

API SUMMER SCHOOL+ 2023

SYNDICATE PROJECT EXECUTIVE SUMMARIES





BRETT REDMAN

CEO, Transgrid

*Energy transition will
need a large skilled
workforce.*

*What do we need to do
or solve to build the
workforce?*



Group Members:

Shaya Azizi, Transmission Lines Design Team Leader – Western Power

Ryan Standing, Protection Engineer – SA Power Networks

Christina Yee, Senior Electrical Engineer – Aurecon

Genevieve Lietz, Lead Engineer – Power System Modelling, Operations, AEMO

Executive Summary:

A large and highly skilled workforce is required to ensure the success of the energy transition. There is a major risk of significant skill shortages which will impact on the timing and cost of transformation of the energy sector. Focusing on the AEMO Step-Change scenario, construction trades and technicians dominate the employment profile followed by professionals.

Beyond just retention of the existing power industry workforce, there are three primary risk factors in planning for labor supply: (i) the boom/bust pattern of construction; (ii) competing with infrastructure projects for human resources, and (iii) training pathways, capacity, and funding. To this end, we have identified two key themes to address, which will ensure that we as an industry can deliver the energy transition. We must optimize processes and efficiency, and we must increase the workforce.



KELLY WOOD

EGM Network Delivery &
Services, Ausgrid



What more can we do as an industry to meet customer's expectations around decarbonization, distributed energy resource (DER) connectivity, and resilience, while still balancing the need for affordability and cost of living in our supply of electricity.

Group Members:

Simon Willis, Principal Electronics Engineer - Redback Technologies
Robert Chang, Senior Engineer Telecommunications Design - Powerlink Queensland
Ponny Thomas, Senior Power Systems Engineer - AEMO
Alex McKay, Substation Engineer - TasNetworks

Executive Summary:

The Australian energy transition will see a complete transformation of the power sector with a shift from large centralised thermal power stations to variable renewable energy sources distributed throughout the network. At the same time, the electricity system will see a significant increase in demand as consumers move to electrification as a means to decarbonise and reduce energy bills. Despite this significant transformation of the power system, customers expect the same level of resilience to which they have become accustomed. Customers are also facing a rise in the cost of living and are therefore expecting a transition that is economically responsible.

The syndicate group identified numerous factors that contribute to the challenge, with three that were felt to be particularly relevant to the DNSP:

Customer: Cost of living pressures mean that the customers are demanding that energy costs remain low. At the same time, they expect network resilience to remain high whilst they also expecting to participate in the energy market via rooftop PV.

Regulatory: Current regulation aims to protect network reliability and does not encourage agile change. Government bodies are making decarbonisation commitments that require extensive work from network providers.

Technical: Load profiles and technical characteristics are evolving with new challenges such as high PV penetration and EV charging requirements.



PETER PRICE

EGM Engineering
Energy Queensland



Part of Energy Queensland



How do we lead delivery of the transition and ensure we don't lose our social license?

Aka, our customers in our communities lose faith in the energy sector (because of blackouts, or because we leave people behind).

There is a widening gap between the haves and the have nots in electricity pricing and the energy transition.

How do we support all customer groups, particularly the disadvantaged, so that we all benefit from the transition?

Group Members:

Shahpar Ahmed, Senior Project Manager - Transgrid
Sanah Al Safadi Chaar, Senior Electrical Engineer - Aurecon
Fraser Hampton, Substation & Planning Engineer - SA Power Networks
Jane Yu, Senior Analyst - AEMO

Executive Summary:

Australia has a legislated target of reaching net-zero emissions by 2050. Through this journey, the power system industry will need to adjust from planning, building and operating a traditional power system to a fundamentally different paradigm while continuing to meet consumer needs. To achieve this, retaining legitimacy, credibility and trust amongst consumers will be critical to ensuring the industry collectively maintains social license. The general public is therefore a very important stakeholder to consider throughout the transition.

