UTS Institute for Sustainable Futures

CLEAN ENERGY COUNCIL

# Renewable Energy Jobs in Australia 2020

## Stage one

June 2020

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# What we’re going to cover

- Study background, methodology and key findings
- Overall results – renewable energy jobs in Australia
- Employment and Skill Shortages by technology
- Local and regional jobs: the role of renewable energy jobs in energy transition
- Skill and Job Opportunities
- Discussion

# Background

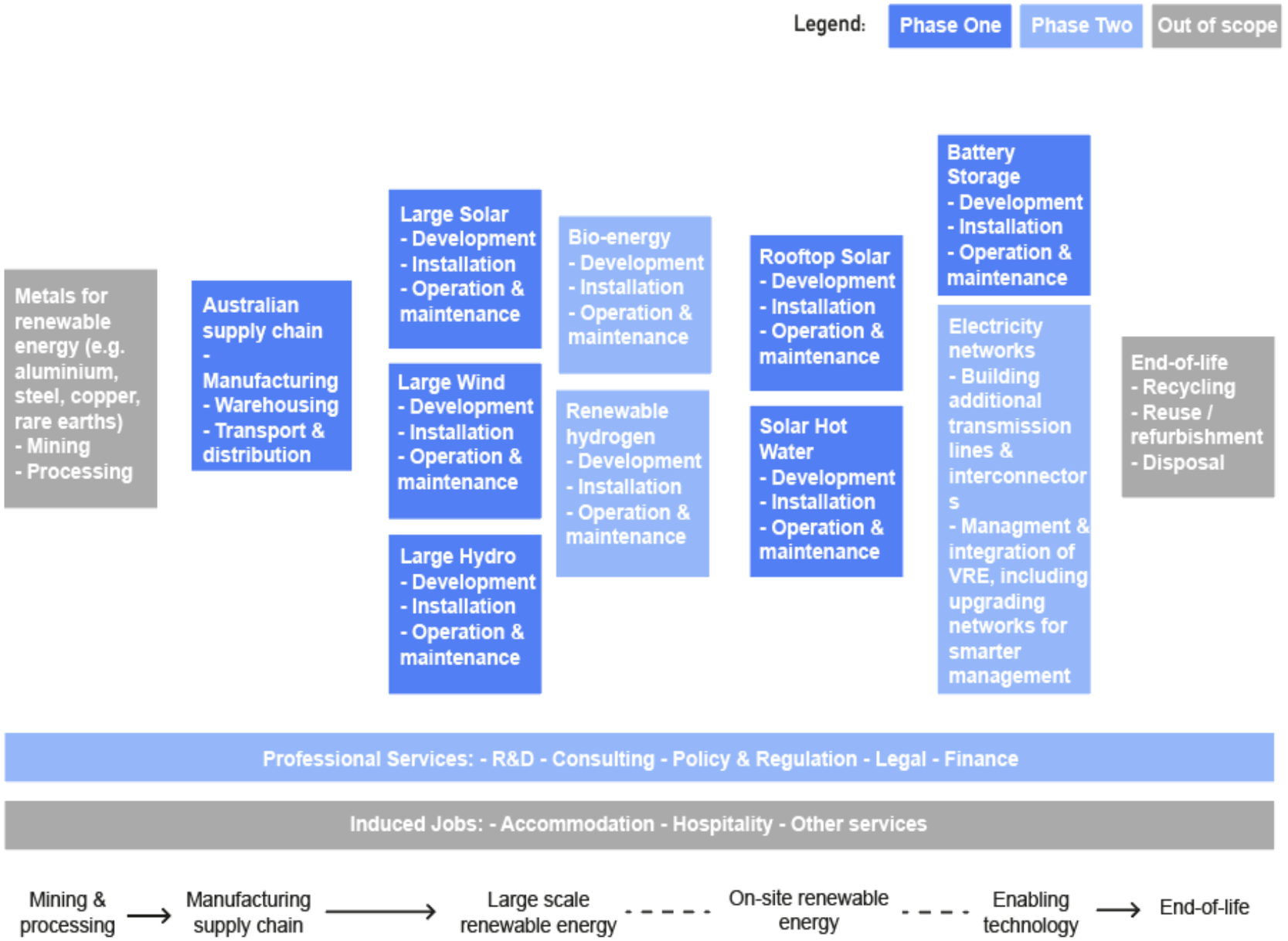
The first large-scale national survey of renewable energy jobs in Australia

**Objectives**

- Improve estimates and understanding of renewable energy employment
- Facilitate better workforce planning to avoid future skill shortages
- Identify opportunities for regional jobs and managing energy transition

# Scope of study

1. Major technologies only – solar, wind, hydro and batteries
2. All direct jobs (development, construction/installation, O&M, manufacturing)
3. Some indirect jobs are included (transport, warehousing) but not professional services or R&D
4. Induced jobs are not included (e.g. expenditure of construction workers in regional towns)



# Methodology

| | | | |
|---|---|---|---|
|  |  |  |  |
| **01: Industry Surveys**<br><br>• Workforce numbers and project capacity<br><br>• Business characteristics<br><br>• Contracting arrangements<br><br>• Skill shortages, recruitment and workforce issues | **02: Derive employment factors**<br><br>• Employment factors from surveys (job years/MW and jobs/MW)<br><br>• Detailed occupational breakdowns derived from surveys<br><br>• International Renewable Energy Agency and other data used for gaps in employment factors | **03: Employment Calculations**<br><br>• Employment factors applied to AEMO ISP renewable energy scenarios (for NEM) plus derived scenario for WA<br><br>• Annual capacity increase used for construction & supply chain, cumulative capacity for O&M<br><br>• Decline factor applied to all EFs to allow for technology cost reductions<br><br>• State & regional projections from AEMO Renewable Energy Zone scenarios | **04: Skill Shortages**<br><br>• Surveys on recruitment experiences (high, medium, low difficulty)<br><br>• Surveys on causes for high and medium recruitment difficulty<br><br>• Qualitative data from respondents on workforce and skill issues |

# Industry Surveys - coverage

| | Number of respondents | Capacity | Proportion of Australian capacity |
|---|---|---|---|
| **Solar Farms** | 14 | 5.1 GW (development)<br>2.0 GW (construction)<br>2.7 GW (O&M) | 46% (construction)<br>51% (O&M) |
| **Wind Farms** | 18 | 11.1 GW (development)<br>3.7 GW (construction)<br>6.3 GW (O&M) | 87% (construction)<br>74% (O&M) |
| **Distributed Solar PV** | 152 | 254 MW | 13% (construction)<br>9% (O&M) |
| **Pumped hydro** | 5 | 2.4 GW (development)<br>2.2 GW (construction)<br>3.1 GW (O&M) | Respondents approx. 80% of current hydro capacity |
| **Solar water heating** | 8 | 756 systems | 1% (installation) |
| **Batteries** | 47 | 9.6 MW (installation)<br>37.2 MW (O&M) | **Residential data only**:<br>Approx. 21% (installation)<br>Approx. 24% (O&M) |
| **Solar - Supply Chain** | 17 | 6.5 GW | |
| **Wind - Supply Chain** | 5 | 2.1 GW | |

# Employment factors

| | Design & Construction | Manufacturing | Australian manufacturing | Operations & maintenance |
|---|---|---|---|---|
| | Job-years/MW | | | Jobs/MW |
| **Wind** | 2.8 | 1.7 [2] | 0.377 | 0.22 |
| **Utility Solar** | 2.3 | 4.4 [2] | 0.092 | 0.11 |
| **Rooftop PV** | 5.8 | 4.4 [2] | 0.153 | 0.16 |
| **Utility batteries** | 4.7 | 6.6 | 0.331 | 1.20 |
| **Distributed batteries** | 5.6 | 6.6 | 0.331 | 0.29 |
| **Hydro** | 7.4 [1] | 3.5 [1] | 0.699 | 0.14 |
| **Pumped hydro** | 7.2 | 3.5 [1] | 0.699 | 0.08 |
| | Job-years/ system | | | |
| **Solar water heating** | 0.015 | n/a | 0.0021 [3] | - |

***All factors derived for this work except:*** *Note 1: Factor from previous work, Rutovitz et al, 2015: Note 2: Factor from IRENA, 2017; Note 3: Australian Bureau of Statistics, 2019*

# Key findings

Renewable energy can develop a workforce the size of coal mining – but needs the right policy support to provide certainty and increase local employment

1. **Under AEMO scenarios, there are very different trajectories in short-run (a peak of 45,000 jobs and a low of 15,000), highlighting the importance of including renewable energy in our Covid response**

2. **Renewable energy will provide an increasing proportion of on-going work across a diverse range of jobs - especially trades & technicians, professionals and labourers – led by distributed PV and wind farms.**

3. **Renewable energy experienced significant skill shortages and recruitment difficulties across blue and white-collar jobs during boom conditions**

4. **Under AEMO's growth scenarios, renewables jobs peaks at ~45,000 jobs - comparable to all coal mining and much higher than the domestic coal sector**

5. **The location and occupational mix of renewable jobs illustrates it could play a meaningful role in providing alternative employment – but only within an industry development plan to diversify coal regional economies**

6. **There are significant opportunities for better coordination & planning to improve employment outcomes e.g. Renewable Energy Zones**

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# Overall employment results

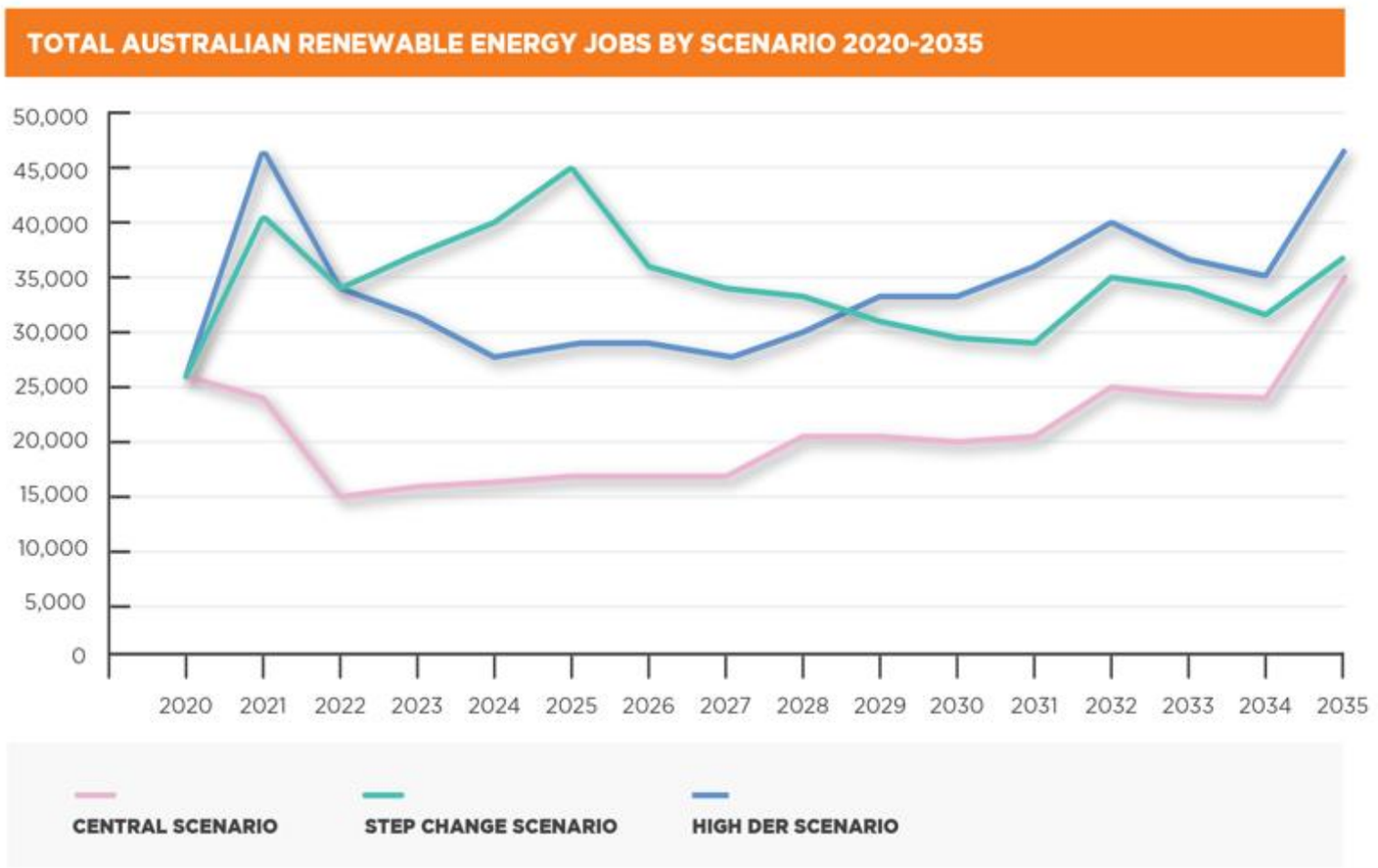
# How many Renewable Energy jobs?

There are different trajectories for RE jobs based on AEMO scenarios:

1. Under the **Central Scenario** (i.e. BAU), jobs fall from 26,000 to 15,000 before plateauing for five years, followed by steady growth. Jobs average **21,000** across the period.

2. Under the **Step Change scenario**, jobs peak ~45,000, and then drop before further coal retirements occur from the late 2020s. Jobs average **34,400** across the period.

3. **High DER** grows strongly early 2020s – also falls away but resumes steady growth to reach over 45,000 by 2035. Jobs average **33,900** across the period.

