or more s	tates?	
For which states did you " None " NSW or ACT " Victoria " South Australia " Queensland " Tasmania	have a differen	NOTE DIFF STAT	: SURVEY ICULTY QU	ESTIONS F PONDENT I	ECRUTIMEN OR RELEVA DENTIFIES	NT
www.western Australia						
» Northern Territory						

APPENDIX 5 HYDRO SURVEY

enough Difficulty candidates attracting with suitable Not specific candidates Suita Not enough enough experience Suitable for candi candidates candidates in candidates projects in but 1 with the right with renewable but they regional or war qualifications wanted remote general energy Ionger / licenses experience projects higher pay locations emplo¹ » Plumbers » Electricians » Steel fixers » Truck drivers » Concreters » Riggers » Other (please specify) Apprentices & Traineeships Did you employ apprentices or trainees during 2018-19 financial year? O Yes O No How many apprentices did you have during financial year 2018/19? (FTE equivalent) Numbers Civil labourers Electrician Engineering - Electrical Trade Electrical supply industry -Power systems Electrical supply industry -Wind generation Electrical/electrotechnology - Renewable

Energy

APPENDIX 5 HYDRO SURVEY

Electrical - PV Others (please specify) How many trainees did you have during financial year 2018/19? (FTE equivalent) Numbers Concreter Dogger Bigging Scaffolder Business administration Others (please specify) What market sectors did they work in (please tick all that apply)? Numbers What market sectors did they work in (please tick all that apply)? Numbers What market sectors did they work in (please tick all that apply)? Numbers What market sectors did they work in (please tick all that apply)? Numbers Small hydro (>50 MW) Numbers Small hydro (>50 MW) Numbers Small hydro (>50 MW) Numbers Numbers Cherical - PV Numbers Concreter Numbers Numbers Numbers Cherical - PV Numbers Concreter Numbers Cabling Cament Pumps/ turbines Steel reinforcing Cement Steel reinforcing Cement Pumps/ turbines Steel reinforcing Cement Pumps/ turbines Concreter Cherical - PV Numbers Concreter Cherical - PV Numbers Numbers Numbers Numbers Numbers Numbers Numbers Numbers Concreter Cherical - PV Numbers Cabling Cement Steel reinforcing Cement Steel reinforcing Cement Cherical - PV Cabling Cement Cabling C		APPENDIX 5 HYDRO SURVEY Numbers
How many trainees did you have during financial year 2018/19? (FTE equivalent) Numbers	Electrical - PV	
Concreter Dogger Rigging Scaffolder Business administration Others (please specify) What market sectors did they work in (please tick all that apply)? " » Large hydro (>50 MW) " » Small hydro (>50 MW) " » Small pumped hydro (>50 MW) " » Small pumped hydro (>50 MW) Which of the following products does your organisation manufacture for hydro generation or storage projects? Pipes	Others (please specify)	
Concreter Dogger Rigging Scaffolder Business administration Others (please specify) What market sectors did they work in (please tick all that apply)? " » Large hydro (>50 MW) " » Small hydro (>50 MW) " » Small pumped hydro (>50 MW) " » Small pumped hydro (>50 MW) Which of the following products does your organisation manufacture for hydro generation or storage projects? Pipes		
Concreter Dogger Rigging Scaffolder Business administration Others (please specify) What market sectors did they work in (please tick all that apply)? " » Large hydro (>50 MW) " » Small hydro (>50 MW) " » Small pumped hydro (>50 MW) " » Small pumped hydro (>50 MW) Which of the following products does your organisation manufacture for hydro generation or storage projects? Pipes		
Concreter Dogger Rigging Scaffolder Business administration Others (please specify) What market sectors did they work in (please tick all that apply)? New Large hydro (>50 MW) New Small hydro (< 50 MW) Small pumped hydro (>50 MW) Small pumped hydro (<50 MW) Manufacturing Which of the following products does your organisation manufacture for hydro generation or storage projects? Pipes Cabling Valves Cement Pumps/ turbines Steel reinforcing Generators/ motors Software	How many trainees did you have during fina	ancial year 2018/19? (FTE equivalent)