While the topic of social license has most recently focused on the delivery of critical infrastructure for the transition, this paper also considers the broader issue of social license amongst everyday consumers who may not be directly impacted by a large infrastructure project. For this, the paper considers social license from three groups of people whose view of the industry are imminently relevant to the energy transition:

- Local communities affected by delivery of infrastructure
- Residential consumers as key customers of the energy industry
- Energy workforce at the forefront of the energy transition

It is important to note that these groups are not necessarily distinct from each other and all fall into the “general public” category. This means any one individual may fall in multiple categories or have influence on an individual who is part of another group. It is the view of the authors that the state of social license from these groups of people is currently at risk. Mismanagement of any one of these groups could be detrimental to the energy transition in the form of:

- Delayed infrastructure delivery
- Instability in the grid and uncertainty for consumers
- Loss of confidence in the industry to progress the energy transition.

Ultimately, any of these could result in a risk of instability in the network and poor energy security for consumers. This could in-turn reduce confidence in the industry’s ability to meet customer needs throughout the transition.



RENEE ANDERSON

Executive - People
TasNetworks



“The energy transition is going to require significant new investment and infrastructure, in both generation and transmission. The energy ‘Trilemma’ points to the balance between security, affordability and environmental sustainability. In some instances, the new infrastructure may need to be built in high-value environmental areas, and across private land to be the most reliable and affordable for customers.

How do we approach this challenge of balancing the ‘trilemma’ – what trade-offs might need to be made between the three arms of the trilemma?’”

Group Members:

Jieh Loong, Planning Engineer - Western Power
Maryam Hasheminamin, Renewable design Lead engineer - Endeavour Energy
Nina Modseni, - Senior Engineer – AEMO
Paul Cullen, Team Leader Lines Strategies - Powerlink
Taru Veijalainen, Senior Analyst - AEMO

Executive Summary:

The National Electricity Market (NEM) has begun the transition towards decarbonising the power system, while managing system security and affordability for consumers. To achieve this, it requires significant new investment and infrastructure in both generation and transmission. As this transition progresses it is apparent that ‘social and local’ factors require a greater emphasis to successfully enable the infrastructure build required.

To achieve the added ‘social and local’ dimension, this report considers the challenge of balancing the energy ‘quadrilemma’, under four key pillars:

1. Environment: meeting global and federal climate and emissions targets to minimize climate change impacts.
2. System security: maintain sufficient security and reliability in the power system to ‘keep the lights on’.
3. Affordability: keeping electricity costs manageable for all Australians, with a particular focus to ensure that vulnerable customers are not unfairly impacted.
4. Social and local: Develop and maintain the industry’s social license to operate, creating positive relationships with landowners and first nations people, and a continued focus on sustainable developments that preserve the environment.

To approach the balance between the four pillars, an understanding of each of the pillars was considered. This identified that affordability is a major concern for electricity consumers, however when factoring in the environmental and system security risks, it became clear that a differentiation needs to be made to consider short-term versus long-term affordability. It is proposed that the short-term affordability may need to be compromised to achieve the more pressing environmental and social engagement activities given the timeframe required. While long-term affordability would ultimately benefit. Additionally, there may be options to consider re-assessing the level of security requirements, to evaluate whether there is flex as technology changes and for the benefit of reducing consumer cost.



SCOTT RYAN

Chief Asset and Operating Officer,
Endeavour Energy



Climate change is resulting in more frequent and more severe major events. Our customers endure outages at the time they need power the most. What should we do differently to support our customers? What can we do through elimination, prevention, or response to climate change? And how do we better empower our customers for these events?

Group Members:

Matthew Crutchfield, Electrical Engineer – Wilson Transformer Company
 Jessica Jones, Senior Network Integration Officer – Energy Queensland
 Dulani Nanayakkara, Electrical Systems Lead, Energy- WSP
 Justin Pickering, Senior HV Designer- Yurika
 Lauren Tan, Senior Transmission Planner- Ausgrid

Executive Summary:

Australia's mean temperature has increased by about 1.5°C and this is causing 1 in 100-year events to happen more regularly. This is causing bushfires, cyclones, and flooding to test the resilience of the power network. While all states and territories are experiencing their own resilience issues, we are focusing on Endeavor Energy in NSW and their major and continuous threat of bushfire.

