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DOS  
ENGENHEIROS



**WORLD  
ENGINEERING  
DAY**  
FOR SUSTAINABLE  
DEVELOPMENT



WFEO / FMOI

In support of UNESCO  
World Engineering Day



Com o Alto Patrocínio  
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Under the High Patronage of the  
President of the Portuguese Republic



O Presidente da República

# Lisbon

March 4<sup>th</sup> 2024



**Engineering Solutions for a Sustainable World**

**Ordem dos Engenheiros**



**WFEO / FMOI**

***Enabling the Energy Transition: Infrastructure Requirements and Impacts on Economic Development. A case study from Sydney Australia***

Dr. Marlene Kanga AO FTSE FREng

WFEO President, 2017-2019

Non-Executive Director Endeavour Energy (2023 onwards)

4th March 2024



# About Dr Marlene Kanga AO FTSE FREng

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Chair and Non-Executive Director of large organisations in science and engineering in Australia and internationally:

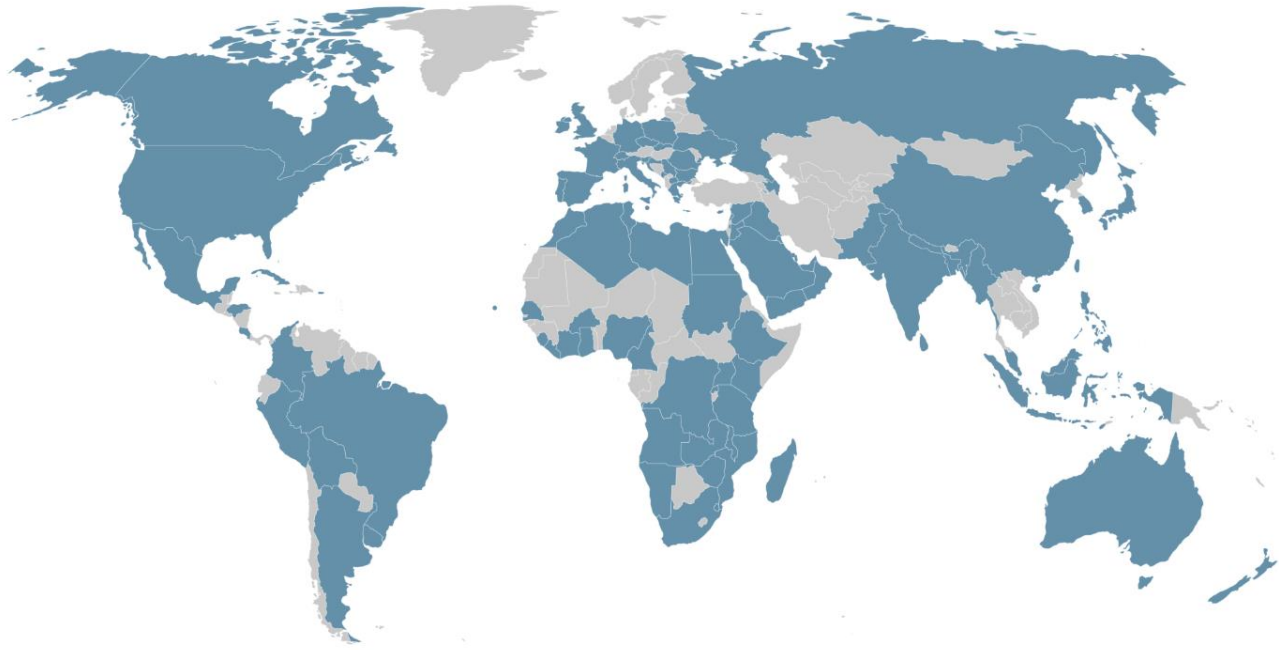
- national and international
- public, private and not-for-profit sectors
- Airservices Australia, **Endeavour Energy**, Standards Australia, Business Events Sydney, Sydney Water Corporation (2017-2023) and formerly Innovation Australia (2013-2019)
- start-ups, collaborative research centres and innovation networks, **Chair Rux Energy**

Professional Organisations:

- President, World Federation of Engineering Organizations, 2017- 2019
- Vice President International Network for Women Engineers and Scientists, 2011-2017
- National President Engineers Australia, 2013
- International Fellow Royal Academy of Engineering
- Co-Chair Australian government ELEVATE project, advancing women in STEM in Australia, \$42 million project, Australian Academy for Technology and Engineering
- Chair, Institution of Chemical Engineers Safety Centre, advancing process safety engineering globally, 100+ members

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MEMBER MAP  
SEPTEMBER 2023

**The World Federation of Engineering Organizations (WFEO):**

- The leading international body for professional engineering institutions
- Founded in 1968, under the auspices of UNESCO
- 100+ national professional engineering institutions, 12 international and continental/regional professional engineering institutions, representing 30 million engineers
- Co-Chair - Major Science and Technology Group at UN
- Represent engineering at major UN Organisations



# Engineering, Cities and the UN Sustainable Development Goals

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A key objective of the World Federation of Engineering Organizations is to **advance the UN SDGs through engineering.**

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# The UN Global Sustainable Development Report 2019: Science and Engineering and the Lever and Sustainable Cities as the Pathway

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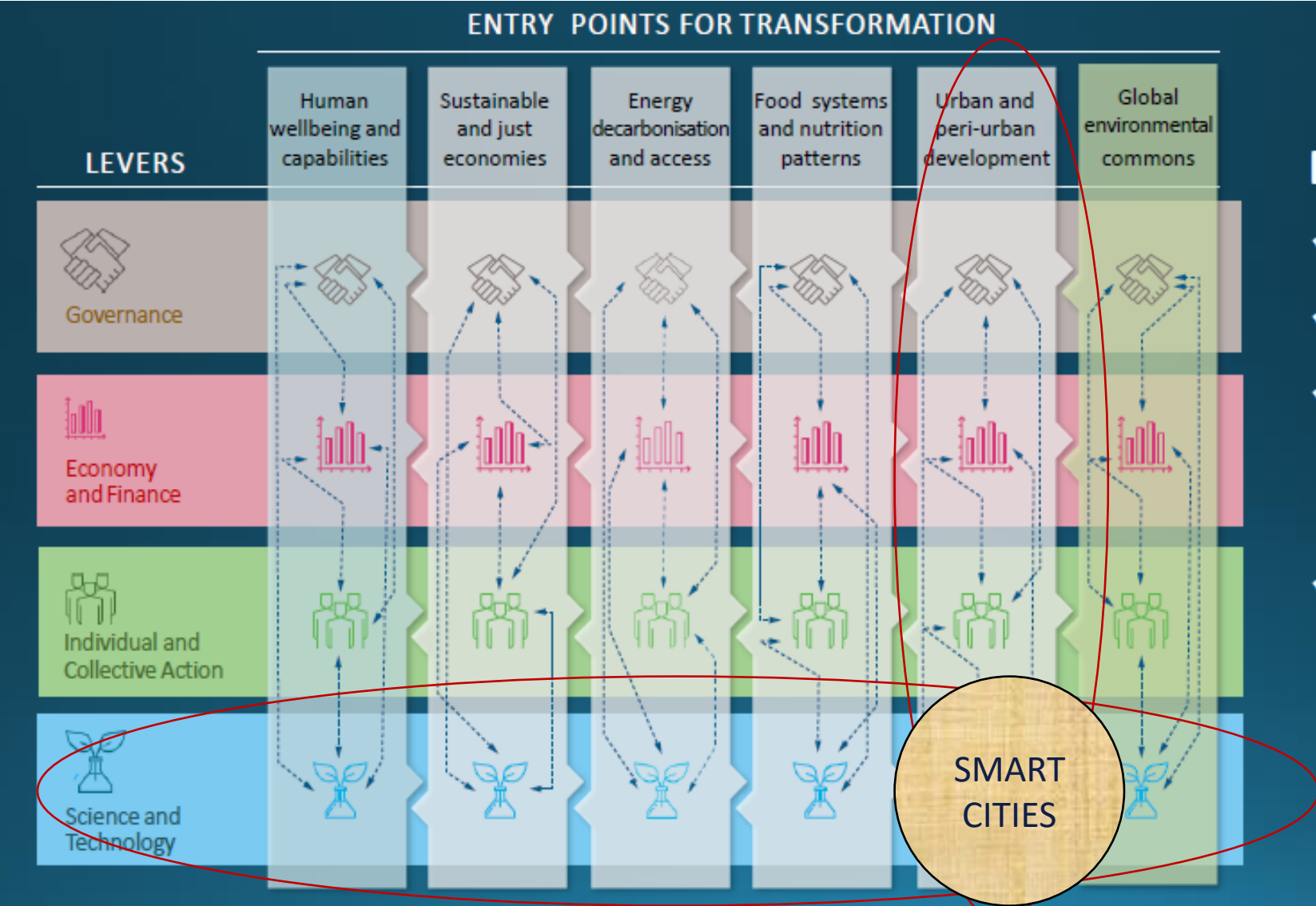
- The UN Global Sustainable Development Report has identified **science and engineering as one of four levers** to accelerate sustainable development.
- **Urban and peri-urban environments** have been identified as **one of six pathways** that can accelerate transformation for sustainable development.