Dogger Rigging Scaffolder Business administration Others (please specify) What market sectors did they work in (please tick all that apply)? > Large hydro (>50 MW) > Small hydro (>50 MW) > Small pumped hydro (>50 MW) > Small pumped hydro (<50 MW) Which of the following products does your organisation manufacture for hydro generation or storage projects? Pipes		Numbers
Rigging Scaffolder Business administration Others (please specify) What market sectors did they work in (please tick all that apply)? **New Large hydro (>50 MW) **New Small hydro (< 50 MW) **New Small pumped hydro (>50 MW) **New Small pumped hydro (<50 MW) **New Small pumped hydro (<50 MW) **New Small pumped hydro (<50 MW) **Manufacturing Which of the following products does your organisation manufacture for hydro generation or storage projects? **Pipes** **Pipes** **Cabling** **Valves** **Pumps/ turbines** **Steel reinforcing** **Generators/ motors** **Software**	Concreter	
Scaffolder Business administration Others (please specify) What market sectors did they work in (please tick all that apply)? " » Large hydro (>50 MW) " » Small hydro (< 50 MW) " » Large pumped hydro (>50 MW) " » Small pumped hydro (<50 MW) Which of the following products does your organisation manufacture for hydro generation or storage projects? " Pipes	Dogger	
Business administration Others (please specify) What market sectors did they work in (please tick all that apply)? " » Large hydro (>50 MW) " » Small hydro (< 50 MW) " » Large pumped hydro (>50 MW) " » Small pumped hydro (<50 MW) Which of the following products does your organisation manufacture for hydro generation or storage projects? " Pipes	Rigging	
Others (please specify) What market sectors did they work in (please tick all that apply)? " ** Large hydro (>50 MW) " ** Small hydro (< 50 MW) " ** Large pumped hydro (>50 MW) " ** Small pumped hydro (<50 MW) Manufacturing Which of the following products does your organisation manufacture for hydro generation or storage projects? Pipes	Scaffolder	
What market sectors did they work in (please tick all that apply)? " Large hydro (>50 MW) " Small hydro (< 50 MW) " Large pumped hydro (>50 MW) " Small pumped hydro (<50 MW) Which of the following products does your organisation manufacture for hydro generation or storage projects? Pipes	Business administration	
 □ » Large hydro (>50 MW) □ » Small hydro (< 50 MW) □ » Small pumped hydro (>50 MW) □ » Small pumped hydro (<50 MW) Manufacturing Which of the following products does your organisation manufacture for hydro generation or storage projects? □ Pipes □ Cabling □ Valves □ Cement □ Pumps/ turbines □ Generators/ motors □ Software 	Others (please specify)	
 □ » Large hydro (>50 MW) □ » Small hydro (< 50 MW) □ » Small pumped hydro (>50 MW) □ » Small pumped hydro (<50 MW) Manufacturing Which of the following products does your organisation manufacture for hydro generation or storage projects? □ Pipes □ Cabling □ Valves □ Cement □ Pumps/ turbines □ Generators/ motors □ Software 		
Which of the following products does your organisation manufacture for hydro generation or storage projects? Pipes Cabling Cement Valves Cement Pumps/ turbines Steel reinforcing Generators/ motors Software	» Small hydro (< 50 MW)» Large pumped hydro (>50 MW)	
generation or storage projects? Pipes	Manufacturing	
Valves □ Cement □ Pumps/ turbines □ Steel reinforcing □ Generators/ motors □ Software		organisation manufacture for hydro
□ Pumps/ turbines □ Steel reinforcing □ Generators/ motors □ Software	Pipes	Cabling
☐ Generators/ motors ☐ Software	Valves	Cement
_	☐ Pumps/ turbines	Steel reinforcing
Transformers Other (please specify)	Generators/ motors	Software
	Transformers	Other (please specify)

APPENDIX 5 HYDRO SURVEY

Approximately how many MW of hydro capacity did your organisation manufacture products for during the last financial year (2018-19)? If you don't know the capacity, please fill in an alternative measure.

Note the survey is only collecting data on manufacturing which occurs in Australia.

	MW hydro manufactured	Alternate measure if you don't know the MW
» Pipes		
» Valves		
» Pumps/ turbines		
» Generators/ motors		
» Transformers		
» Cabling		
» Cement		
» Steel reinforcing		
» Software		
» Other (please specify)		

Employment for a specific hydro project

Please now consider a major project for your organisation.