In 2022, several DNSPs decided to jointly define resilience in a network as “the ability to resist, absorb, accommodate, adapt to, transform and recover from the effects of a hazard.” Major factors contributing to hazards include:

- Increasing disasters/climate change events
- Diverse customer needs
- Aging assets
- Communication and customer awareness

The Challenge question defines the primary issue as “Our customers endure outages at the time they need power the most.” The number of ways electricity is used, and the reliance people have on it has increased over time but also at a faster rate in the last decade. While customers are a key stakeholder, they are not the only stakeholder. Other important stakeholders include:

- NSPs
- Local, state, and federal government
- Community groups

The way the stakeholders identified are managed depends on their influence or power as well as their interest and availability. The spectrum ranges from close management and engagement for stakeholders with high influence or power as well as interest and availability to notifying of development and monitoring for stakeholders with low influence or power as well as interest and availability.

As hazardous events continue to increase in frequency and severity it is important that each DNSP continually monitors, adapts, and improves their response to such events to ensure their customers are not left in the dark. The following recommendations have been developed after discussion between several NSPs across Australia.



DR BILL LILLEY

Chief Research Officer,
RACE for 2030 CRC



As a case study for how organisations better work together to develop and implement the innovations needed to support the energy system transformation in Australia:

How do we (the RACE for 2030 CRC) work with industry and university stakeholders to develop a research plan that best satisfies our wide range of stakeholders? Our industrial partners often have short-term pressing issues, and our research partners are often focused on long-term transformative change. What is the best way to balance this tension of immediate vs long-term research needs? Given how extensive and fast change is and will be happening within all our organisations, what do we need to be doing differently to engage with and support the breadth of the power sector workforce? How would you approach this situation and how do we effectively engage with people in roles that don't traditionally connect with research and innovation?



Group Members:

Bianca Christison, Manager Network Development - AEMO
Barton Hellyer, Senior Engineer Future Grid - Endeavour Energy
Daena Ho, Senior Engineer - AEMO
Andrew Wheatland, Secondary Systems Engineer - SA Power Networks

Executive Summary:

In the Reliable, Affordable, Clean Energy (RACE) for 2030 Cooperative Research Centre (CRC), funding contributions are negotiated in a 'marketplace', with the possibility of simultaneous projects being formed across the same parties. Challenges arise due to the differences in priorities, timeframes and profit models between industry and academia. The current approaches taken by RACE for 2030 to bridge that gap include:

- **Highlighting feasible projects:** the CRC has an active 'fast track' stream that scans for project feasibility or kickstart pilot projects.
- **Greater ownership:** industry partners allocate 70% of their funding to projects they select.
- **Improve collaboration:** Partner and stakeholder management positions from RACE whose purpose is to build connections between groups.

As a first step, industry and academia should build buy-in to prioritise collaboration - executives need to make the commitment to innovation and forward thinking, embedding this into the organization at all levels.

Our report also identifies three key actionable ways to build collaboration:

Leveraging platforms Forums within and between industries allow topic experts to pool knowledge and identify common issues. Knowledge sharing hubs (eg. wikis) allow consolidation of expertise onto an easily accessible platform with key topics tagged for experts to focus on. Provide a framework for short term studies to be 'building blocks' in long term strategic contexts, which combines the benefits of results-based short-term goals with overarching strategic long-term aims. Finally, encouraging engineers to publish on platforms such as CIGRE allows them to build understanding of research aspects of the work they do.

Workforce integration Creation of placement within industry for academics to provide a window into the opportunities which exist for new collaboration and insights. The appointment of a research officer within industry businesses to act as a business partner to make the connections between academic and industry opportunities.

Risk management plans Risk management plans need to be developed for each research project in collaboration between industry and academia as they are essential to identify risks within the research project and mechanism to deal with them. Risk management plans coupled with frequent engagement sessions will ensure the project progresses with both academia and industry needs in mind.