See: [https://sustainabledevelopment.un.org/content/documents/24797GSDR\\_report\\_2019.pdf](https://sustainabledevelopment.un.org/content/documents/24797GSDR_report_2019.pdf)

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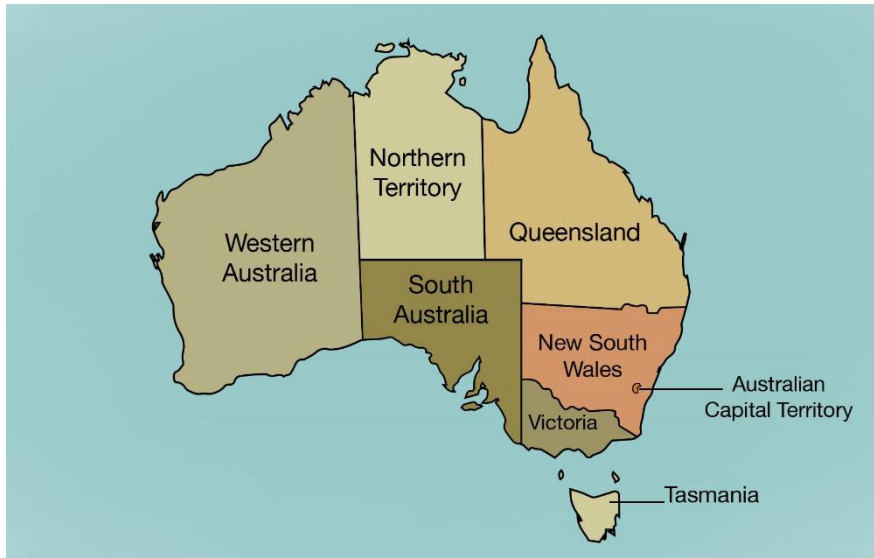
# Science and Engineering as the Lever Urban and Peri-urban environments as the transformation pathway



# Case Study: Implementation of Renewable Energy Networks in New South Wales Australia to supply western Sydney by Endeavour Energy, Acciona and Cobra

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Endeavour Energy is responsible for building, maintaining and operating an electricity network that connects 2.6 million people to traditional and renewable energy sources in homes and businesses across Sydney's Greater West, the Blue Mountains, Southern Highlands, the Illawarra and the South Coast.





# Endeavour Energy : By the Numbers (2022)

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## We serve:



**2.6** million people



**25,000** square km across **23** Council areas



**32,000** life support customers



**221,000** customers with renewable energy generation



**20,000** new customers per year in some of the largest and fastest growing regional economies in the state. Over **50%** of Sydney's population will reside in Greater Western Sydney by 2036.



## By the numbers:

**207** major substations

**20,000+** new customers per year

**430,000+** power poles

**>25,000** km<sup>2</sup> of powerlines

**225,000** streetlights

**221,000** customers with renewable energy

**2.6m** people

**1m+** customers

**32,000** life support customers

**85%** of our area is bushfire prone



Source: [2021-2022-Energy-Charter-Disclosure-Report.pdf \(endeavourenergy.com.au\)](https://www.endeavourenergy.com.au/2021-2022-Energy-Charter-Disclosure-Report.pdf)

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# Endeavour Energy: Commitment by leaders to the net zero energy transition

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"We can't turn off the coal generation tomorrow, but we all have an ambition to have a transition. There's a huge shift underway and it's so exciting to be a part of it."

- Scott Ryan, Endeavour Energy



**Scott Ryan**, Chief Asset & Operating Officer, Endeavour Energy

Scott Ryan is responsible for grid transformation, asset management and delivery operations for the safe and reliable supply of electricity to Endeavour Energy's customers. Scott began his career as a Cadet Engineer in 1989 and held a wide range of positions before assuming his current role in March 2020. He leads a team of 1,100 employees and has led major reform efforts for Endeavour's workforce and operations. He also established Endeavour's unregulated business, Ausconnex, which under his leadership has seen revenue grow by as much as 70 per cent annually.



Artist impression of the view to Merotherie energy hub east to south-west.



# Endeavour Energy: Commitment to the UN Sustainable Development Goals



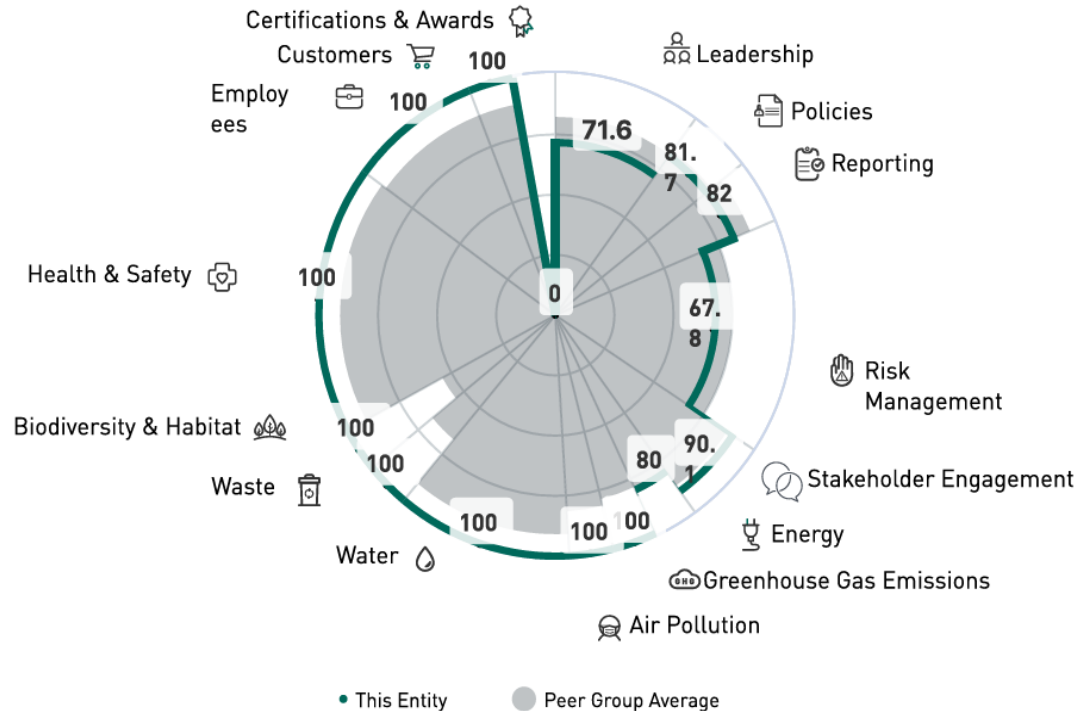
[See: Sustainability-Strategy-Report.pdf \(endeavourenergy.com.au\)](#)