Choose whatever size and type you are most familiar with - it could be a project under development, in construction, or a planned future project. For some organisations, a planned future project may be a new development but for others a major refurbishment of an existing scheme is more common.

If you are able to answer for more than one size or type you will get the opportunity to answer for a second project.

The aim of these questions is to determine employment per MW for additional hydro capacity.

How many MW is your project?

		APPENDIX 5 HYDRO SURVEY
ls it	a refurbishment of an ex	xisting scheme, an extension, or entirely new?
0	Major robabilitation / rafurb	ishment (please note which hydro it is refurbishing)
	Major renabilitation/ return	shrient (please note which hydro it is returbishing)
0		Extension (please specify which hydro it extends)
0		New
Wha	at are the major activities	s of the project?
Wha	at is the type of project?	
0	Pumped storage	
0	Generation	
0	Both pumped storage & g	eneration
0		Other (please specify)
ls th	ne generation element :	
0	Impoundment	
0	Diversion	
0	Run of river	
0		Other (please specify)
Hov	w much storage is assoc	ciated with the hydro, and what is the head?
		Storage
MV	Vh	

		APPENDIX Storage	5 HYDRO SURVEY
Head (metres)			
If the hydro plant you are des	scribing is entirely new	, how would yo	u characterise it?
O Seawater			
O Disused mine			
0	Other (please specify)		
How may years do you expe	ect for each phase for t	the hydro projec	ct you are describing?
	Years		Months
Development (pre- construction)			
Construction			
How often would you expect Project to occur?	t your hydro project to	need such a N	lajor Refurbishment
On average, what proportion Australian suppliers for proje number between 0 & 100).			
		%	
Pipes			
Valves			
Pumps/ turbines			
Generators/ motors			
Transformers			
Cabling			
Cement			
Steel reinforcing			
Software			

	70
Other - please list any other components you purchase from Australian suppliers and the approximate percentage for each one that you source on-shore	

APPENDIX 5 HYDRO SURVEY

Please list your main Australian suppliers you might expect to use, if you feel comfortable doing so (we would like to ask them about employment in manufacturing and supply).

Pipes	
Valves	
Pumps/ turbines	
Generators/ motors	
Transformers	
Cabling	
Cement	
Steel reinforcing	
\${q://QID84/ChoiceTextEntryValue/9}	

Job Types

We are now going to ask questions about the number of workers, on average, you would expect to be engaged per year for the typical hydro project:

- managers & administrators;
- professionals;
- technicians & trades; and
- machine operators, drivers & labourers.

Please read through the full list of jobs below before answering as it will make it easier to place jobs, and include both employees and contractors.

APPENDIX 5 HYDRO SURVEY

On average, how many Managers and Administrative support staff would you expect to be engaged per year for your typical hydro project. Please enter:

- the number of full time equivalent (FTE) jobs (including contractors) you would expect to be engaged per year for your typical hydro project; and
- the percentage of jobs you expect to be local to the site (local is defined as within 100km of the project).

Note to be defined as a manager they should usually have internal staff that report to them.

	Managers & administrative jobs	% of workers local to the project (defined as within 100 km)
Development		
Construction		
O&M / maintenance/ asset management		

For each of the following Managerial & Administrative jobs, please enter the number of full time equivalent (FTE) jobs (including contractors) you would expect to be engaged per year for your typical hydro project.

	Development	Construction (includes O&M major refurb)	Operations and Maintentance/ asset management
Executives/General Mangers			
HR, Finance & Business administration managers (etc)			
Commercial & Business Development Managers			
Construction / Project managers			
Site Managers			
Operations Managers			
Asset managers			
Other management jobs (please specify)			

		APPENDIX 5 HYDRO SURVEY Construction Operations and					
	Development	(includes O&M major refurb)					
Office managers/contract administrators	Development		management				
Project Control Officer							
Other administrative jobs							
(please specify)							
On average, how many Profe typical hydro project. Please - the number of full time equiv	enter:						
engaged per year for your typ			would expect to be				
- the percentage of jobs you e	expect to be local to the	he site (local is defined a	as within 100km of the				
project).							
		% of worke	ers local to the project				
	Professionals		as within 100 km)				
Development							
Construction							
O&M and/or Asset Management							
For each of the following Pequivalent (FTE) jobs (include for your hydro project							
	Development (pre financial close)	Construction	O&M and/or Asset Management				
HR, finance and accounting professionals							
Legal & planning assessment professionals							
Civil Engineer							
Mechanical Engineer							
Electrical engineers							
Grid Engineer							