MARGARET PYRCHLA

Executive Manager Energy Transition & Sustainability, Western Power



“ Aside from setting climate change targets, what role should the federal/state governments and policy makers play to ensure these targets are met?”

What actions can technical professionals in the power sector workforce take to support these roles?”

Group Members:

Blake Ashton, Network Systems & Data Analyst- SA Power Networks
 Ben Dufty, Delivery & Performance Optimisation Manager- Endeavour Energy
 Marcus Excell, Asset Performance Team Leader- TasNetworks
 Inez Zheng, Grid Connections Manager- Akaysha Energy

Executive Summary:

After six years of wrangling, the UN-led effort to create a market for units representing emissions reductions under the so-called Article 6 was finally agreed at COP26. Australia from a federal level has not been in a world leading position even though we have abundant natural resources to empower the local communities with clean green power as well as potential to become a net power exporter and boosting the local economy. Cost of living is increasing with economies coming out of COVID as well as having supply side limitations around the globe. The role of the government is increasingly being questioned on “what more” can they do for Australians in our response and play catch up with climate change action. There are four main areas the group has focused on to pinpoint tangible changes that a government, state or federal, can make. They are the following -

1. **Empowering the customer** Provide our customers with information to upskill and inform them on the energy transition. As such a key component of our climate change objectives, customers need to be taken on the journey to understand what, why and how of our transition plans, and the key roles they play within this transition. This includes providing the ability to understand complex technologies and enable ease of market participation to reduce barriers to entry and decrease payback time of investment.
2. **Facilitating early transition of generation sources** the government should fund, provide frameworks and incentives to promote installation of new technologies, such as storage, to facilitate a better market outcome for renewable projects in the midst of transmission build. Training the workforce to support the skill gap in the construction, operations and maintenance of new technologies is necessary to empower a sustainable transition.
3. **Increasing demand side investments and incentives** Electric Vehicles (EVs) will play a significant role in demand side response and initial government investment and incentives will need to focus on the rollout of a versatile charging network allowing consumers to “fuel” their vehicles in the locations where they park. With the further electrification of the network and the higher uptake of electric vehicles, the expectation is that more options for electric vehicles will result in a lower overall cost of ownership helping consumers to transition. The need to control consumer demand with energy efficiency measures (home insulation and efficient appliances) are crucial in enabling consumers to control the affordability of household electricity as well as the demand on the grid.
4. **Boosting innovation through a strong entrepreneurial ecosystem** to ensure sustainable innovation of new green technologies to support renewables, Australia needs to have a strong entrepreneurial ecosystem. The current gaps lie in improving 1. a technology agnostic but clear and simple regulatory framework and infrastructure, 2. venture capital funding and finance opportunities and 3. an innovation culture from both the investors, technology adopters and inventors.



STEWART BELL

Executive General Manager Network
and Business Development,
Powerlink Queensland



Group Members:

Melissa Taylor, Senior asset strategy engineer - Transmission Substations - TasNetworks
Glen Adcock, Senior Technology Innovation Engineer – Energy Queensland
Katrina Thomlinson, Reliability, Supply Quality & Ratings Engineer - Ausgrid

Executive Summary:

The Australian power industry is undergoing unprecedented change. As part of the Paris Agreement, to keep global warming to a maximum of 1.5 degrees Celsius, Australia as a signatory, must reduce carbon emissions to as close to zero as possible by 2050. The energy sector is the source of almost three-quarters of greenhouse emissions today and therefore is a vital component in the changes required to reach net zero. Historically power has been generated by coal and gas. The infrastructure for these generators was mostly built around 50 to 60 years ago. Little has changed in how the power industry has operated until now.

Moving from traditional fossil-fueled generation to renewables is driving an extensive redesign of the transmission networks across Australia. This transformation will impact every power user in the NEM (National Energy Market). This represents a vast number of stakeholders which need to be considered.

Community education will be vital in telling the story of why the transformation is needed. Feedback will be crucial to understanding the community's needs, wants, beliefs and values. Using this information to curate creative solutions will be vital to maintaining our social license and building trust.