# Endeavour Energy achieves 5 star GRESB Sustainability Rating

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In 2021 and 2022, Endeavour Energy achieved a 5-star rating in the Global Real Estate Sustainability Benchmark (GRESB), the leading worldwide measurement for sustainability performance.

Endeavour Energy is ranked in the top 5% of global GRESB respondents, ranked 27th out of 649 infrastructure assets worldwide, and 2nd out of 8 participating worldwide electricity distribution companies.



## Sample of GRESB Sustainability Assessment

[Source: GRESB five star rating | Endeavour Energy](#)

[Source: How to read your benchmark report asset.pdf \(gresb-prd-public.s3.amazonaws.com\)](#)



# Implementing Targets for Sustainability: The Journey

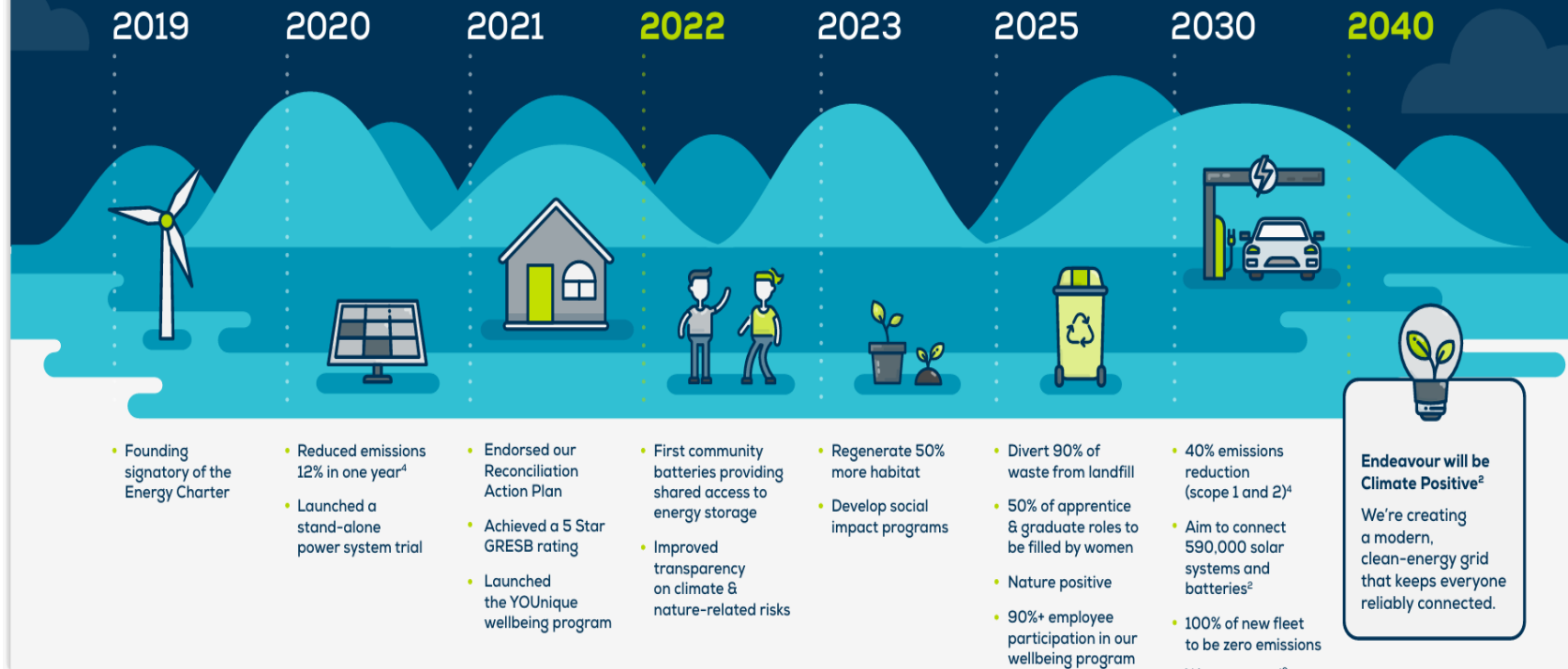
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A brighter tomorrow  
begins with action today

We're accelerating the renewable revolution, advancing a regenerative economy, and supporting resilient communities. This is how.



See: [https://www.endeavourenergy.com.au/\\_data/assets/pdf\\_file/0024/37086/Sustainability-Strategy-Report.pdf](https://www.endeavourenergy.com.au/_data/assets/pdf_file/0024/37086/Sustainability-Strategy-Report.pdf)

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**New generation** to replace retiring coal-fired power stations



**New network infrastructure** to deliver energy to consumers



**New storage and firming** to better respond to our electricity needs and improve reliability of the grid

[Source: Electricity Infrastructure Roadmap | NSW Climate and Energy Action](#)