	Development (pre	APPENDIX 5 H	HYDRO SURVEY O&M and/or Asset
	financial close)	Construction	Management
Scada Engineers			
Surveyors			
Land developers			
GIS Specialist			
Environment, Health & Safety professionals			
Community engagement			
Power plant/control room operator			
Transport & Logistics			
Sales & trading			
Other professionals (please specify)			
engaged per year for your typ - the percentage of jobs you e project).		site (local is defined	as within 100km of the
	Trades & Technicians		ers local to the project I as within 100 km)
Development			
Construction			
O&M or asset Management			
For each of the following Tr equivalent (FTE) jobs (includ for your typical hydro projed	ding contractors) you v	•	
			O&M or asset

Development

Construction

management

		APPENDIX 5 H	IYDRO SURVEY O&M or asset
	Development	Construction	management
Electrical technician (e.g. grid commissioning)			
SCADA technician			
Civil engineering technician			
Site supervisors			
Other technicians (please specify)			
Electricians			
Plumbers			
Carpenters			
Metal trades			
Other trades (please specify)			
On average, how many Mac to be engaged per year for y - the number of full time equal to be engaged per year for y	our typical hydro pro uivalent (FTE) jobs (ir	oject. Please enter:	
- the percentage of jobs you	u expect to be local	to the site (local is d	efined as within
N	Machine operators, drivers		ers local to the project as within 100 km)
Development			
Construction			
O&M or asset management			

For each of the following Machine Operator, Driver and Labourer jobs, please enter the number of full time equivalent (FTE) jobs (including contractors) you would expect to be engaged per year for your typical hydro project

			Cana	hw . atla.	برام مار	daa O		ENDIX	5 HY[DRO S	URVEY
			Cons		n (inclu or refur		&IVI	0&l	M or as	sset ma	anagement
Crane Hoist Operators											
Earthmoving, grader operations											
Forklift operators											
Drivers (trucks, vans)											
Other drivers & machin operators (please spec		l									
Concreters				Ļ							
Riggers				L							
Dogmen											
Mechanical labourers											
Civil labourers/trades- assistants											
Electrical trade assista	nts										
General labourers											
Steel fixers											
Other labourers (please specify)	9	1									
For the project you'v were able to capture	-	t be	en de:	scribir	ng, wh	at pro	portio	n of jo	bs do	you tl	nink you
	None	e of tl	nem					All of	them		
()	10	20	30	40	50	60	70	80	90	100
» Manufacturing											
» Development (pre- financial close)											
» Construction (civil work)											
Construction (electrical)											

» Construction (mechanical)

» Operation & Maintenance (including asset management)		
» Rehabilitation / refurbishment major projects		
•		•
Please give us any additiona include.	al information about the types of jobs you weren't able to	
	/	
Employment for a second I	hydro project	
Would you like to answer quality (There won't be as much d	uestions for a second hydro project? etail as for the last one)	
Yes	No	
O	O	
How many MW is your seco	and project ?	1
Is it a refurbishment of an ex	xisting scheme, an extension , or entirely new?	
Major rehabilitation/ refurbi	ishment (please note which hydro it is refurbishing)	
0	Extension (please specify which hydro it extends)	
\bigcirc	New	

None of them

10 20 30 40 50

0

APPENDIX 5 HYDRO SURVEY

90 100

60 70 80

APPENDIX 5 HYDRO SURVEY

What are the major activities of t	:he project?
What is the type of project?	
O Pumped storage	
Generation	
O Both pumped storage & general	tion
Othe	er (please specify)
le the generation classest.	
Is the generation element:	
O Impoundment	
O Diversion	
O Run of river	
Othe	er (please specify)
How much storage is associated	d with the hydro, and what is the head?
	Storage
MWh	Ctorago
Head (metres)	
If the hydro plant you are describ	oing is entirely new, how would you characterise it?
O Seawater	
O Disused mine	
Othe	er (please specify)