Relationships with industry bodies must be leveraged for their knowledge, stakeholder base and research. This will save time, money and resources, this approach will also support communication and the delivery of creative solutions. Undertaking large-scale community interactions is not core to most power industry businesses. It would be prudent to explore the use of specialists.

“
As an industry we are often saying how we need to do earlier community engagement.

So how can we meaningfully involve the community in the planning of energy infrastructure to lead to better siting with regards to social and environmental impacts?”



HEIDI SICK

Industry Director, Energy
Australia & New Zealand



“Transmission networks are the key enabler for unlocking the next wave of renewable energy generation to decarbonise our energy system, and our economy to avoid catastrophic climate change and price instability. The scale and speed of transformation required is unprecedented.

How can we fast-track the build-out of tens of thousands of kilometres of transmission network across the NEM?

Group Members:

Deepthi Yogiswara, Intelligent Grid Engineer – Energy Queensland
Dilini Darmawardana, Network Engineer - TransGrid
Meagan Evans, Principal Project Manager - AEMO
Mohammad Jafari, Senior Asset Performance & Risk Engineer - TasNetworks
Myra Nolan, Estimation Manager - TransGrid

Executive Summary:

The global drive towards renewables and decarbonisation is rapidly gaining momentum as the world becomes increasingly concerned about the environment. At a federal level Australia has committed to net zero carbon emissions by 2050. Electrical transmission networks will play a vital role in achieving this goal. However, the fast build-out of transmission infrastructure presents a significant challenge. The lack of national level coordination and delays in supply chains are among the challenges faced.



MERRYN YORK

Executive General Manager,
System Design, AEMO



Most of the Executive Insights speakers have discussed the transition and its challenges – workforce, environment impacts, price outcomes and supporting different customer groups. There are many many aspects that need to come together for the transition to be successful.

How do we bring people (communities, landholders and industry) into the challenges of the energy transition in an uncertain environment while recognising decisions need to be made and we need social licence to implement them?

Group Members:

Fiona Isaacson, Job Scheduler - TransGrid

Samuel Mayberry, Senior Project Engineer Batteries – Energy Queensland

Randy Supangat, Principal Engineer - Network Operations – Western Power

Kim Whattler, Network Project Delivery Manager – Western Power

Executive Summary:

As climate change starts to have an impact on our environment, the Federal Government has set some extremely ambitious targets to reach net-zero by 2050. To achieve this requires major changes to the energy industry which presents a number of challenges. Transmission network expansion is a vital element in the transition to a low-carbon future economy. With the ambitious decarbonization targets and retirement dates having been set for most of the current fossil fuel generation (coal power stations) the power industry is having to pivot rapidly and navigate its way through the energy transition at a very fast pace.

Whilst the goal is clear, 'net-zero,' how we are going to get there has not yet been perfectly ironed out. There are numerous factors and complexities which add to the challenge of the energy transition. Various technical challenges like being able to maintain network stability and reliability whilst the demand forecast is built on multiple assumptions, as well as rapidly changing technologies makes it difficult to map and plan the end-to-end transition upfront.

When looking specifically at the large increase in transmission networks to support electrification, this network expansion will impact a wide range of communities, landowners and industries and will impact their ability to generate revenue. It's therefore important that Transmission Network Service Providers (TNSPs) and Government bodies ensure that rural industries and communities are engaged and supported to seize economic opportunities in the new and traditional markets.

To maximise the chances of success and minimise the negative impacts of the energy transition to net-zero, a coordinated effort between governments, TNSPs, businesses, and other relevant institutions and communities is required, and this starts by extending planning periods and starting stakeholder engagement as early as possible in the planning phase.

Establishing a social license has never been so important. As we enter the renewable revolution and attempt to shift the way customers consume energy and the industry implements major network expansion across Australia, having support of key stakeholders is vital. Early consultative and continued stakeholder engagement from planning and throughout construction is going to be critical for the success of the energy transition.