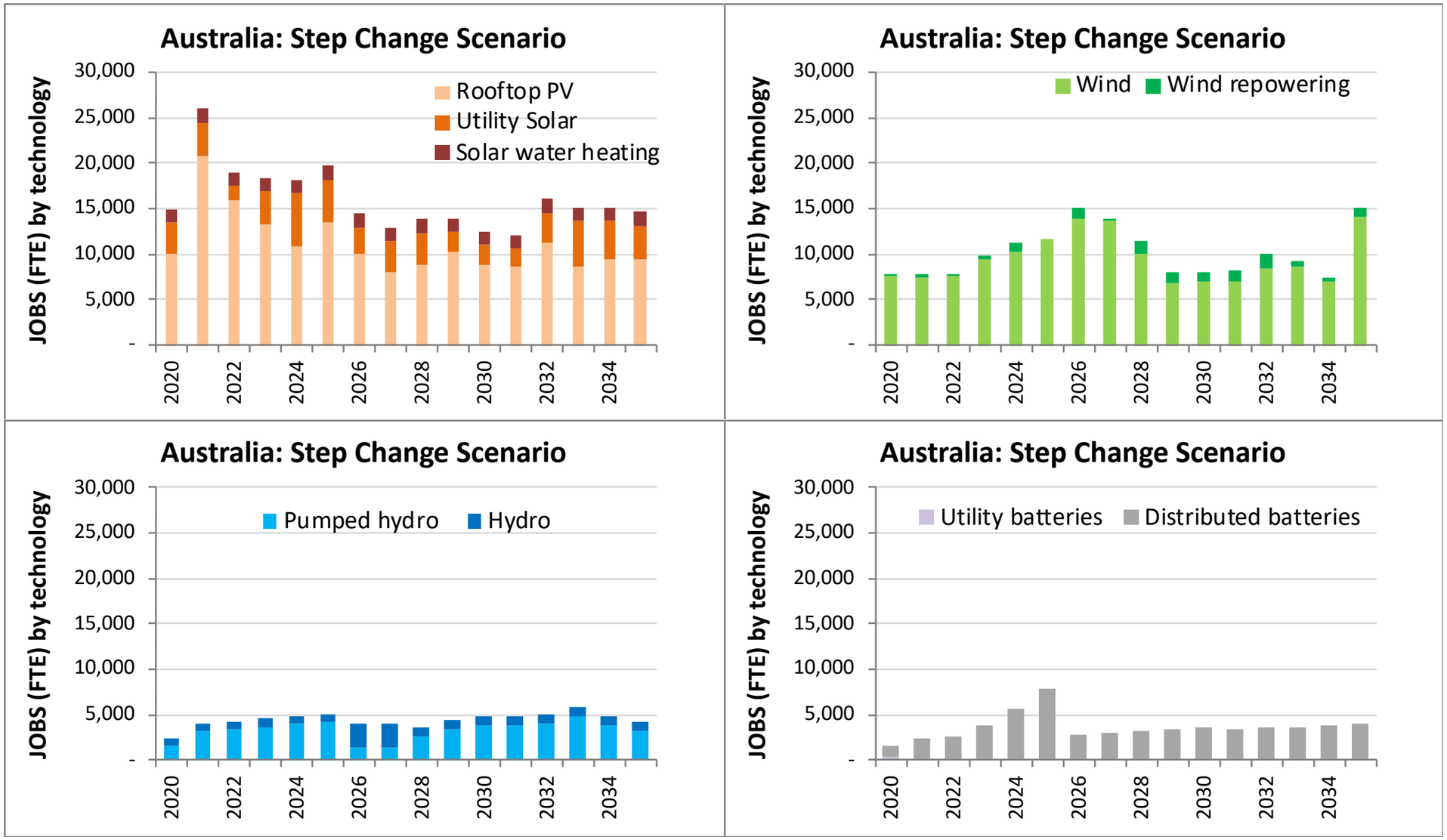



**Central: BAU (i.e. existing policy)**

**Step-change:** de-carbonisation broadly consistent with Paris agreement; 40% less cumulative emissions than BAU by 2040)

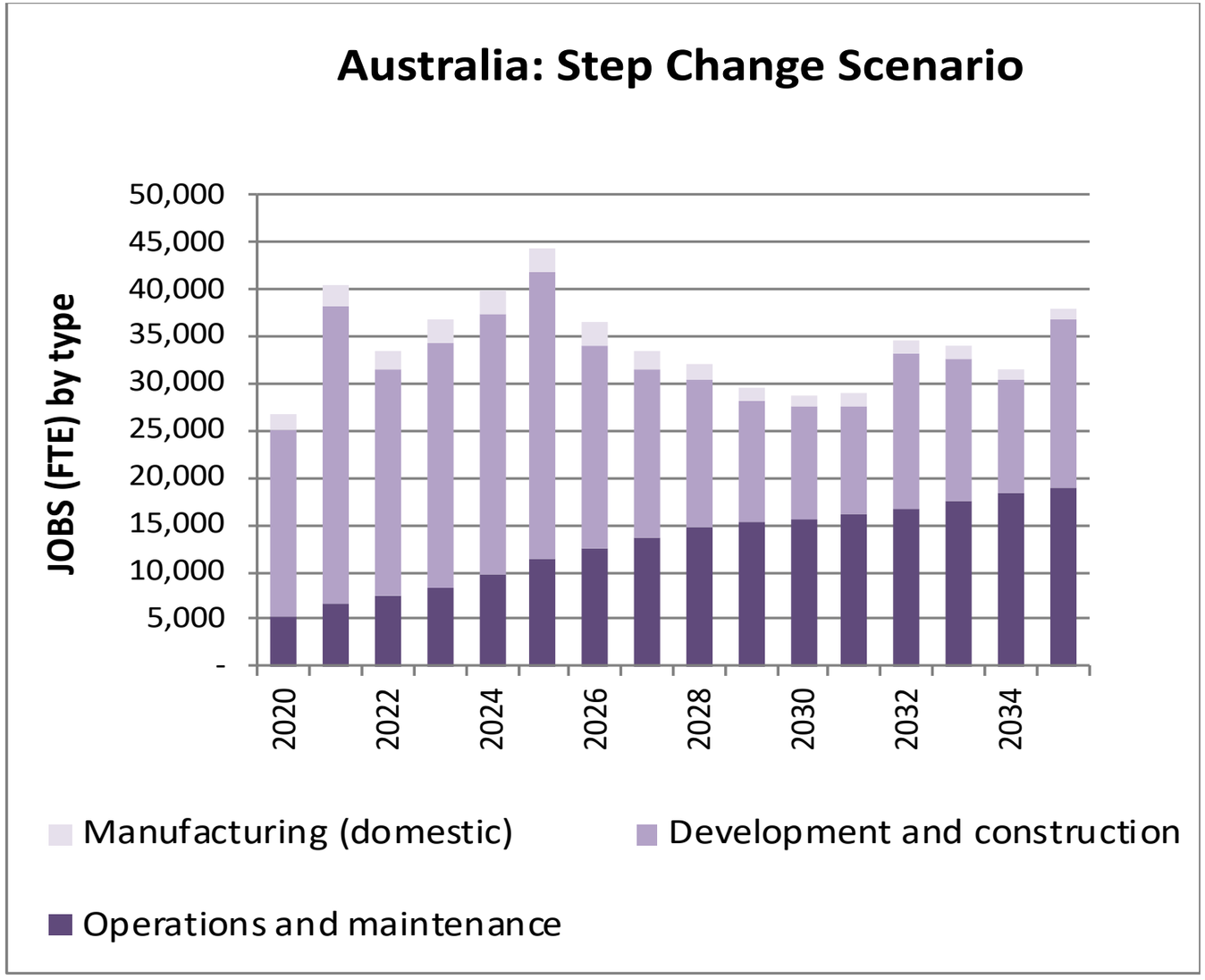
**High DER:** high proportion of distributed renewable energy; 2% less cumulative emissions than BAU by 2040

# Jobs growth by technology

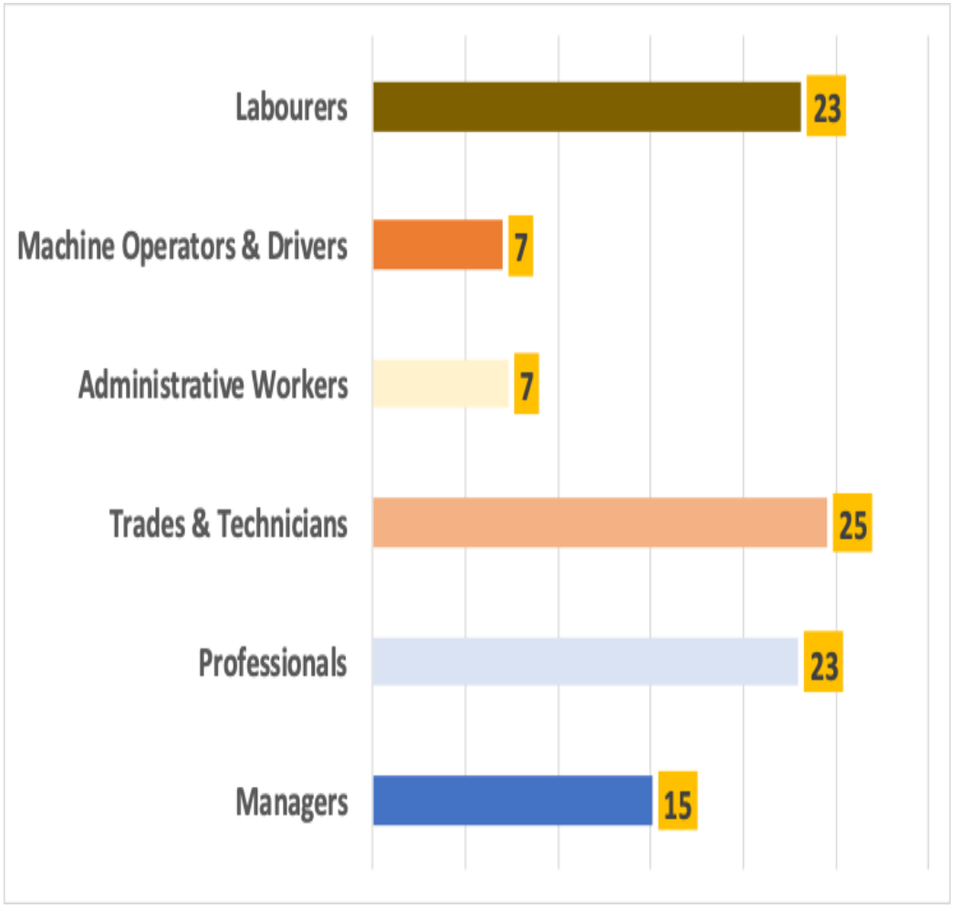


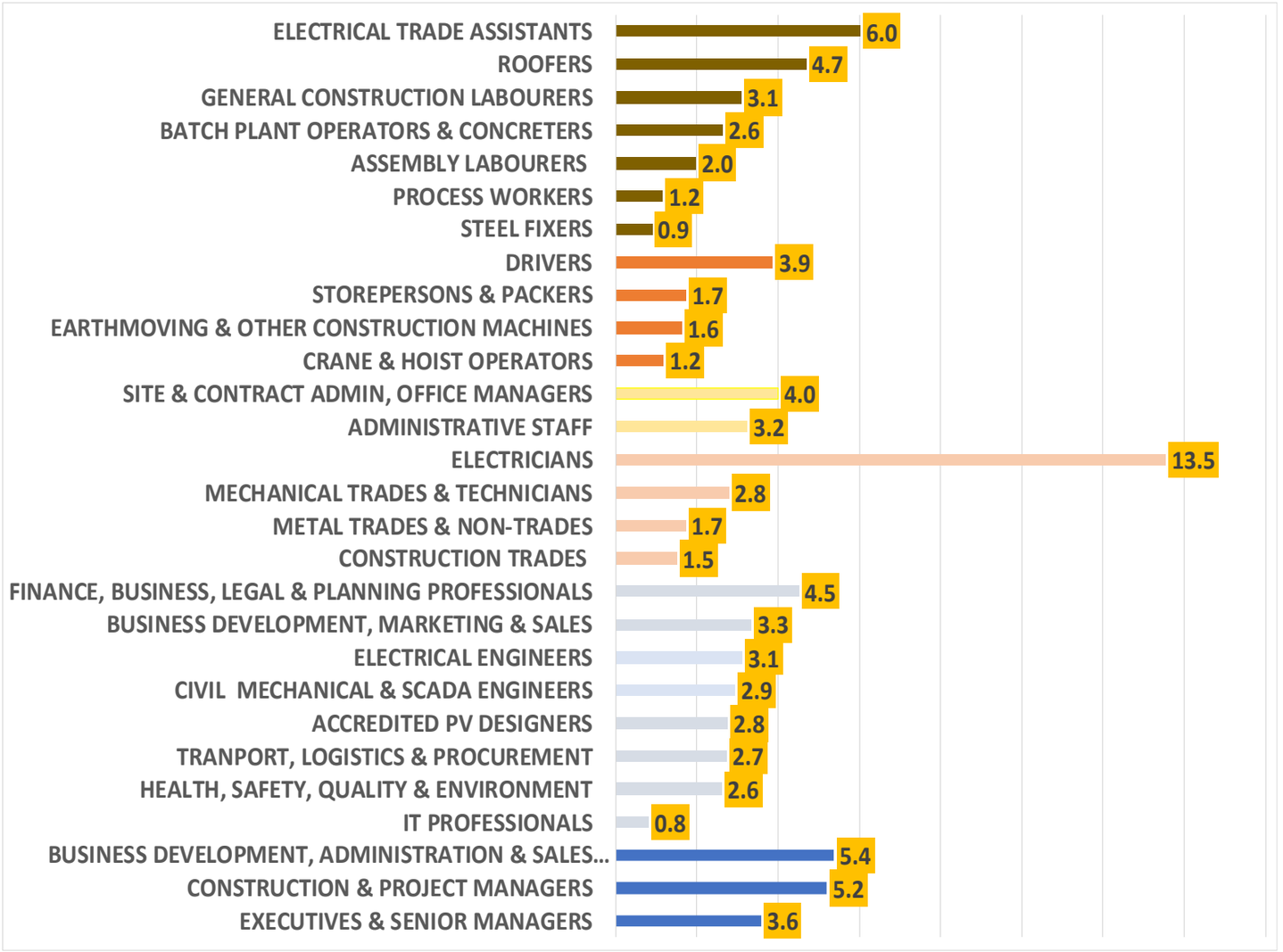
# O&M jobs will grow in importance

- By 2035, O&M jobs could be as high as half of renewable energy jobs
- Trend driven by wind farms (good quality blue-collar jobs) and also growing trend in rooftop solar
- The Step Change scenario performs best: ~50%
  - High DER (45%)
  - Central scenario (1/3)



# What are the key occupations across renewable energy (%)?




Note: the figures are an average for each occupation in the Step Change Scenario 2020-2035