APPENDIX 5 HYDRO SURVEY

How may years do you ex	pect for each phase for the h	ydro project you are describing?
Development (pre- construction) Construction	Years	Months
How often would you experience to occur?	ect your hydro project to need	d such a Major Refurbishment
Job Types for Second Hy	dro project	
		would you expect to be engaged of full time equivalent (FTE) jobs
Note to be defined as a m them.	anager they should usually ha	ave internal staff that report to
		% local to the project (defined as
Development Construction O&M / maintenance/ asset management	Managers & administrative jobs	within 100 km)
		et to be engaged per year for you e equivalent (FTE) jobs (including
Development Construction	Professionals	% local to the project (defined as within 100 km)

APPENDIX 5 HYDRO SURVEY % local to the project (defined as within 100 km)

		Р	rofession	onals				withir	100 k	km)	
O&M and/or Asset Management											
On average, how may year for your typical highest jobs (including contra	nydro pro					_	•				
Development Construction O&M or asset Management		Trade	es & Ted	chnicia	ıns	C	% local		projec 1 100 k	t (defined km)	as
On average, how material to be engaged per yellow equivalent (FTE) jobs	ear for yo	our typ	oical hy	ydro p				_			
Development Construction O&M or asset management	Ma	achine	operato labour		ivers &	C	% local		projec 100 ł	t (defined km)	as
For the project you've were able to capture	-	en de	scribin	g, wh	at pro	portio	n of jo	bs do	you t	hink you	
	None of t	:hem					All of	them			
() 10	20	30	40	50	60	70	80	90	100	
» Manufacturing											
» Development (pre- financial close)											
» Construction (civil work)											

Construction (mechanical)	
» Operation & Maintenance (including asset management)	
» Rehabilitation / refurbishment major projects	
Please give us any a include.	dditional information about the types of jobs you weren't able to
Wrap Up	
Are there any other whighlight?	vorkforce recruitment, skills or training issues you would like to
Can we contact you	again if we have follow up questions?

None of them

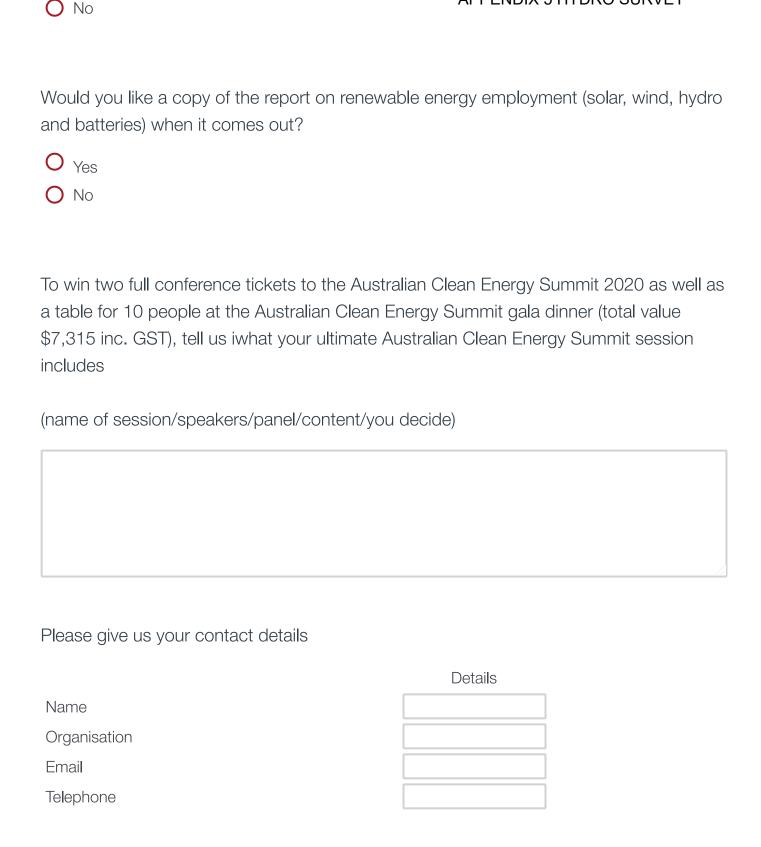
30 40 50

» Construction (electrical)

O Yes

APPENDIX 5 HYDRO SURVEY

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APPENDIX 5 HYDRO SURVI	_ `	Y



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