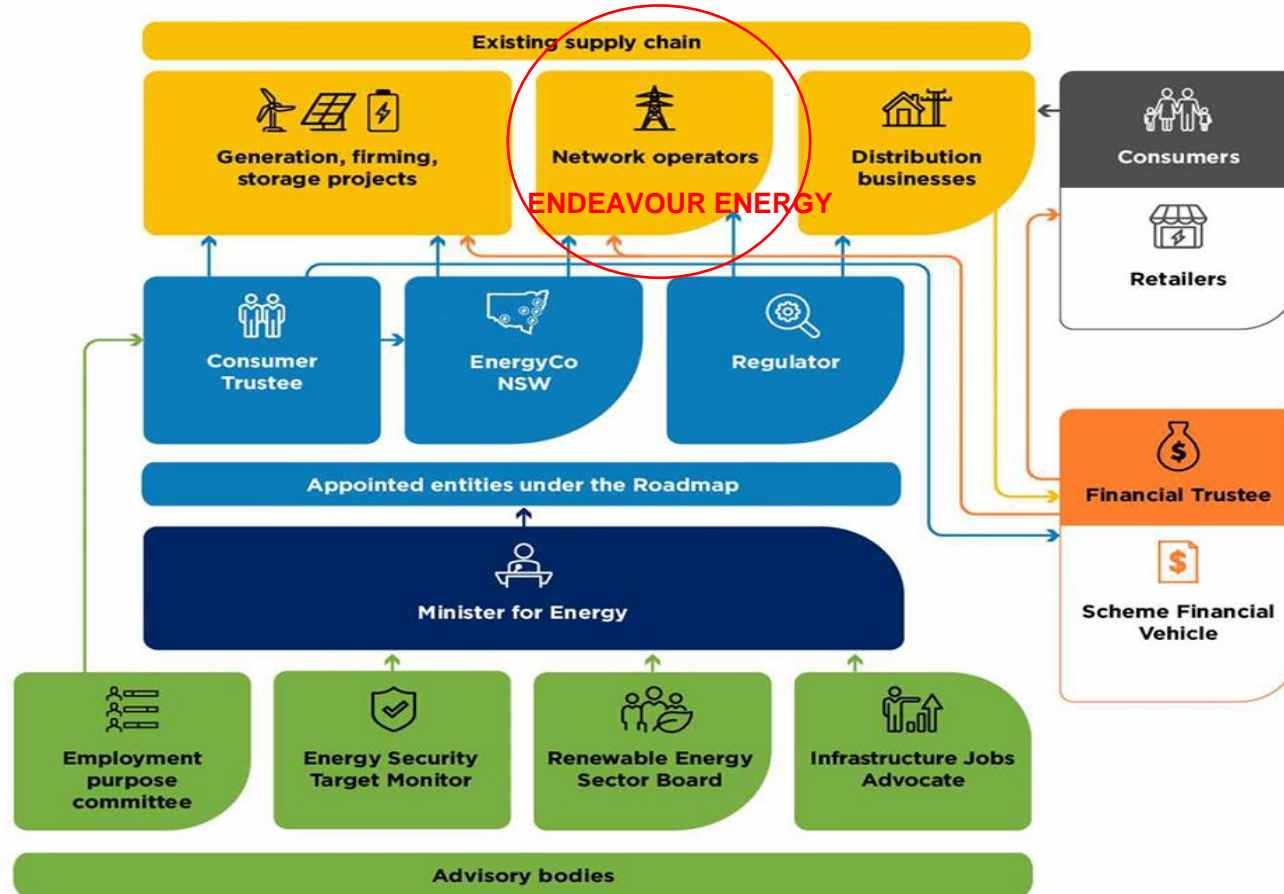
# State Government of New South Wales Electricity Infrastructure Roadmap (2020)

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## The NSW Electricity Infrastructure Roadmap

Various organisations and stakeholders are working together to deliver the energy transformation in New South Wales.



Source: [Entities delivering the Roadmap | NSW Climate and Energy Action](#)

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# Suitable sites for wind energy in the State of New South Wales, Australia and existing and proposed transmission lines.

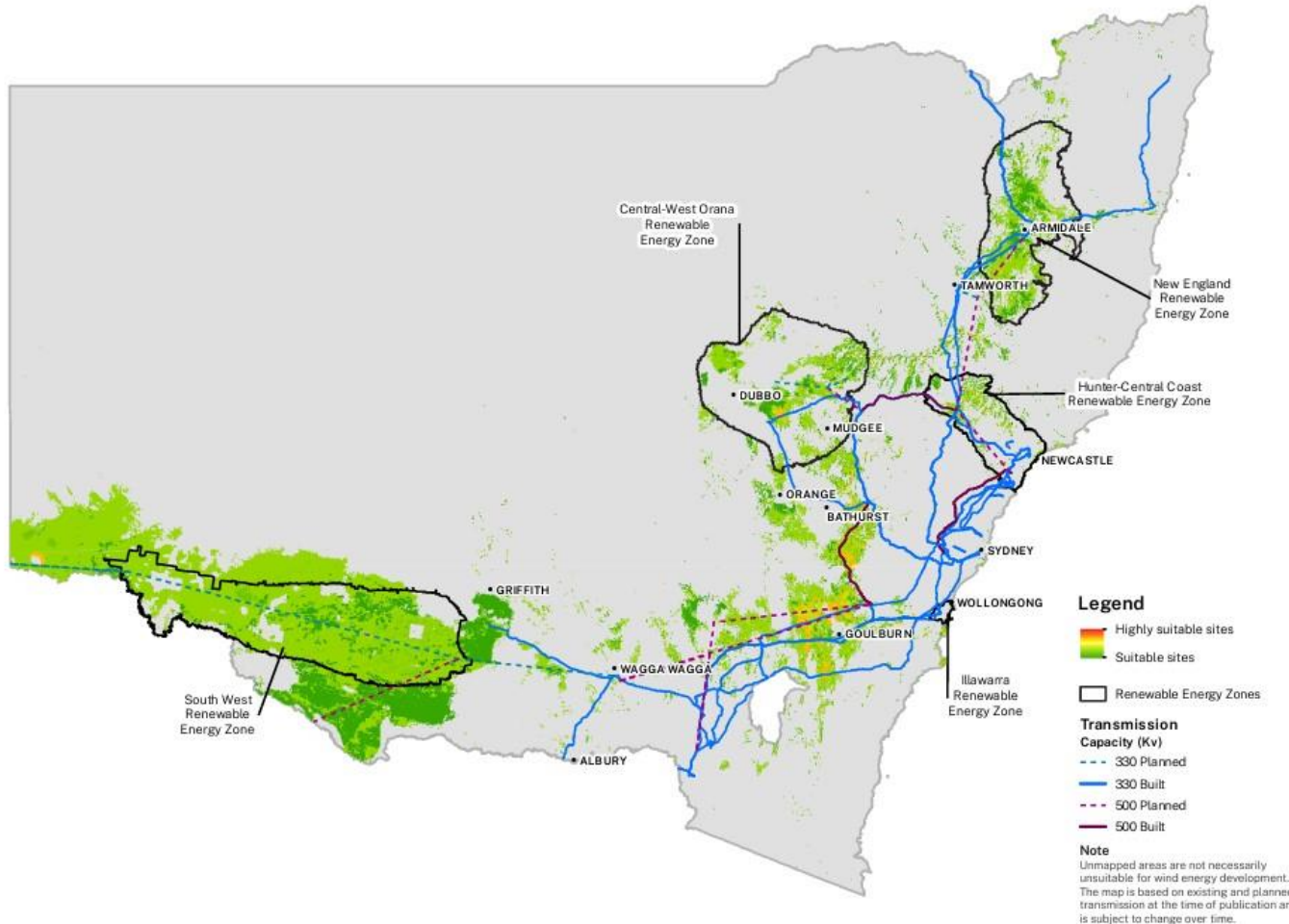


Figure 3 –Suitable areas for wind energy development





# Suitable sites for solar energy in the State of New South Wales, Australia and existing and proposed transmission lines.