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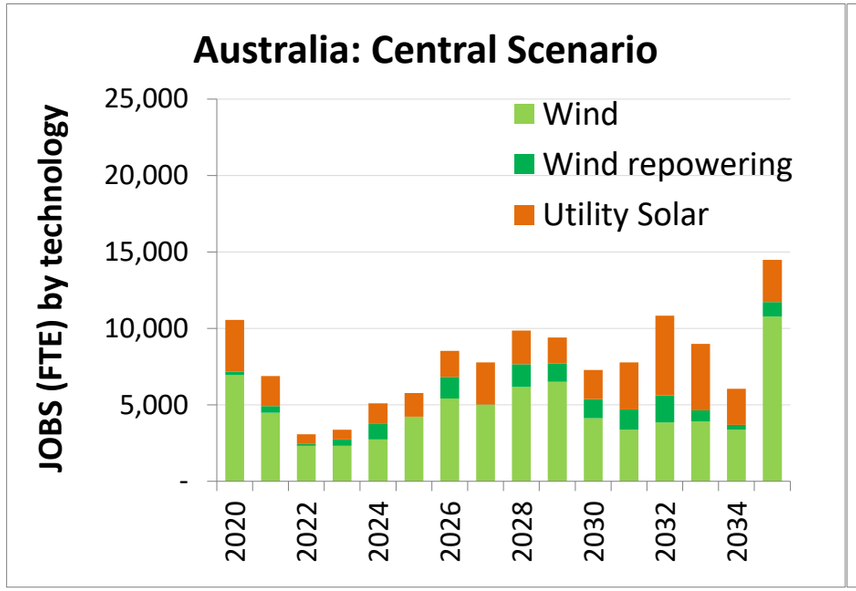
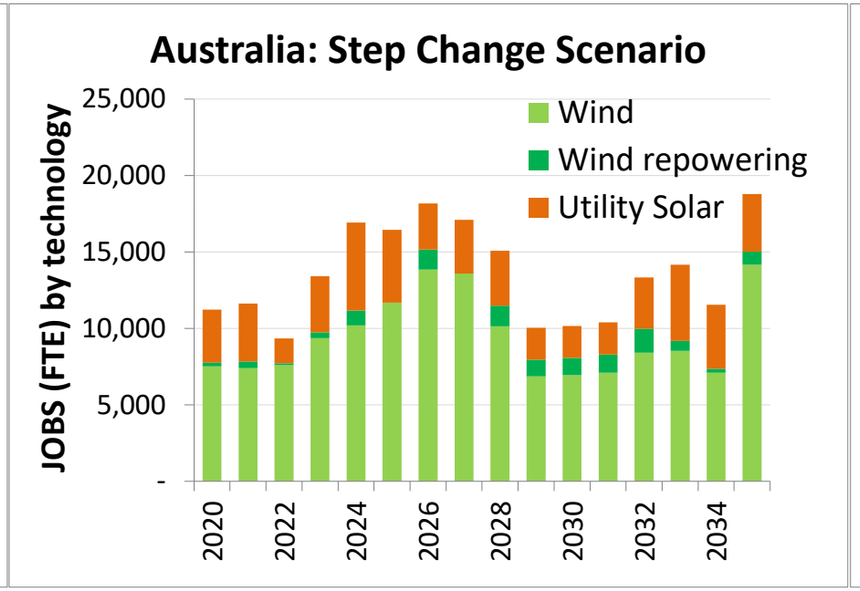
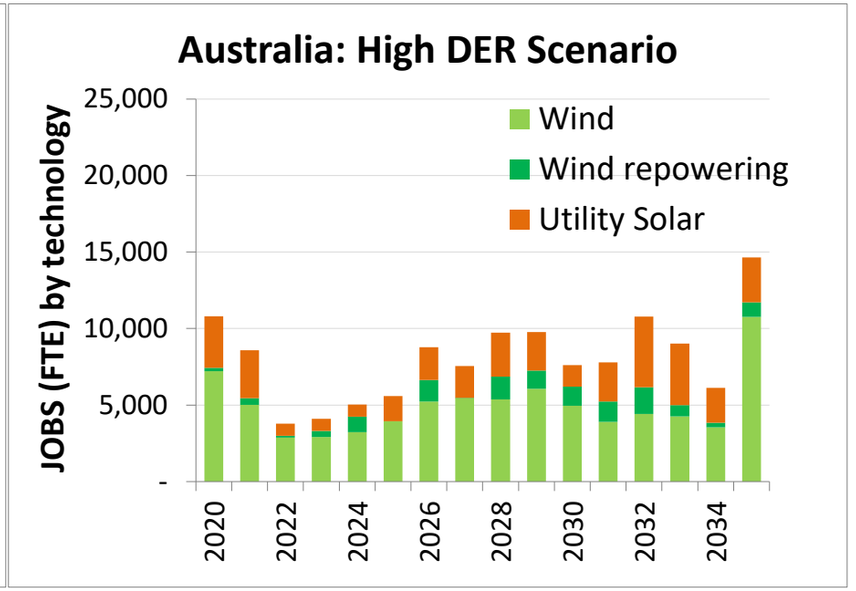
# Employment by technology

a) Utility wind and solar
b) Distributed solar
c) Batteries and
d) Hydro

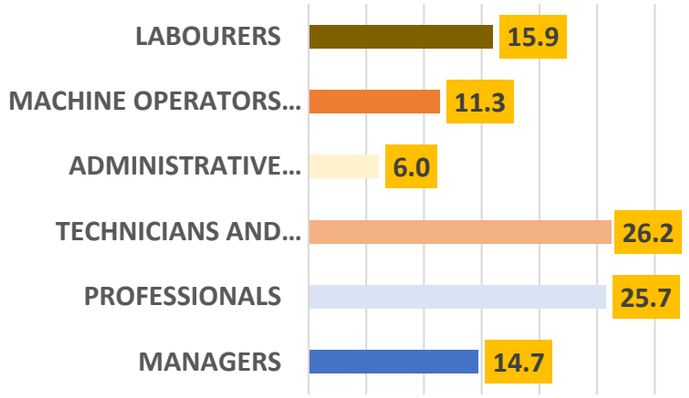
# A) Employment in Wind and Solar Farms - total jobs by scenario

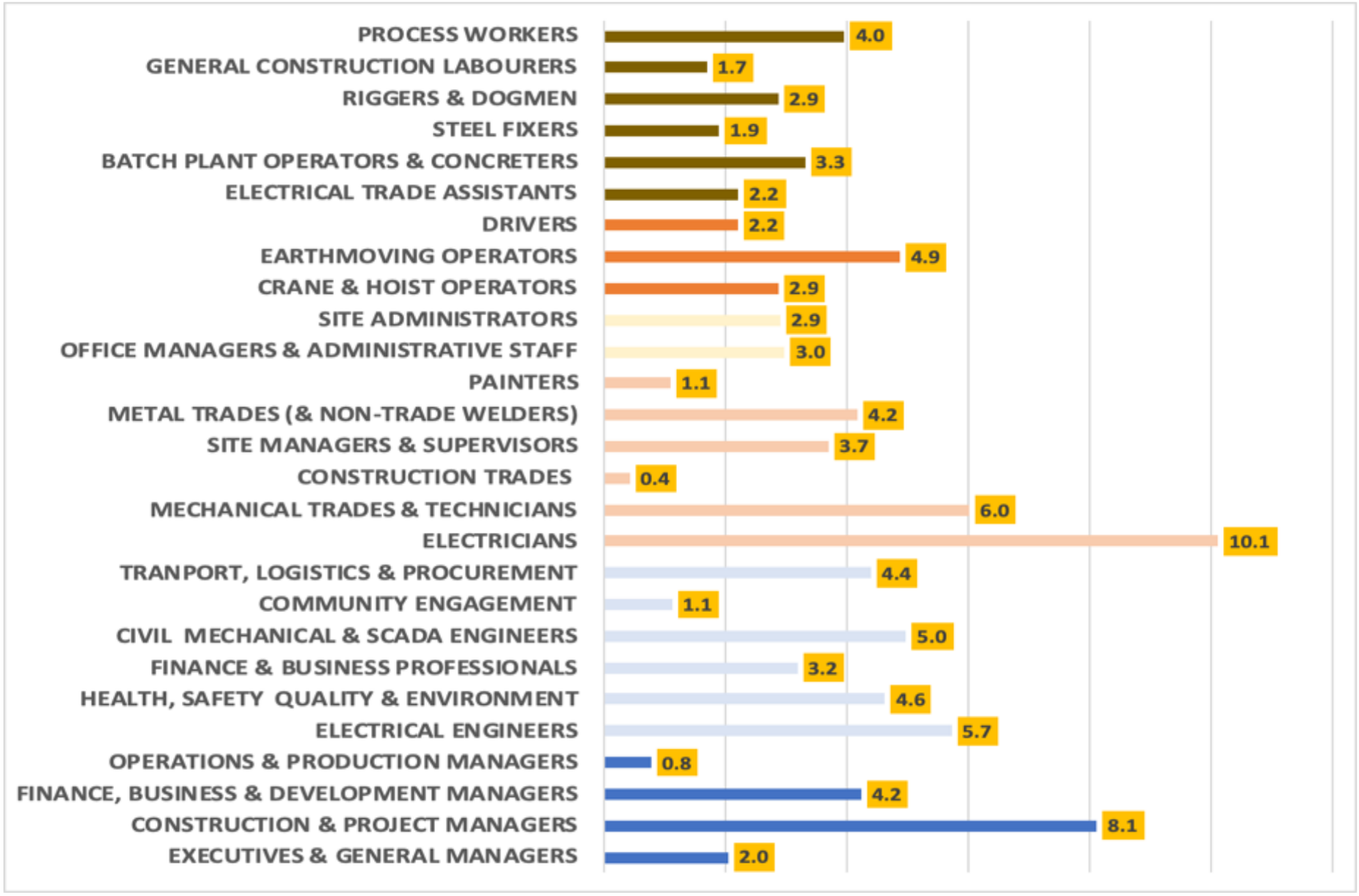


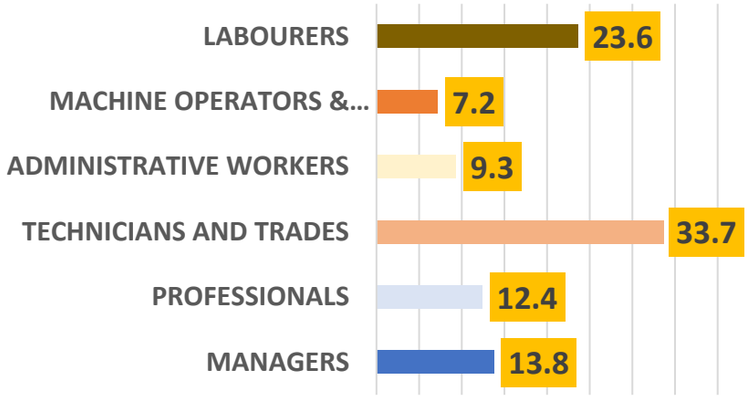
# What are the key occupations for wind farms (%)?