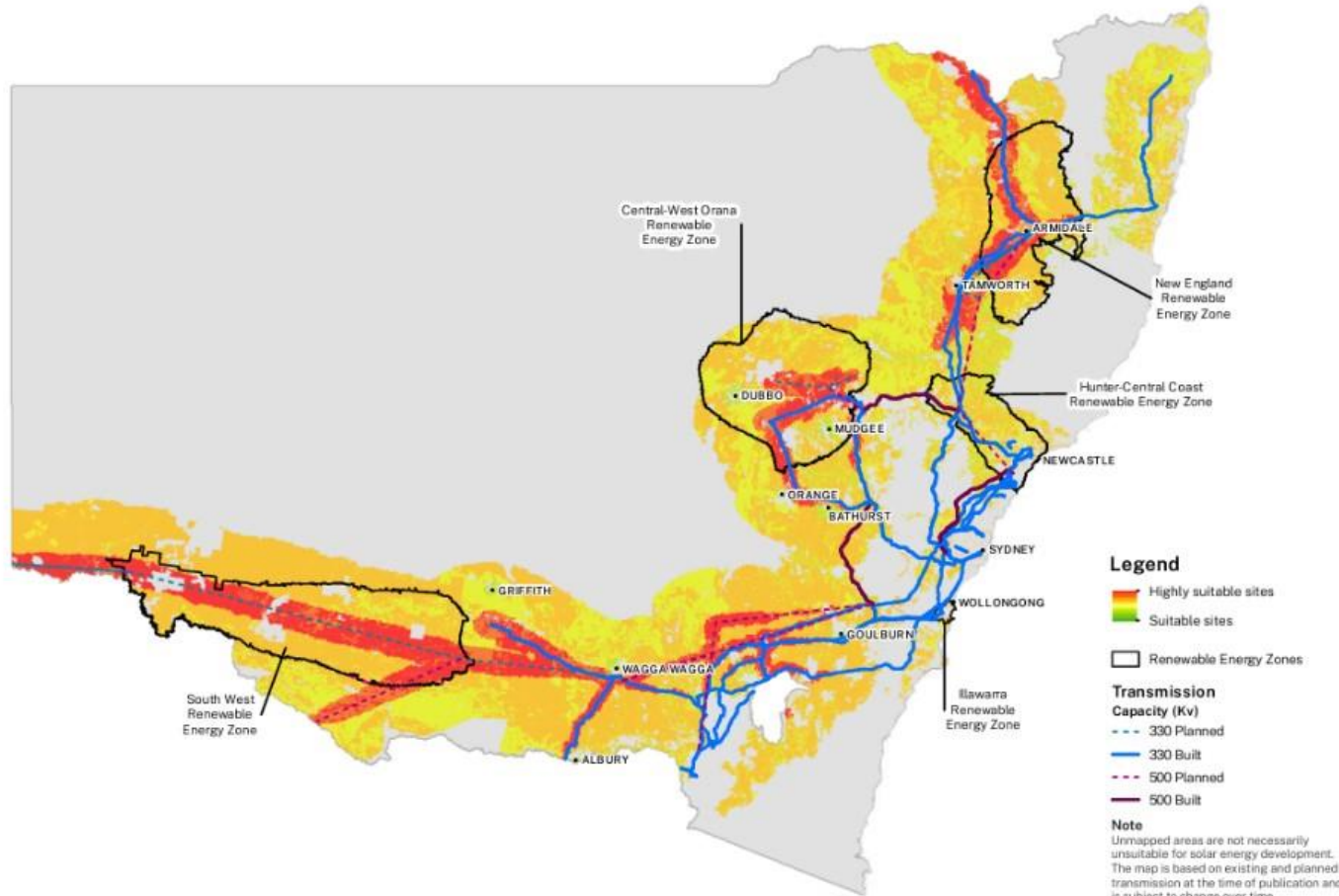
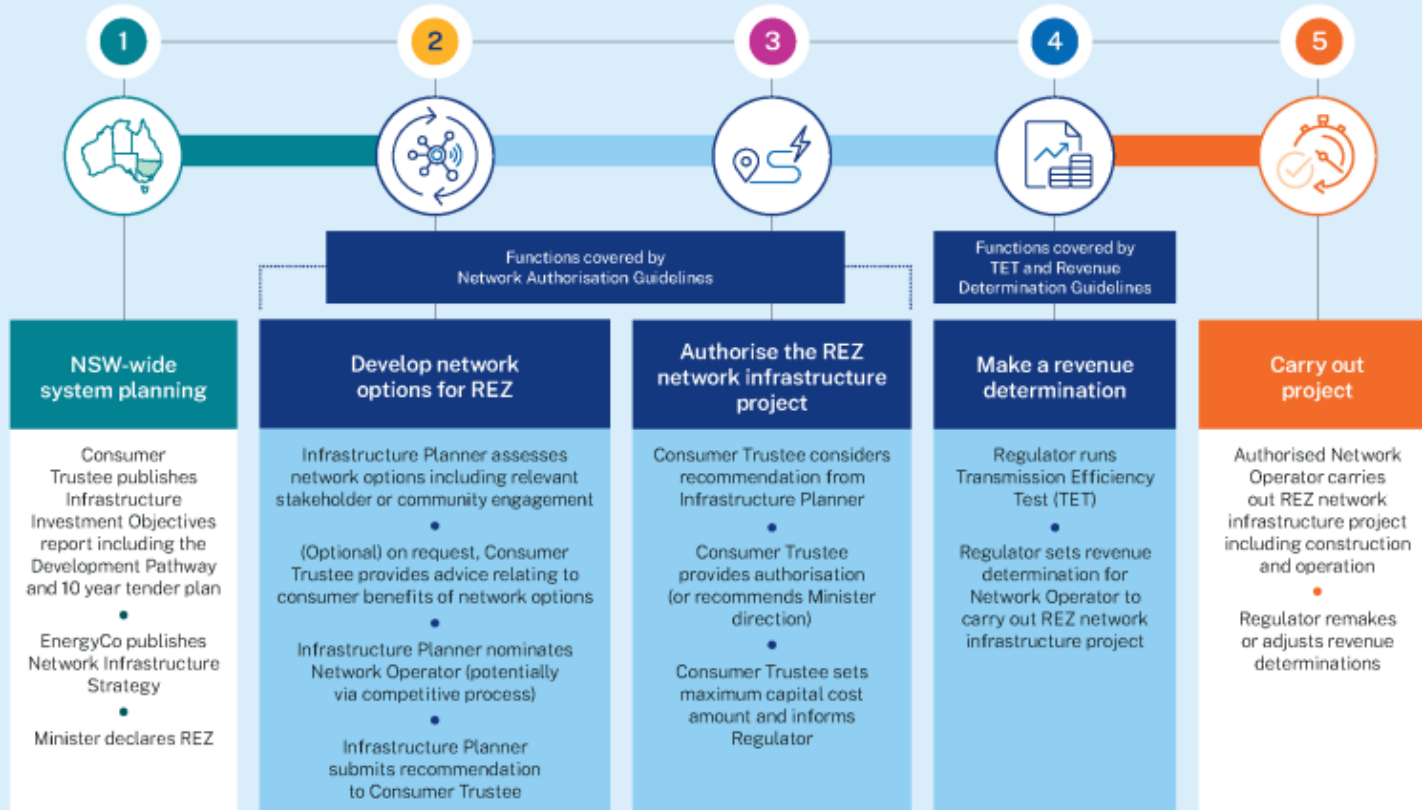


Figure 3. Suitable locations for solar development



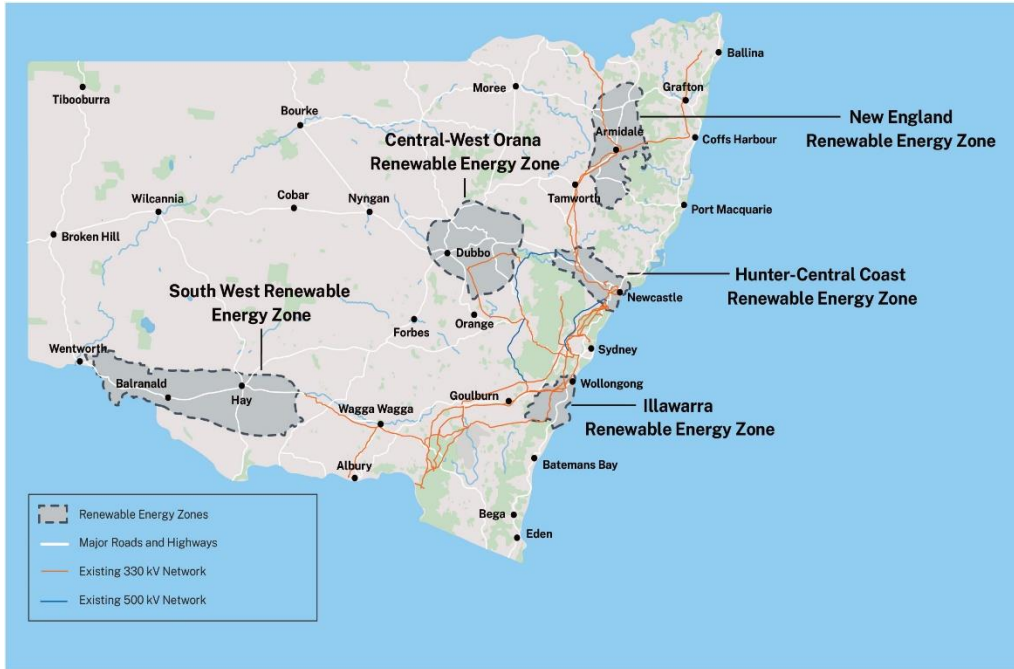
## Regulatory process for Renewable Energy Zone infrastructure projects



Source: Regulatory framework | NSW Climate and Energy Action



# Location of Government mandated Renewable Energy Zones



NSW Energy Co Renewable Energy Zones

Central West Orana (CWO) Renewable Energy Zone

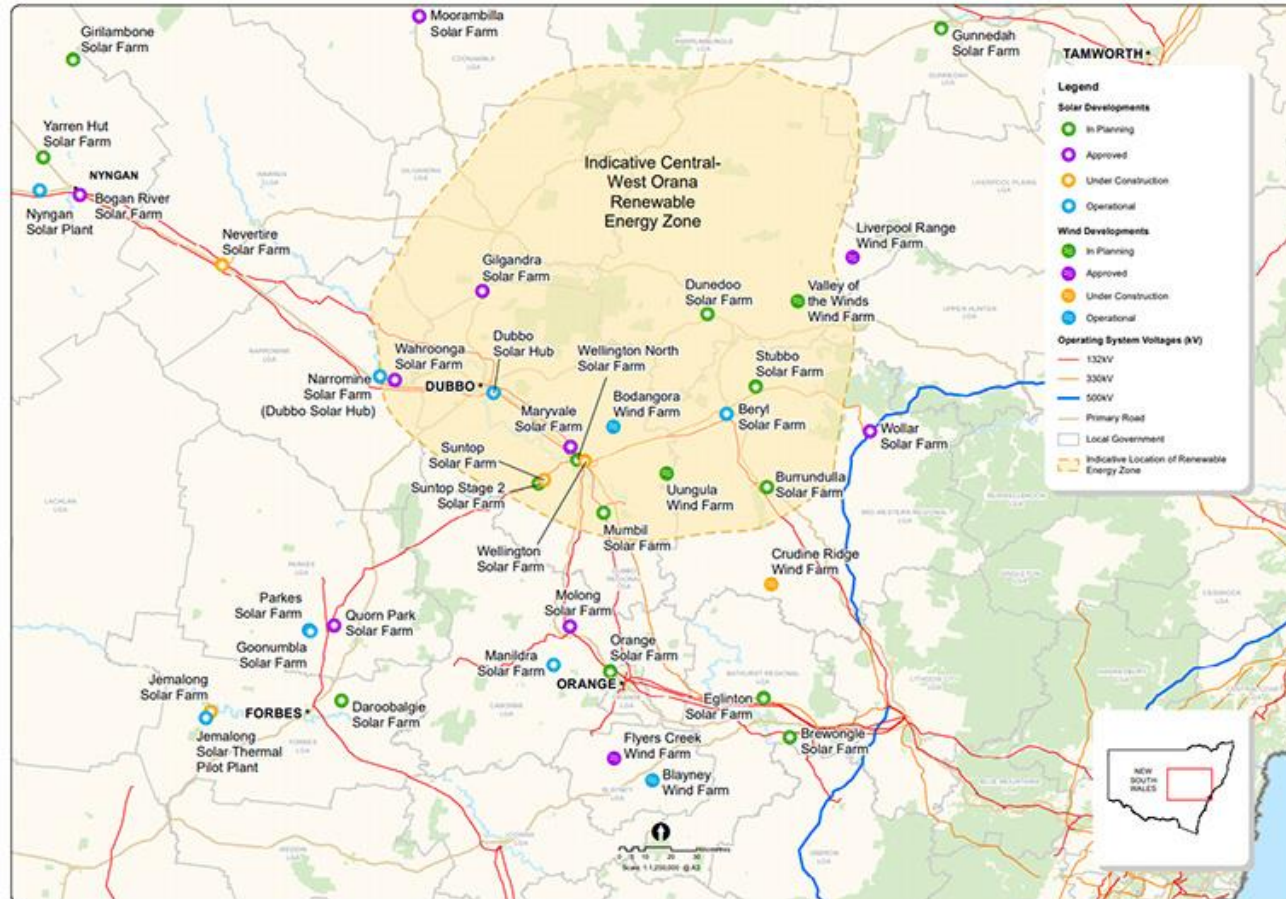
Source: <https://www.energyco.nsw.gov.au/cwo-rez>



# Central West Orana (CWO) Renewable Energy Zone where Endeavour Energy, Acciona and Cobra will be building transmission lines to customers in Western Sydney

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Sourced: [Exploring the energy transition roadmap \(essentialenergy.com.au\)](https://essentialenergy.com.au)

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Signing of Commitment Deed to deliver the first transmission network for a Renewable Energy Zone (REZ) by Endeavour Energy in partnership with Acciona and Cobra, 18 December 2023

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“ACEREZ”, is a consortium comprised of [Acciona](#), [Cobra](#) and [Endeavour Energy](#) as preferred Network Operator for the Renewable Energy Zone (REZ). The consortium ACEREZ has signed on to seek approval to deliver, operate and maintain the REZ transmission network for the next 35 years. This includes new high-capacity transmission lines, energy hubs and related infrastructure in the Central West Orana Region of NSW.