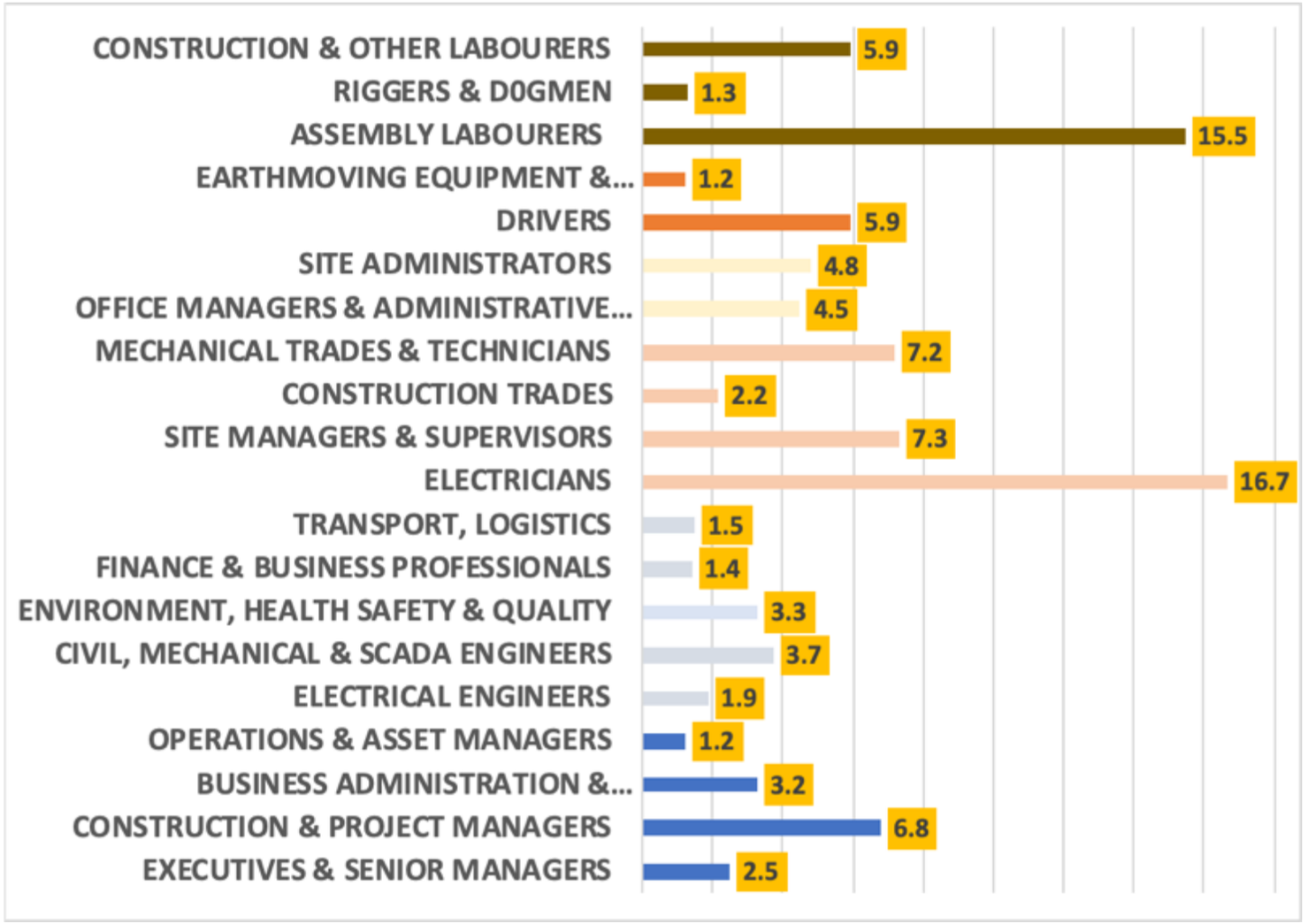


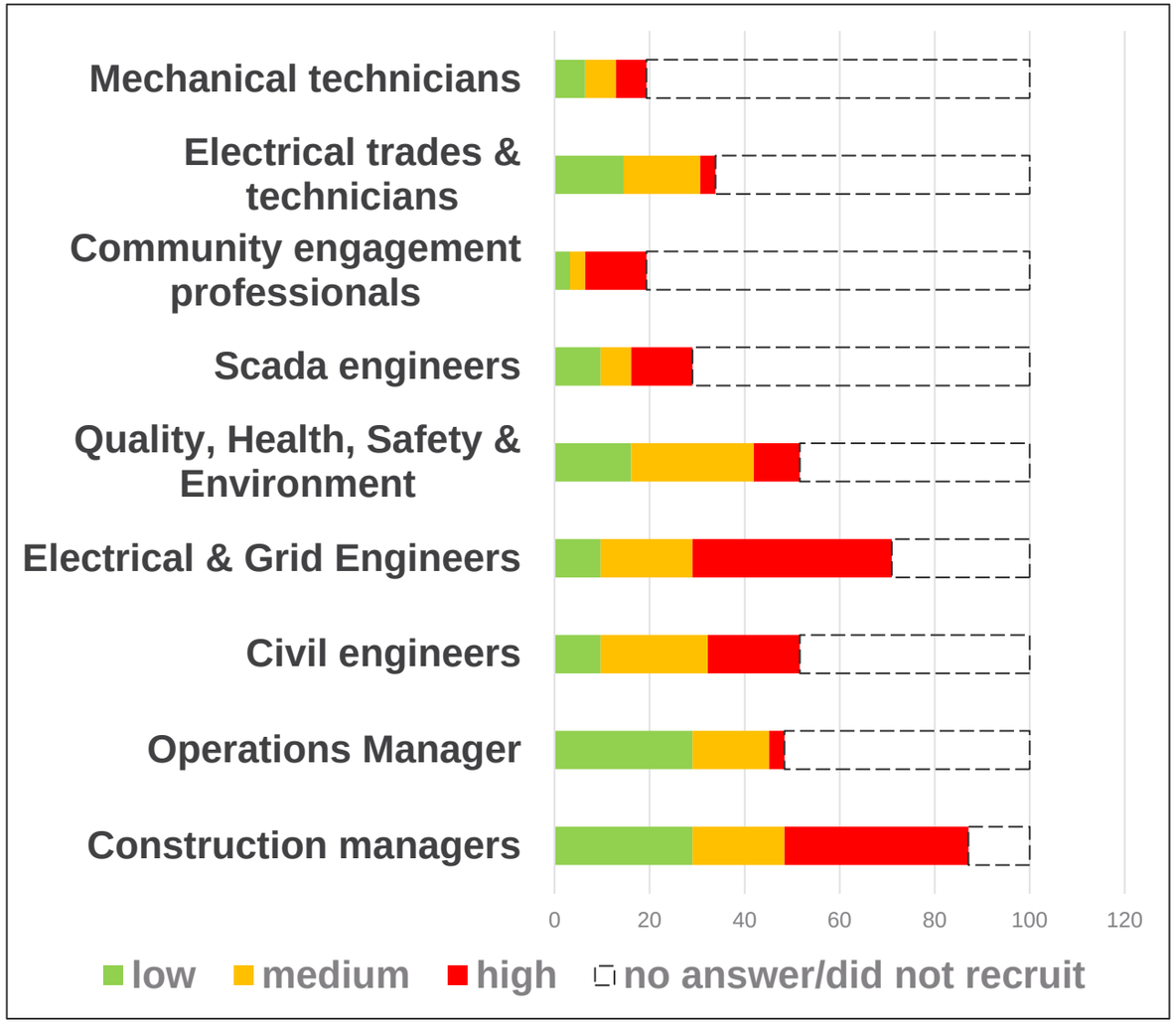
# What are the key occupations for solar farms?

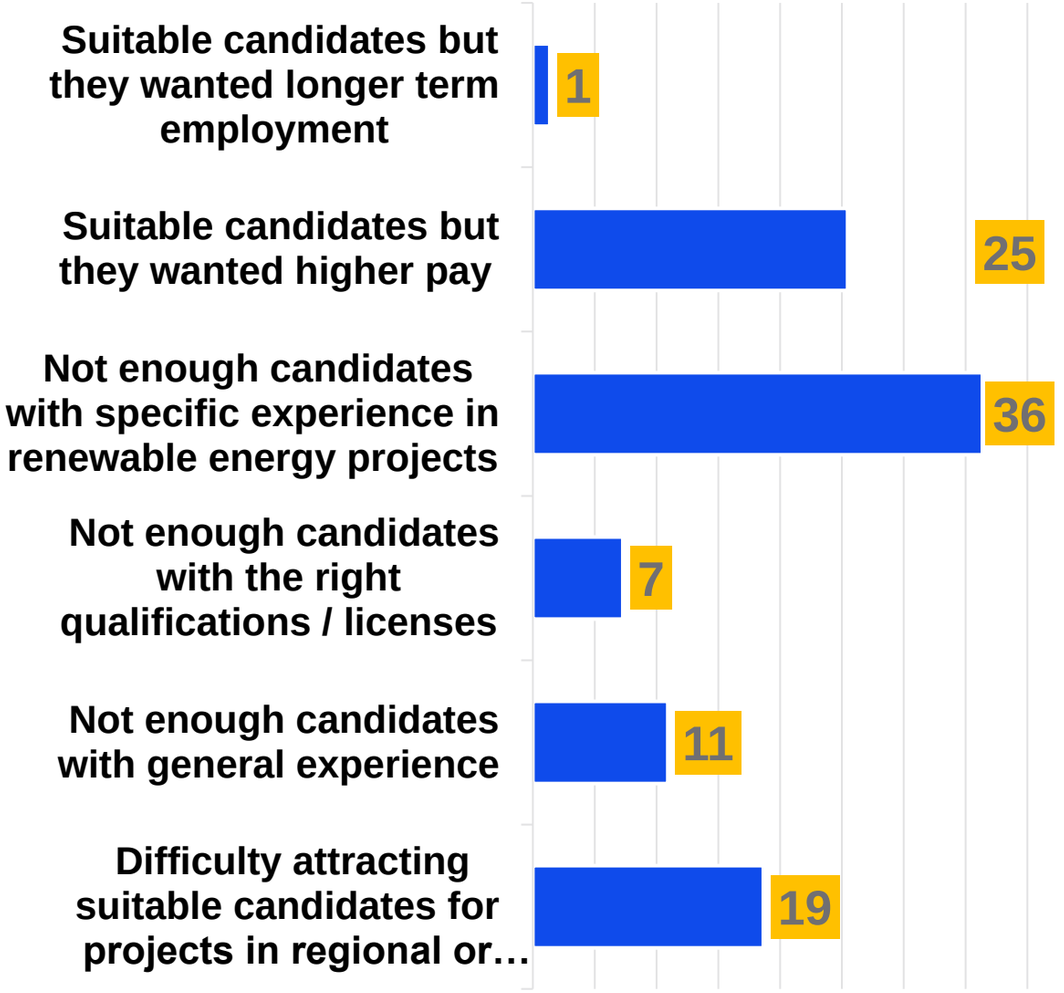
## Less diverse than wind farms – higher proportion of electricians and labourers



# Skill shortages – wind and solar Farms

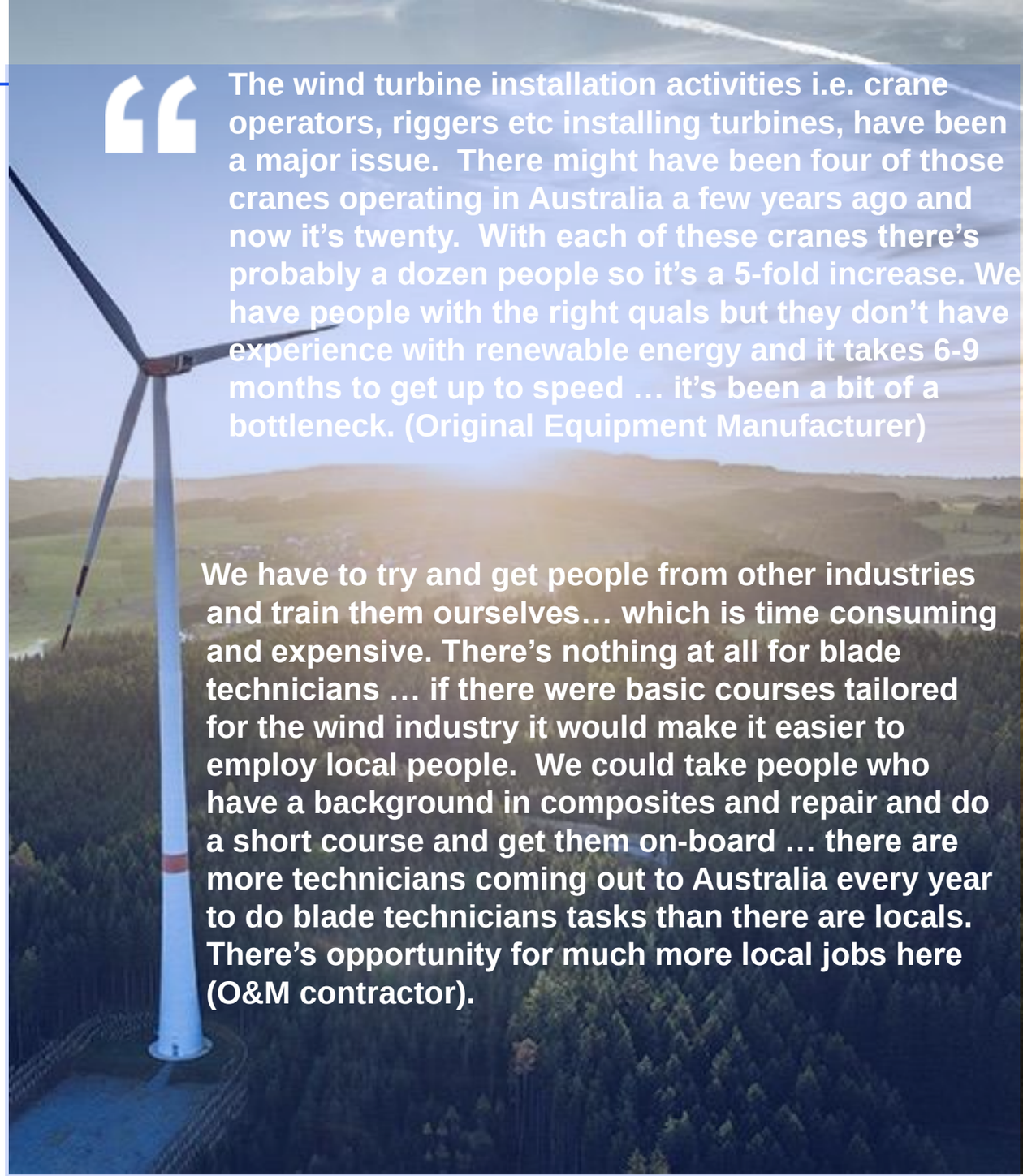


# Skills issues – construction & O&M

There are some shortages and bottlenecks that don't show up in an industry-wide survey

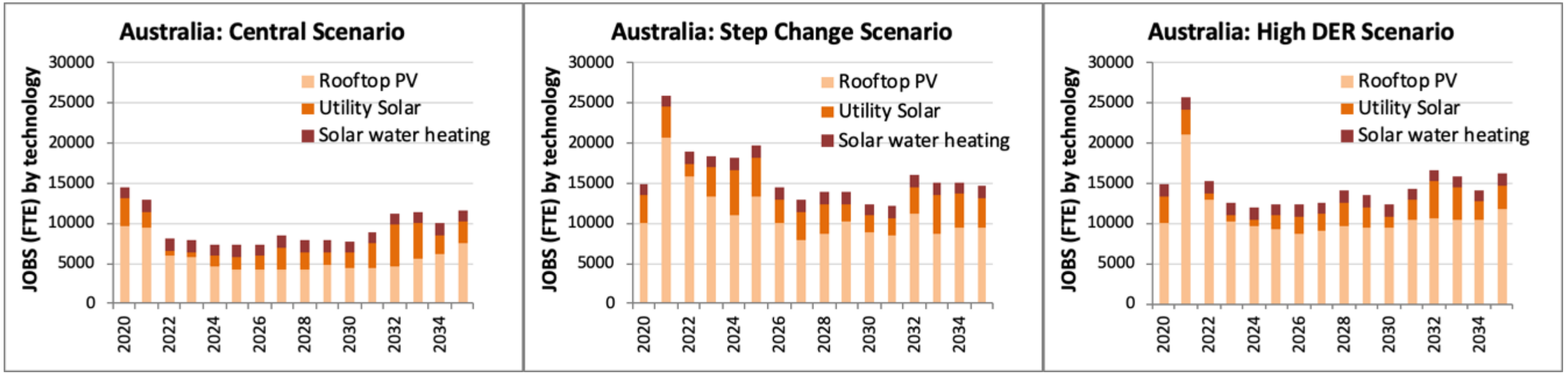
- High cranes and operators
- Truck drivers and escorts to transport blades, towers etc - up to 2 years to train them, loss of workers to higher-paying resource sector
- Notably very few respondents had issues recruiting construction trades and labourers
- Major issue in O&M with wind farm technicians – especially blade technicians: training opportunity to increase local supply good-quality b/c jobs



**"The wind turbine installation activities i.e. crane operators, riggers etc installing turbines, have been a major issue. There might have been four of those cranes operating in Australia a few years ago and now it's twenty. With each of these cranes there's probably a dozen people so it's a 5-fold increase. We have people with the right quals but they don't have experience with renewable energy and it takes 6-9 months to get up to speed … it's been a bit of a bottleneck. (Original Equipment Manufacturer)**

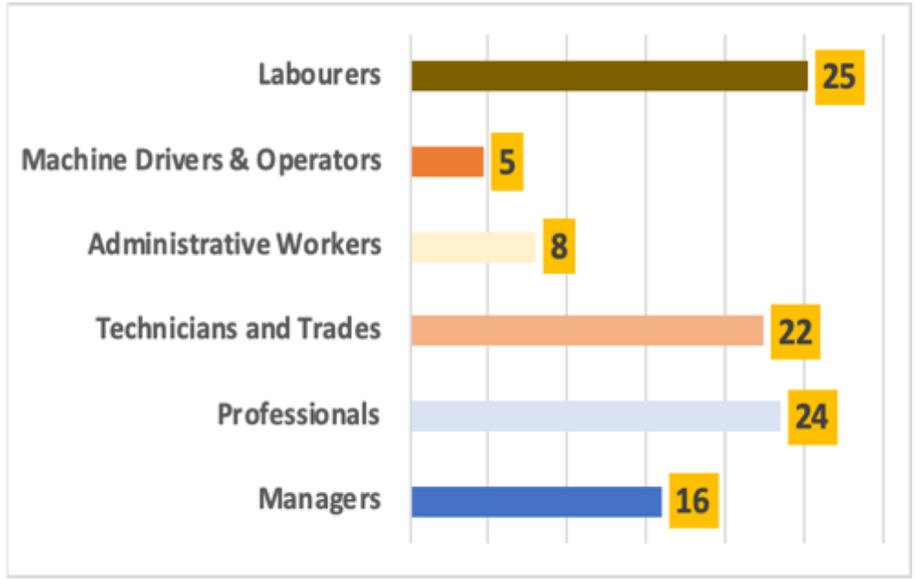
**We have to try and get people from other industries and train them ourselves… which is time consuming and expensive. There's nothing at all for blade technicians … if there were basic courses tailored for the wind industry it would make it easier to employ local people. We could take people who have a background in composites and repair and do a short course and get them on-board … there are more technicians coming out to Australia every year to do blade technicians tasks than there are locals. There's opportunity for much more local jobs here (O&M contractor).**