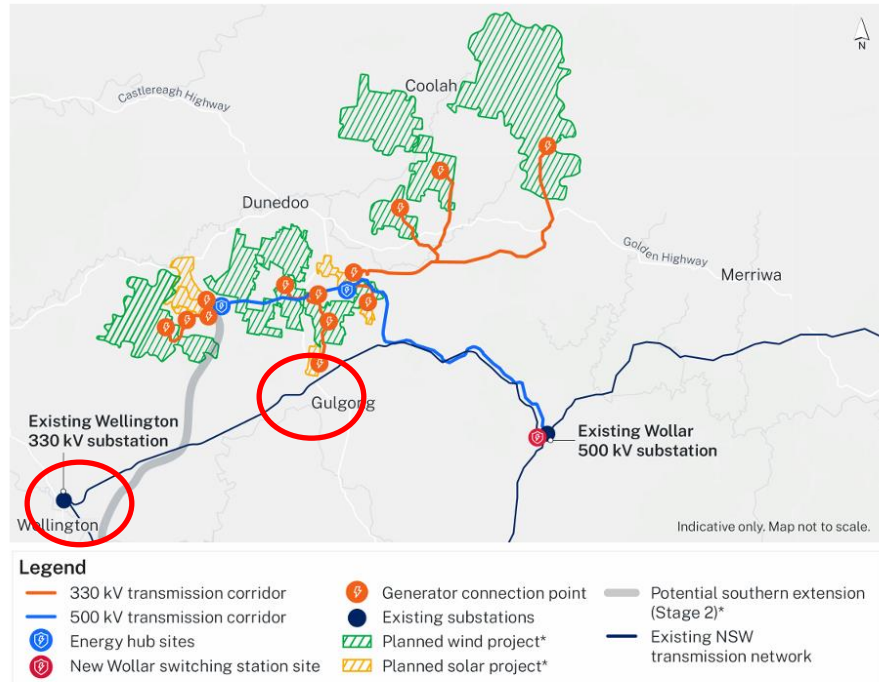
Source: <https://www.nsw.gov.au/media-releases/orana-rez-powering-ahead>

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# Scope of the Transmission Project from Central New South Wales to Sydney – provided for community consultation

Operational features of the project



The Central-West Orana REZ transmission project will involve the construction of new transmission lines, energy hubs, switching stations and related infrastructure. The new REZ network infrastructure will enable renewable energy from solar, wind and storage projects to be distributed to energy consumers across the State via the existing NSW transmission network



[Source: cwo-rez-fact-sheet-eis-transmission-infrastru](#)

# The ACEREZ Project for the Central West Orana Region in New South Wales

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- Endeavour Energy, Acciona and Cobra, Madrid based companies, have formed ACEREZ, the preferred network operator to deliver the first 6GW capacity renewable energy zone.
- The partnership will design, build, operate and maintain the transmission network for the New South Wales (NSW) Government's first Renewable Energy Zone in Australia – in the Central West Orana region of New South Wales.
- The new transmission infrastructure will enable generators such as solar and wind farms and energy storage providers in the REZ to connect to the electricity grid at a scale never seen before.
- This will provide a reliable supply of clean, affordable electricity for households and businesses across NSW while helping to meet the State Government's newly legislated Net Zero targets.
- This is a great example of how engineers are leading the energy transition to meet the world's net zero targets.



Acciona and Cobra Group are Madrid based companies and partners in the ACEREZ Renewable Energy Project

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**ACCIONA** is a Spanish, global company with a business model based on sustainability, building projects for the provision of renewable energy, infrastructure, water and services.

See: <https://www.acciona.com.au/>



**Grupo COBRA** is a global company that designs, develops and operates and maintains industrial infrastructure.

See: [Corporate Information – GRUPO COBRA](#)





# Social and Economic benefits to rural and regional communities

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Town Centre, Gulgong, NSW Australia



# Social and Economic Benefits

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Photography  
Solar farm at Moree, NSW.

NSW Department of Planning, Industry and Environment | NSW Electricity Infrastructure Roadmap Benefits for Regional NSW | 6



## Healthcare

Together with NSW Health, we are investigating opportunities to attract medical workers such as doctors, nurses, specialists and other healthcare workers to the regions, including key worker accommodation to house medical staff in REZ communities.



## Education

We are engaging with the NSW Department of Education to plan for increased demand on schools, childcare and tertiary education in the REZs due to incoming construction workforces and their families.



## Justice and emergency services

As the REZs progress to the detailed design and construction phases, we are working with NSW Police, Rural Fire Service (RFS) and other emergency service providers to help understand and mitigate project activities and potential hazards and risks.



## Recreation and community facilities

We are considering ways to improve local recreation and community facilities during delivery of the REZs. This will help support increased demand from incoming construction workforces and provide long-term legacy benefits for host communities.

[See: NSW Electricity Infrastructure Roadmap - Benefits for Regional NSW.pdf](#)

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# Social and Economic Benefits



- Jobs
- Schools
- Housing
- Telecommunications
- Roads
- Local business growth

[NSW Electricity Infrastructure Roadmap - Benefits for Regional NSW.pdf](#)

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# Sustainable management of impacts on the community and environment

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- **Land use, property and agriculture**, including temporary construction impacts such as traffic, noise and dust.
- **Visual amenity** changes where multiple renewable energy projects are in construction or operation.
- **Biodiversity**, including cumulative impacts to local flora and fauna species and habitats.
- **Aboriginal heritage**, including cumulative impacts to Aboriginal heritage sites, positive impacts from conservation, heritage interpretation and engagement.
- Increased **demand for social services – housing schools, hospitals** and impacts to social cohesion
- **Economic**, such as direct and indirect economic benefits to the region, increased demand for labour and goods and services and temporary population growth during construction.
- **Noise and vibration** from the transmission project and other nearby projects during construction.

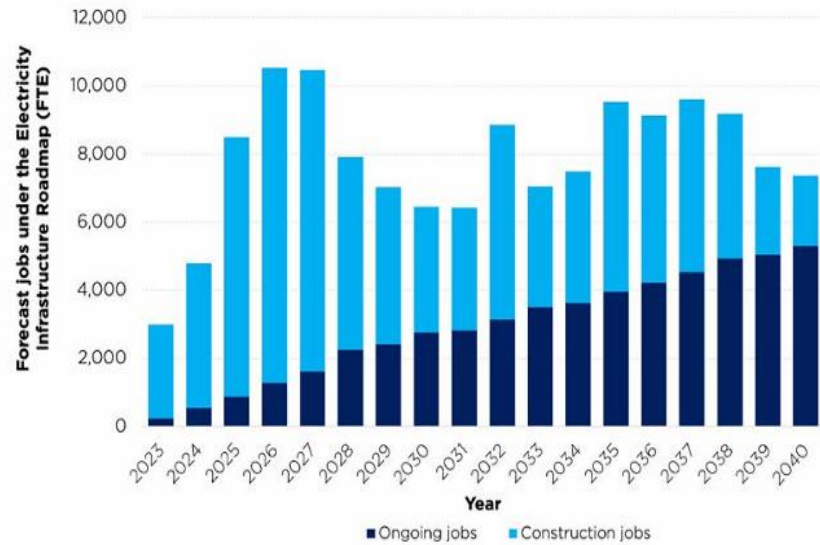
[Source: cwo-rez-fact-sheet-eis-cumulative-impacts.pdf \(nsw.gov.au\)](https://www.nsw.gov.au/cwo-rez-fact-sheet-eis-cumulative-impacts.pdf)



Artist impression of the view towards Elong Elong energy hub from Dapper Road.



# Jobs growth versus environmental impacts



**Figure 1.** Forecast construction and ongoing jobs under the Electricity Infrastructure Roadmap.

[Source: NSW Electricity Infrastructure Roadmap - Benefits for Regional NSW.pdf](#)



# Engineering Innovation for Electricity Services: Drones for powerline inspections

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Source: <https://www.endeavourenergy.com.au/news/media-releases/drones-to-replace-helicopters-for-annual-powerline-safety-inspections>, Feb 2024.