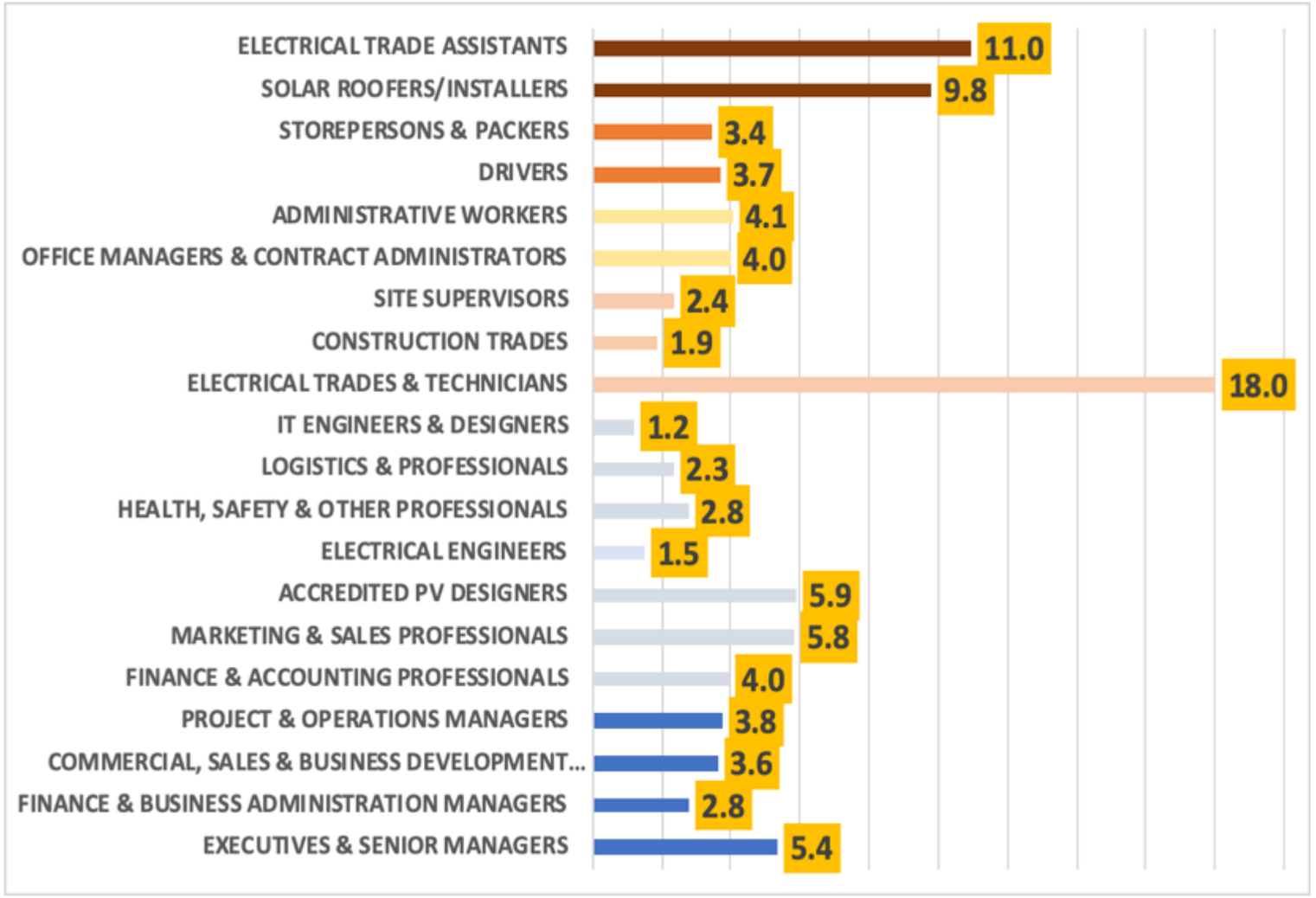
# B) Distributed Solar PV – employment



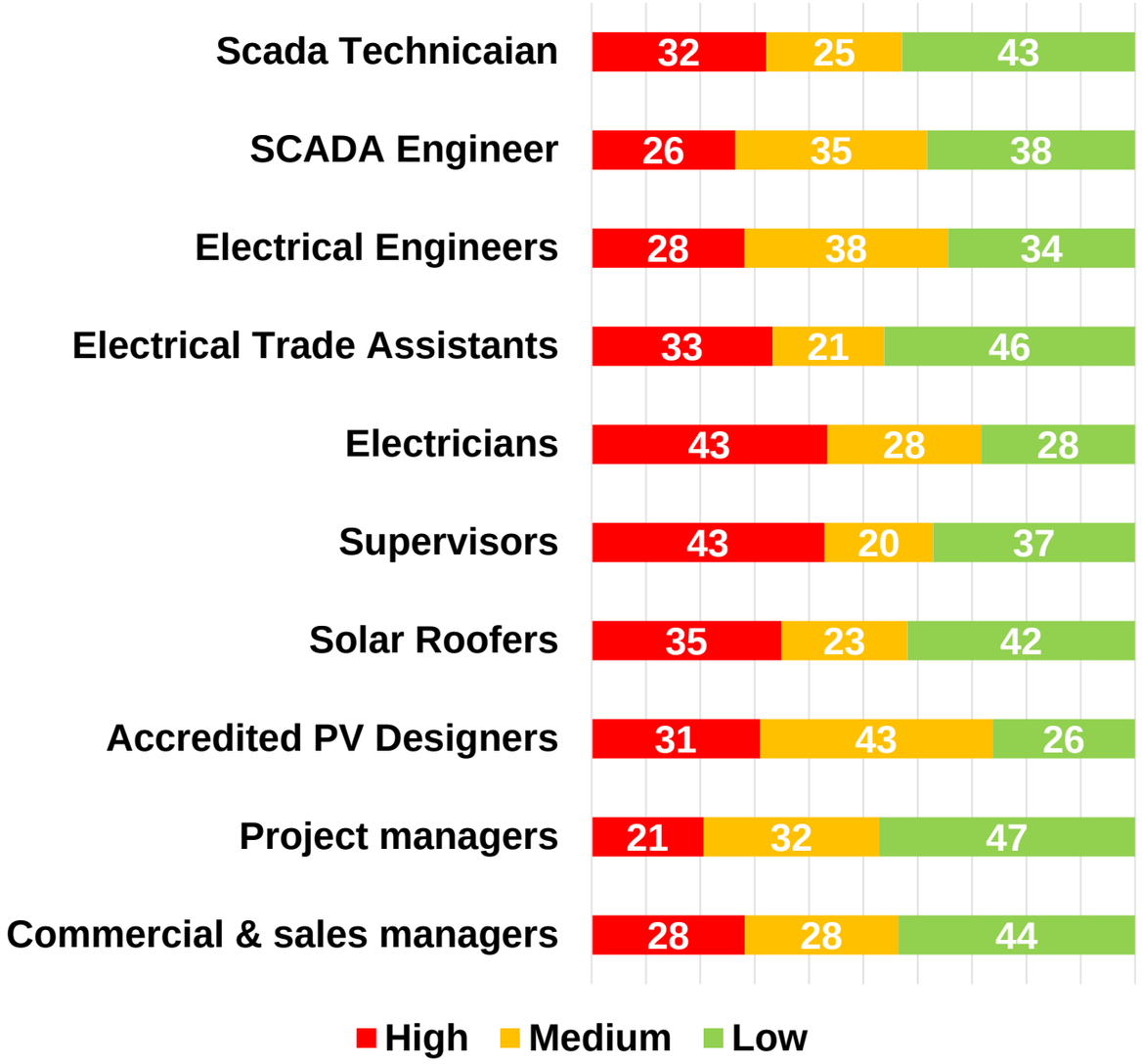

- Distributed solar is the largest contributor to solar employment and renewable jobs
- Wholesalers, transport and distribution employs more people than manufacturing which is low in Australia
- C&I is less labour intensive than residential PV

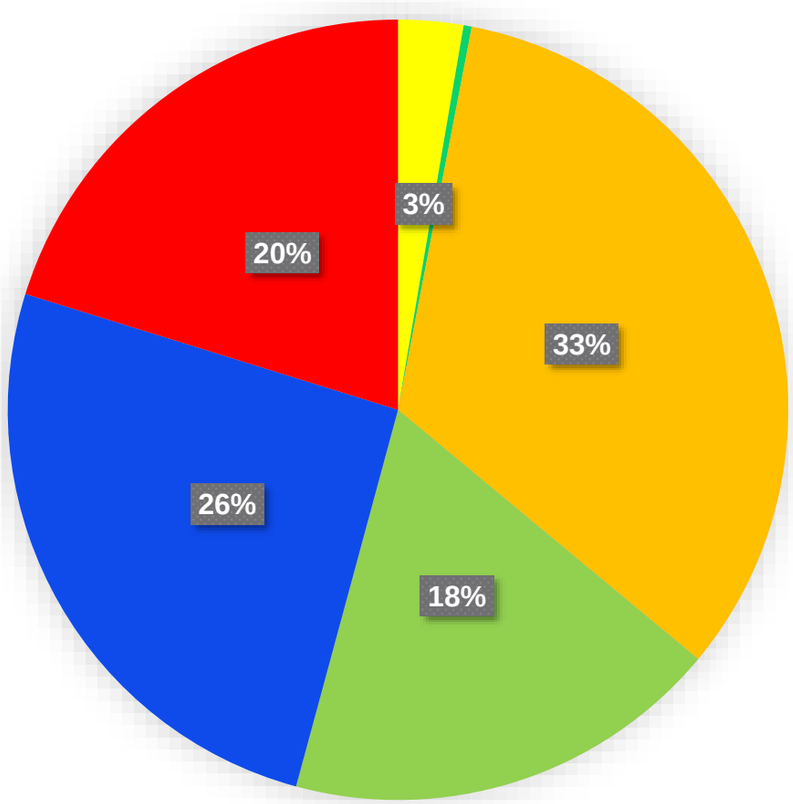
# Distributed Solar PV – Occupational Mix (%)



# Skill Shortages – Solar PV

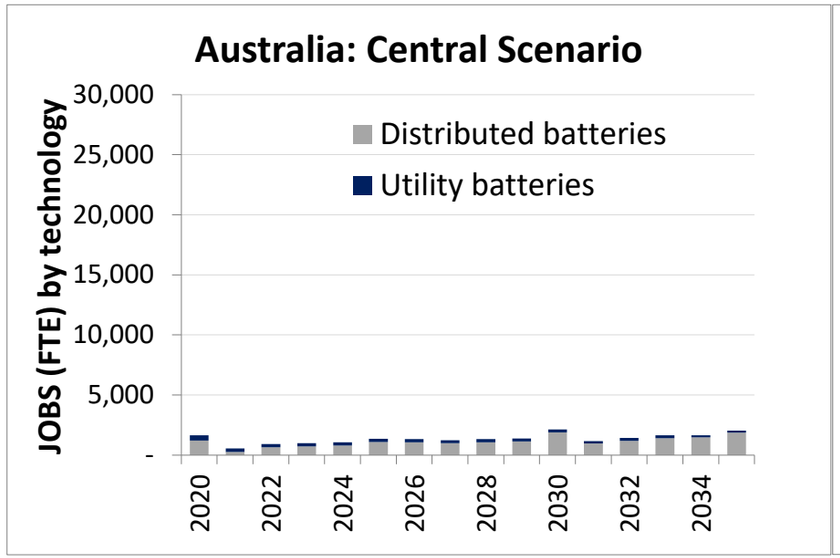


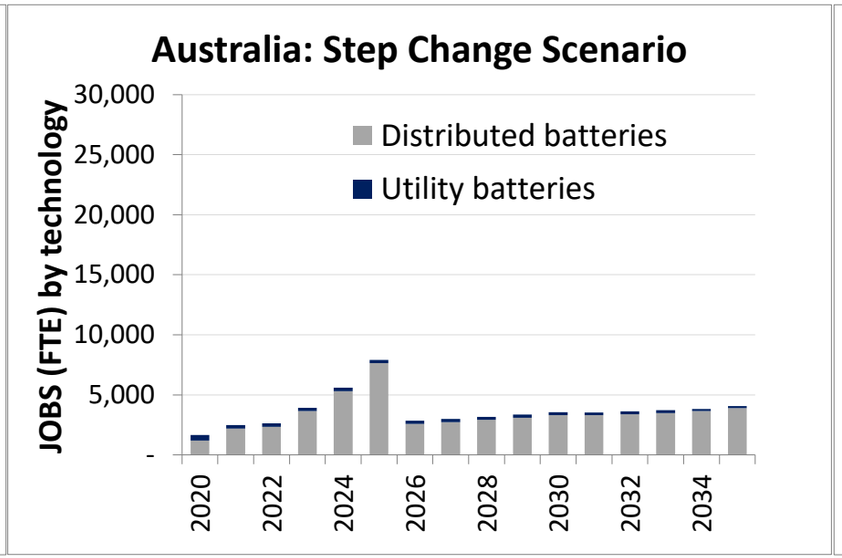



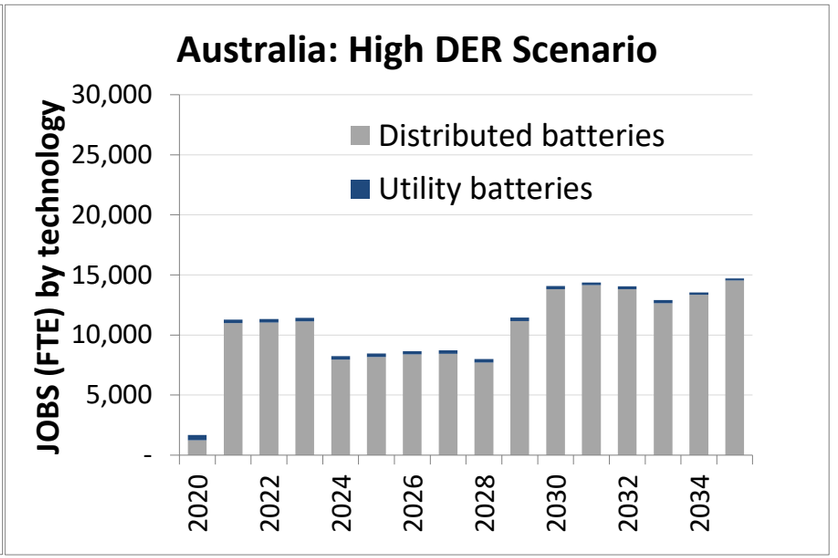

- Not enough candidates with the right qualifications / licenses
- Not enough candidates with general experience
- Not enough candidates with specific experience in renewable energy projects
- Suitable candidates but they wanted higher pay
- Difficulty attracting suitable candidates for projects in regional or remote locations
- Suitable candidates but they wanted longer-term employment

# C) Employment in Battery Storage – key findings

- Covered 9.6 MW installation during the survey year, with 35.7 MW installed previously; ~ 20-24% of Australian market
- Employment per installation currently high (for distributed batteries, ~7 person-days per installation) – but industry is in early stages so productivity improvements very likely
- Unsurprisingly employment is much higher in the High DER scenario, reaching 15,000 by 2035 (although it is likely that the employment per install would reduce much more sharply in that scenario)

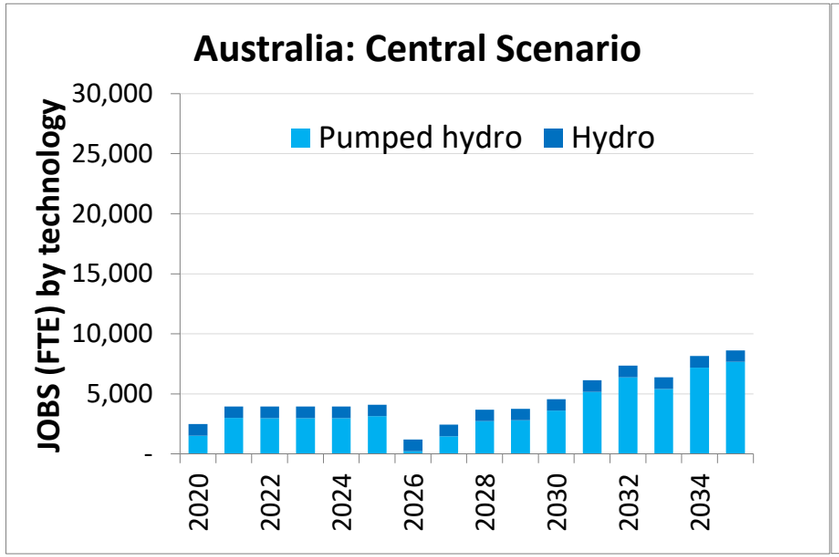


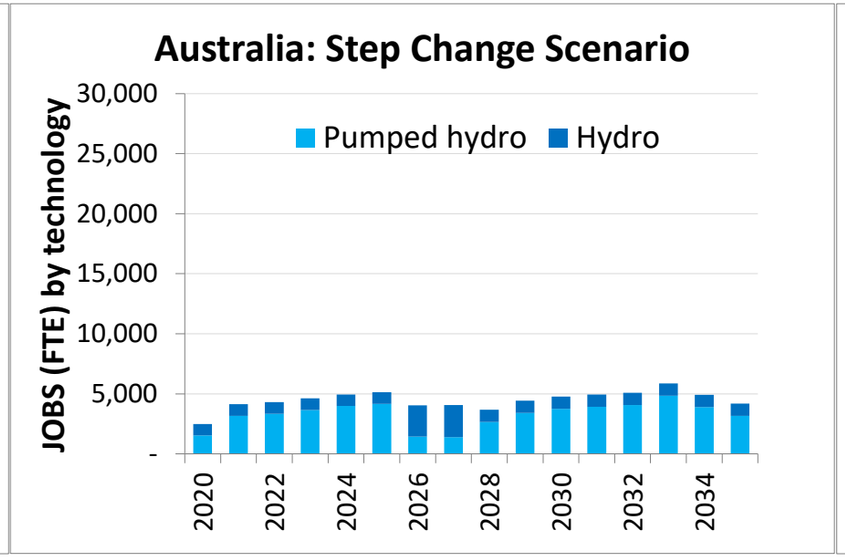



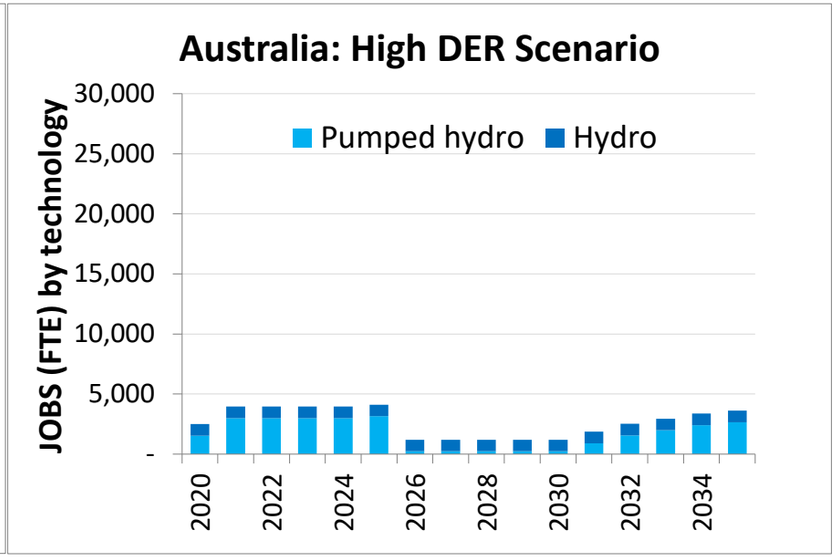



# D) Employment in hydro and pumped hydro – key findings

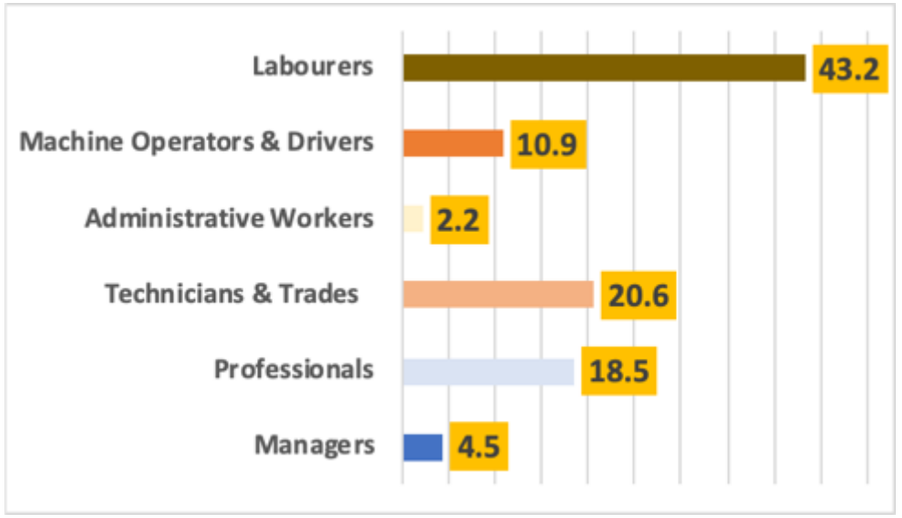
- “New” phase of industry emerging with pumped hydro schemes, so data is from companies planning schemes rather than actually building now (Respondents covered >80% of existing Australian hydro).
- High proportion of regional jobs, especially ongoing O&M
- Construction jobs spread over long period and can be very “lumpy” (especially in the Central Scenario). This is much more dramatic if you look at a single state profile

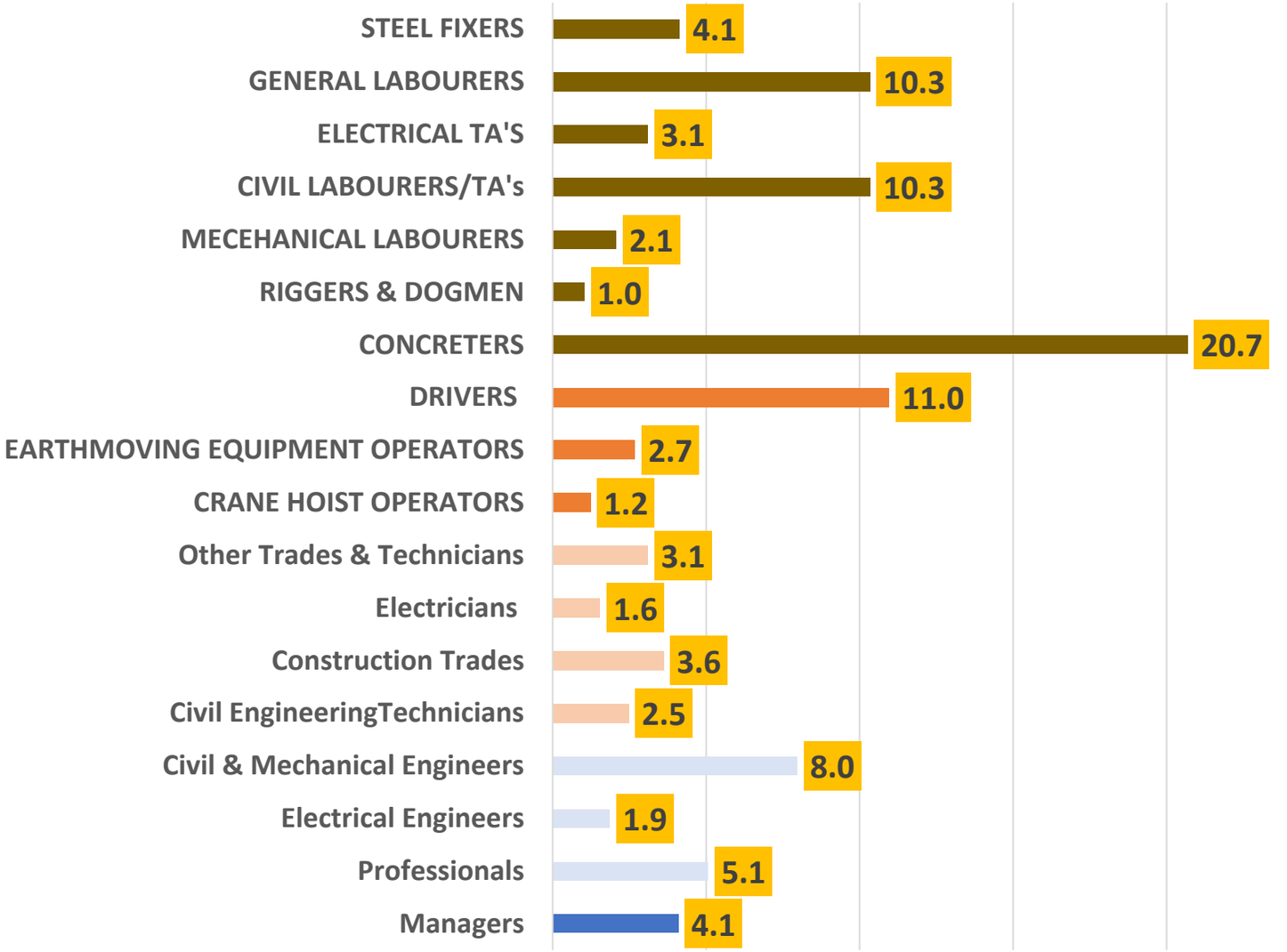


# New hydro will require large volumes of construction workers (%)



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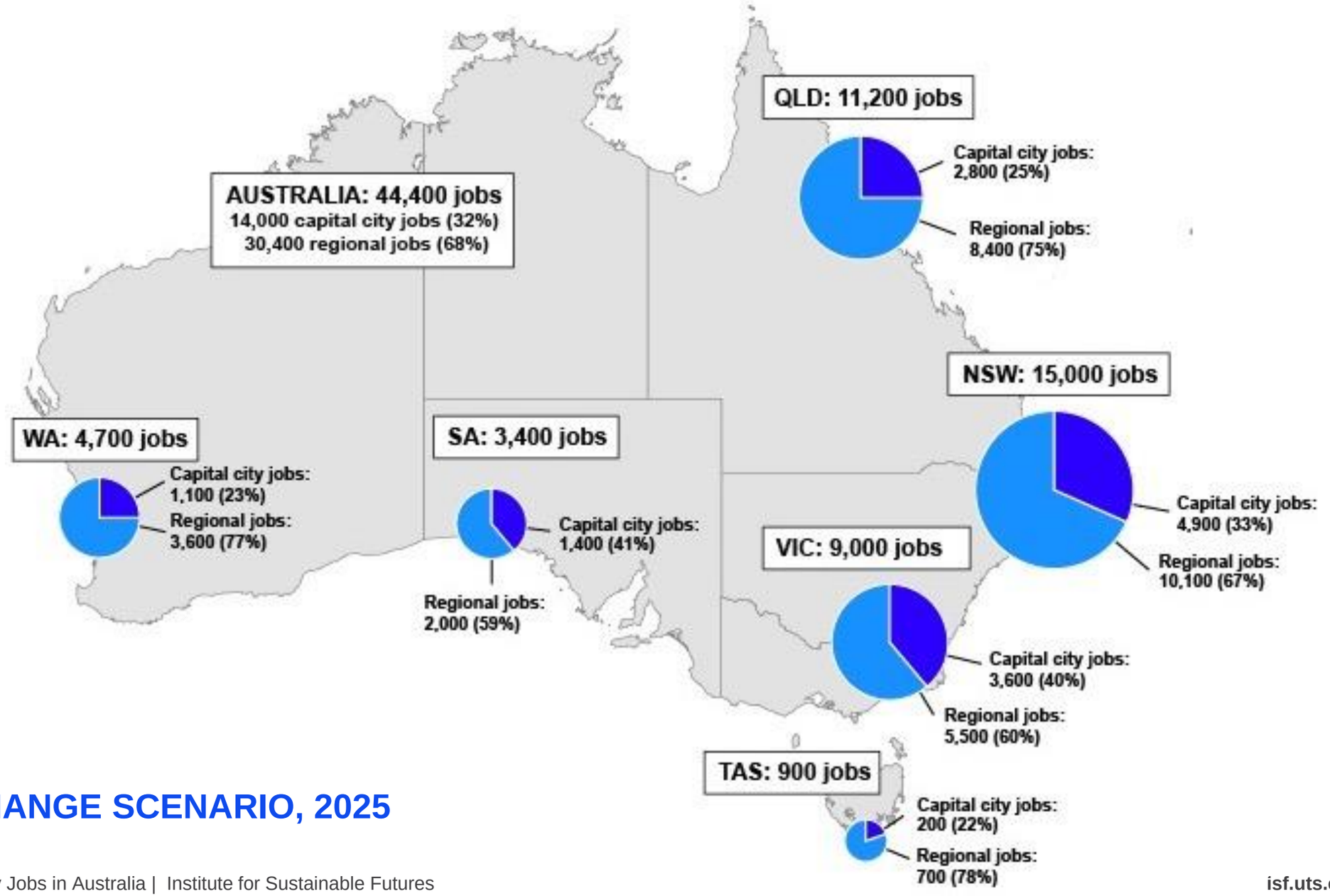
# Local and regional jobs: the role of renewable energy jobs in energy transition

**People over estimate the number of mining jobs – they don't see renewable energy as creating real jobs; they think of someone installing solar panels and ask, what comes next? … regional communities don't believe in the promise of alternative jobs - and they have seen the results of past restructures**