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# Engineering Innovation for Sustainable Electricity Services to remote and regional areas, leaving no one behind

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Bawley Point, southern  
New South Wales



- Endeavour Energy commissioned the first community microgrid to power two coastal towns from storms and bushfires, in December 2023.
- This is State's first community microgrid, which will power around 100 homes in Bawley Point and Kioloa, 250km south of Sydney on Australia's southeast coast.
- The AU\$8 million project is a self-contained energy system, harnessing electricity from renewable sources including rooftop solar, home-based batteries, and a 3MW grid connected battery, strategically positioned between the two communities.

See: <https://www.microgridknowledge.com/community-microgrids/article/33009609/new-community-microgrid-brings-resilience-to-nsw-coastal-communities>



# Engineering Innovation for Sustainable Electricity Services to enable the transition to net zero emissions

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Substations with Battery and EV charging facilities

- Endeavour Energy forecasts that one in four of its customers will be driving an electric vehicle (EV) within the next decade.
- It is partnering with innovative companies to make it easier for customers to choose an electric vehicle as their transport of choice.
- Smart meters are being installed to keep our customers informed and empowered.
- Batteries are being installed close to substations to provide grid stability as the percentage of solar PV generation by customers grows.

See: [https://www.endeavourenergy.com.au/\\_data/assets/pdf\\_file/0018/61074/Western-Sydney-Developer-Brochure-powering-your-growth.pdf](https://www.endeavourenergy.com.au/_data/assets/pdf_file/0018/61074/Western-Sydney-Developer-Brochure-powering-your-growth.pdf)

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# Diversity Equity Inclusion for an Inclusive and Ethical Culture

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- Systematic approach for a diverse and inclusive workforce
- Track progress with diversity – gender, age, ethnicity, neurodiversity, physical capabilities, First Nations people
- Ensure pay equity, equal opportunities for recruitment, training, development, promotion and recognition
- Achieve 50% diversity by 2030

See: <https://www.endeavourenergy.com.au/about/inclusion-and-diversity>

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- New South Wales State Government Treasury Corp issues sustainability bonds to support projects that advance the UN SDGs and have social and economic benefits
- **Endeavour Energy signed a landmark \$920 Million Sustainability-Linked Loan in March 2022**, becoming the first known Australian electricity distribution network to access sustainability linked financing.
- Endeavour Energy is the first known electricity distribution network service provider (DNSP) in Australia to access sustainability linked financing.
- The five-year sustainability-linked loan (SLL) facility, can be used for general corporate purposes, however, the pricing of the loan is tied to the Endeavour Energy achieving a set of agreed sustainability performance targets focused on four areas including greenhouse gas emissions reduction, landfill waste diversion, net habitat gain and mental health and wellbeing.

- Aligned to United Nations Sustainable Development Goals\*



\* The Sustainable Development Goals (SDGs) were adopted by the United Nations in 2015 as a universal call to action to end poverty, protect the planet, and ensure that by 2030 all people enjoy peace and prosperity. Source: <https://www.undp.org/sustainable-development-goals>

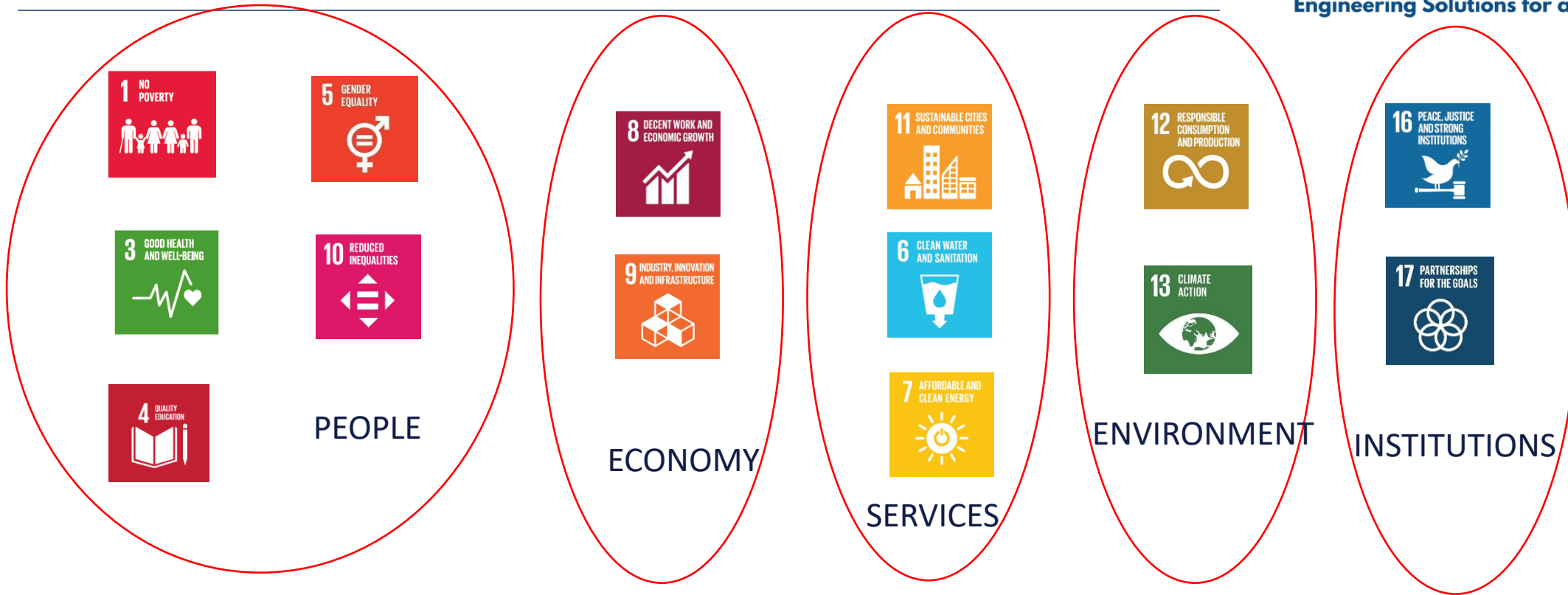


# Engineering Innovation for a more Resilient World

## Engineering the Cities of the Future

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**Cities are essential for sustainable development, economic growth and resilience. Sustainable engineering is an important enabler, to accelerate sustainable development in urban and peri-urban environments.**

**We engineers can make the difference!!**

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# World Engineering Day for Sustainable Development Engineering Solutions for a Sustainable World

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- **4<sup>th</sup> March every year**
- Proud to lead the proposal as WFEO President 2017-2019
- Declared by UNESCO as an international day
- An opportunity to engage with people, government, policy makers, students on the importance of engineering in our societies
- Encourage young people, boys and girls, to consider engineering as a career for positive change for a better sustainable world
- Its our celebration of engineering!!

See: <https://worldengineeringday.net/>



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## *Engineering* for Sustainable Development

- Participation
- Influence
- Representation



The world's engineers  
united in rising to  
**the world's challenges.**  
For a better, sustainable  
world.



**WFEO / FMOI**



**The World Federation of Engineering Organizations**  
*Fédération Mondiale des Organisations d'Ingénieurs*

[www.wfeo.org](http://www.wfeo.org)  
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[info@wfeo.org](mailto:info@wfeo.org)





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President of the Portuguese Republic



O Presidente da República



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