**Rebecca Huntley, Social Researcher**
**Vox Populi Research**

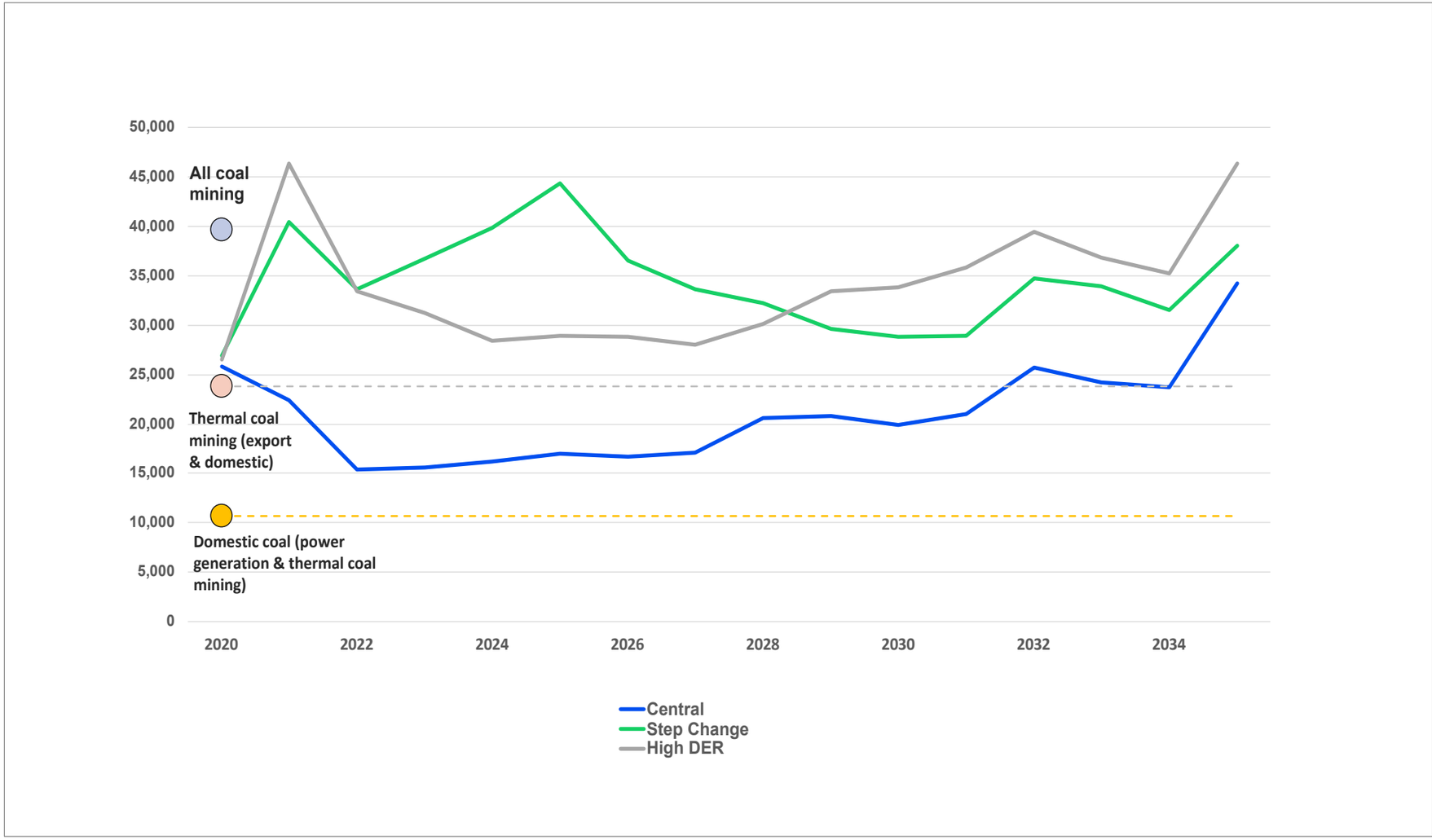
# Where are the Renewable Jobs – capital cities & regions




## STEP CHANGE SCENARIO, 2025

# Renewable Energy & Coal Employment

1. Even under the Central scenario, RE jobs > current jobs in coal & gas power stations and thermal coal mining for domestic use
2. RE jobs > current jobs in thermal coal mining for Step Change and High DER scenarios
3. RE jobs in Step Change & High DER scenarios comparable to all current coal mining jobs



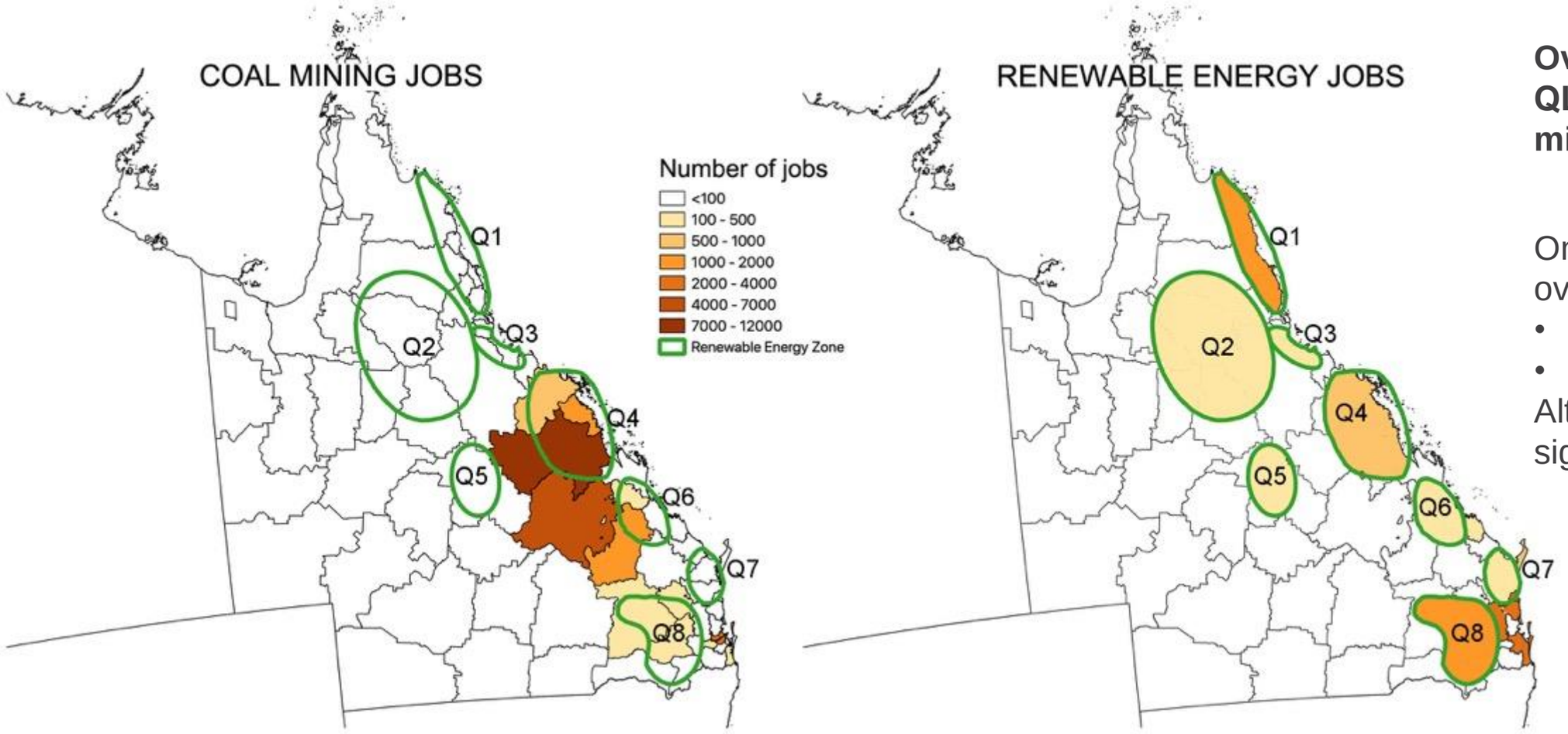
# Local and regional jobs

Estimating the scope for job creation local to projects is complex – solar and wind farms source labour at different scales

- **International:** specialist skills that are in shortage in Australia (e.g. grid engineers)
- **National:** recruitment for professionals – also sometimes trades/ technicians)
- **Regional:** workers move from project to project (e.g. Newcastle-based wind firm with engineers, electricians etc)
- **Local:** jobs sourced locally varies depending on location – but generally labourers, some trades & technicians, some construction managers and site administrators

Assumptions for jobs that could be local or regional made for each occupation based on survey responses

# Coal Mining and RE Jobs - QLD



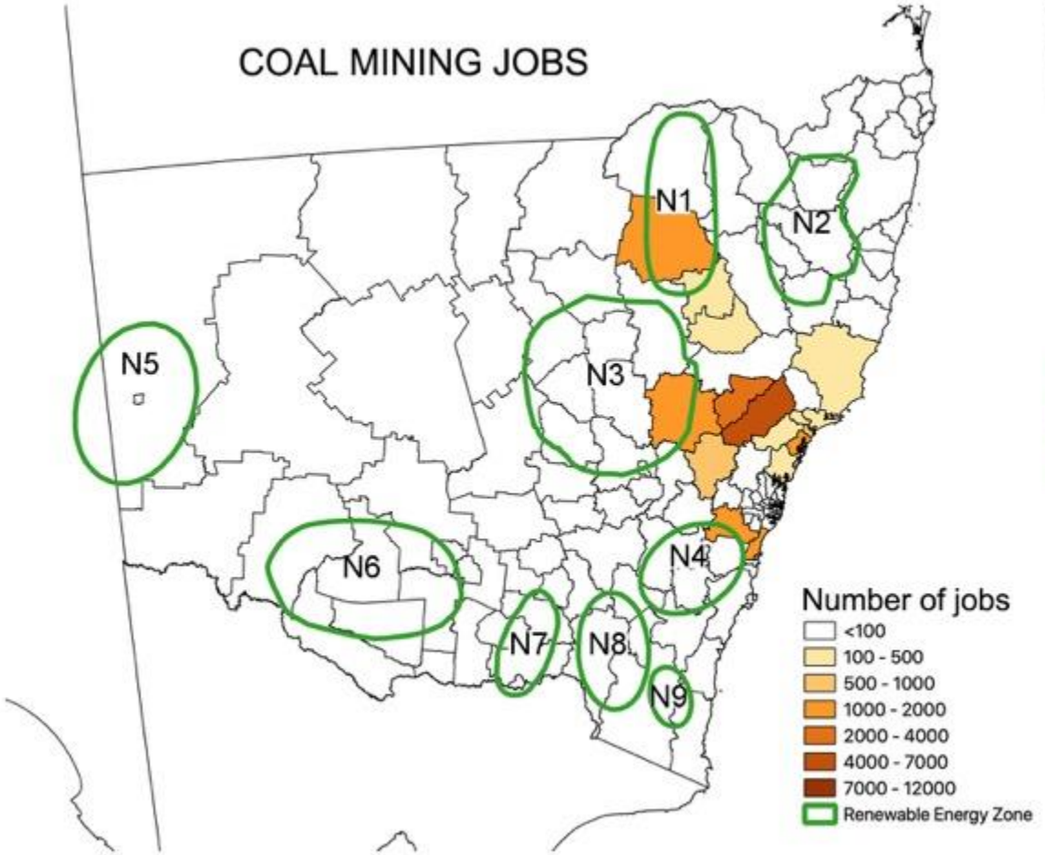

**Overlay between QLD REZ's and mining**

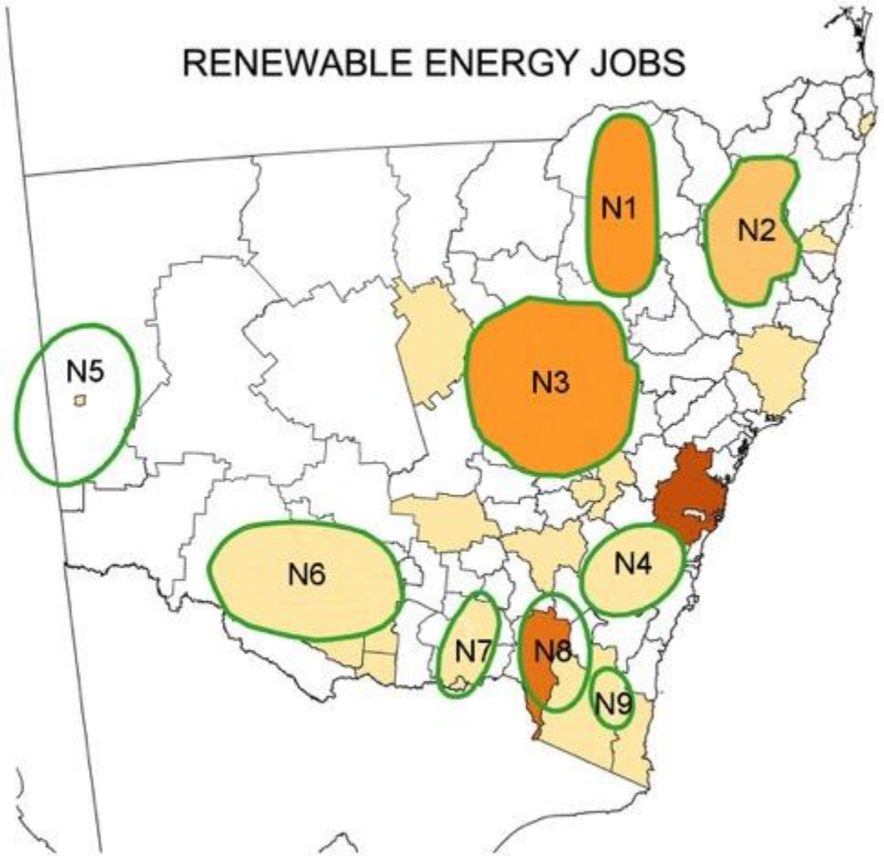
Only two have much overlap:

- Q4 (Isaac)
- Q8 (Darling downs)

Although others have significant job creation.

# Coal Mining and RE Jobs - NSW



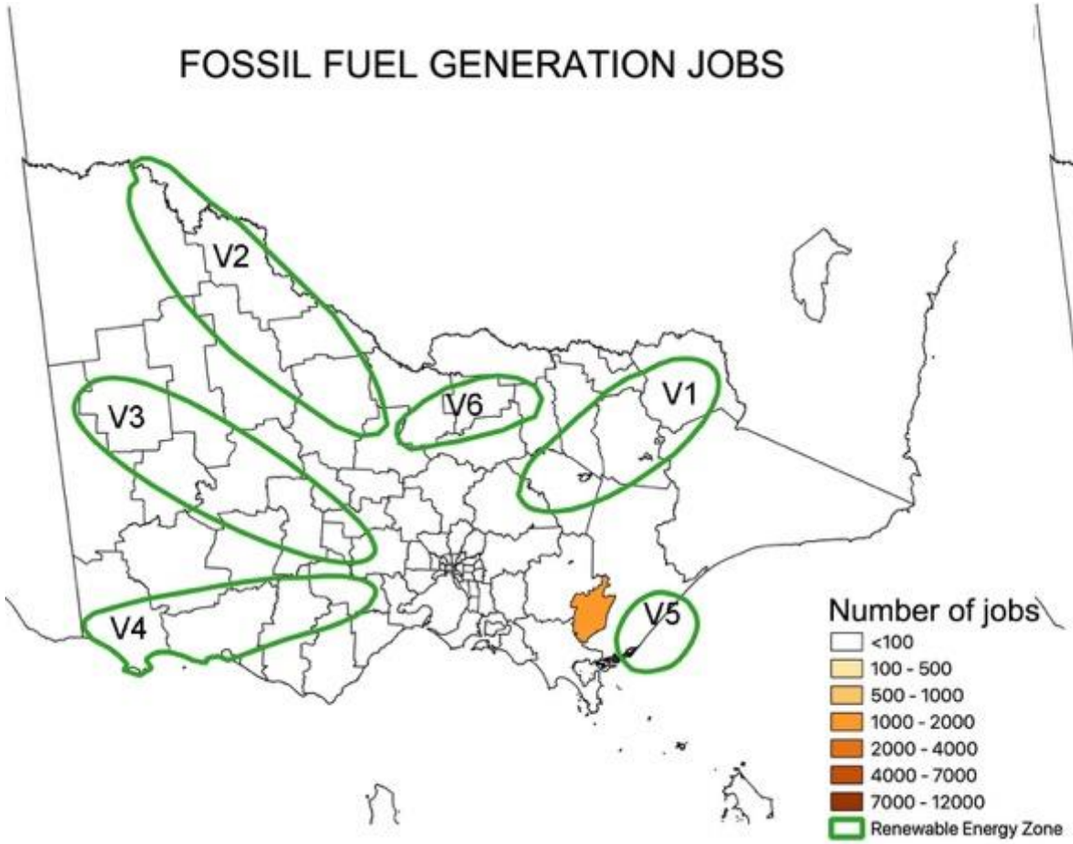

**NSW REZ's are primarily further west and south than the coal mining areas**

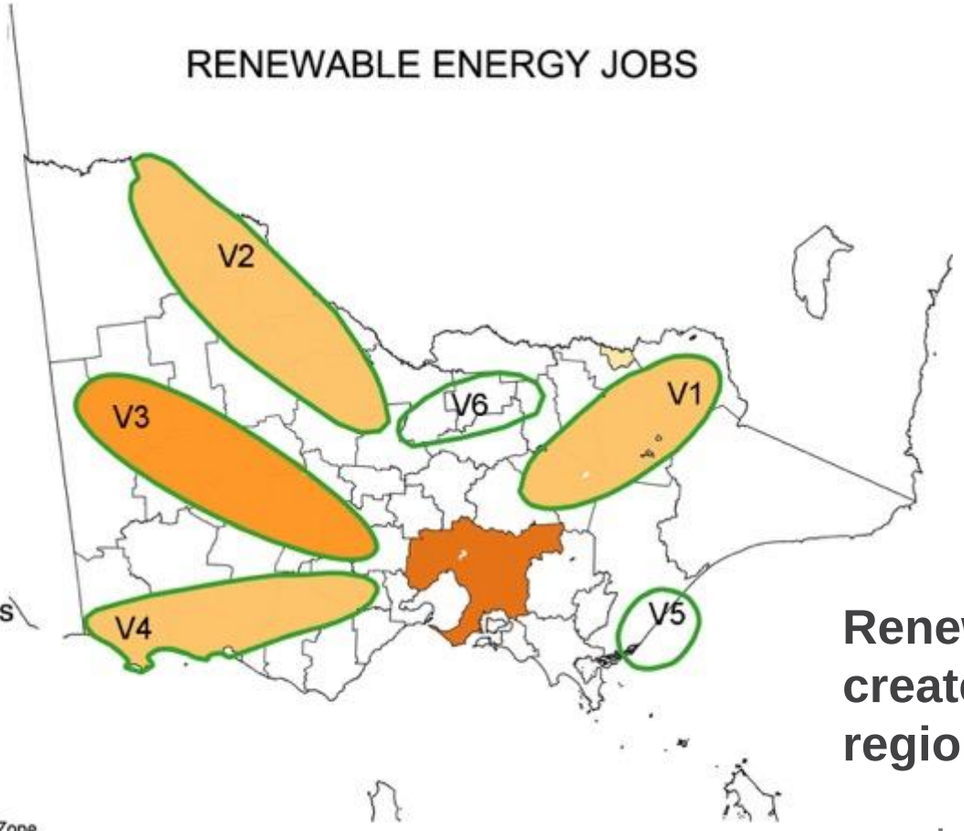
Exceptions are:

- N1 (North West NSW)
- N3 (Central West) &
- N4 (Southern Tablelands)

.. These are adjacent to coal areas.

# Fossil fuel and RE Jobs - VIC



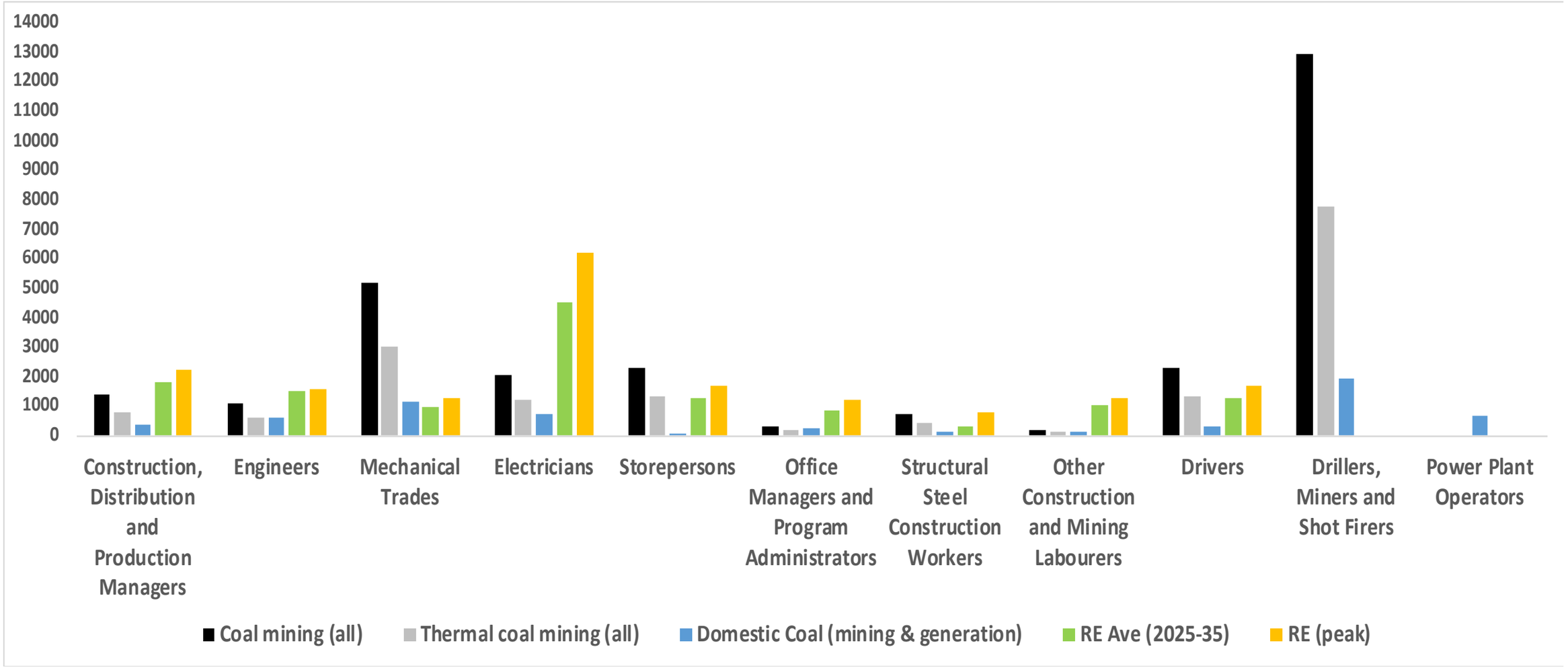




**Renewable energy creates jobs across regional Victoria**

… but not in La Trobe Valley

# What is the match like between coal and renewables jobs?

Good match with some trades, technicians and labourers – but not the core workforce of machine operators



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# Job and Skill Opportunities

# Skills and Jobs Opportunities

Policy and program responses were not the focus of this study but some opportunities have been identified

**01: Increasing the supply and retention of skilled labour**

Role for training authorities in some areas (e.g. power systems engineers)

Improving interaction between training schemes & industry (e.g. short courses, group training schemes where apprentices are shared between companies and industries)

**02: Local content requirements in exchange for policy certainty/auctions**

Local content is low by international standards – and much was the result of VRET. Auctions with local content and training requirements are a proven mechanism here & overseas

**03: Planning for hydro & pumped hydro**

Pre-planning important to avoid competition for labour (e.g. transmission projects) and maximise opportunities for local jobs from supply chain (concrete, steel)

*”I have had some ad-hoc discussions with other companies regarding this model. A company I was with hired full time electrical apprentices but it became a disaster due to them being used as menial labour and so specialised in the wind industry they couldn’t transfer their skills over to other electrical fields. A group scheme apprentice would at least get trained in multiple fields such as domestic and light industrial during different secondments. The big issue is the initial cost of getting them the basic training to climb a turbine. If this was subsidised by the government then a pool of group scheme apprentices in the Western District (Victoria) for example would have plenty of opportunities” (O&M contractor)*

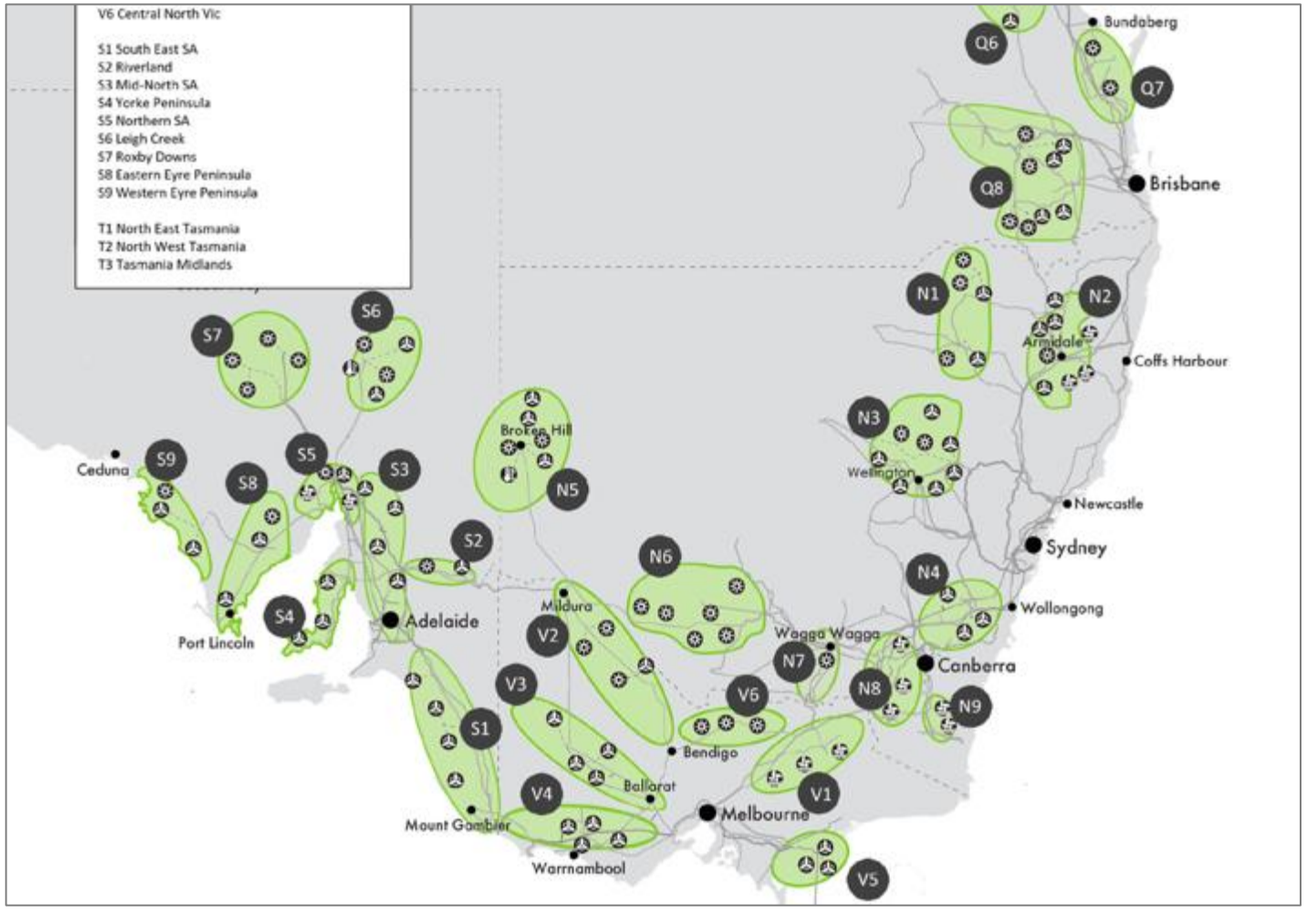
*“There is likely to be a shortage of hydro skills in Australia because it's a long time since any new hydro was built, so international recruitment is likely to be needed”*

# Skills and Jobs Opportunities

Renewable Energy Zones initiative by AEMO creates opportunities for a more coordinated approach

**04: Renewable Energy Zones**

- Opportunity to develop more planned and place-based approach to workforce development (‘skill ecosystems’)
- Stakeholder collaboration: Industry, Government, Energy Networks, Regional Development Authority etc)
- Identify skill and labour requirements for network extensions, construction & O&M
- NSW Central West REZ pilot



# Skills and Jobs Opportunities

Renewables sector could play a meaningful role in supporting transition in coal regions

**05: Regional transition**

- There will serious social and economic consequences without a transition plan for mining regions (e.g. 2 years after the closure of Hazelwood only 1/3 workers has a full-time job) – which will and is impacting community support for renewable energy
- Renewables job creation is comparable or greater than mining but more dispersed
- The location and occupational mix of renewables jobs indicates sector can support alternative employment in mining regions – especially with some further supply chain development - but only within a wider industry transition plan
- Ross Garnaut & Grattan Institute have highlighted role renewable energy could play in underwriting development of new heavy industry (e.g. ‘green steel’)
- Through direct and indirect employment, RE could play role in transition plans for coal regions.

Institute for Sustainable Futures

# QUESTIONS?

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Full report, methodology report, and state profiles available at https://bit.ly/REjobsAu