

Project Brief

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“The role of DNSPs is changing substantially, and we don’t yet know where it is going to land. How do we ensure we remain continually relevant and high performing, while optimising our investments and ensuring that we maintain delivery of services to our current customers?”

“What are the best options for managing the change (e.g., do we lean in and define our future role vs wait for the market to decide)?”

Executive Summary

Ausgrid is facing similar challenges and opportunities as other participants in the Australian energy sector, largely influenced by the high uptake of distributed energy resources (**DER**). It has a unique opportunity to influence its future operating environment and to some extent influence the effectiveness of the end product of its own transformation.

This paper considers key aspects of integrating emerging technologies, resource opportunities, and community, industry, and regulatory engagement required to do this. While there are many opportunities during this time of energy transition, there will be risks that will need to be mitigated, including:

- Recruitment of key resources during a time of peak demand for these skills;
- Managing and utilising data effectively;
- Influencing regulatory changes where necessary; and
- Engaging with the right people at the right time.

It is recommended that Ausgrid takes a proactive role in determining the environment it wishes to operate within by seeking to become a Distribution System Operator (**DSO**). This will address the upcoming challenges and opportunities, rather than having to adapt to a model that is developed by others.

Purpose

To ensure Ausgrid can continue to connect communities and empower lives, this briefing paper provides advice to Ausgrid’s executive management to become a DSO.

Recommendations

It is recommended that Ausgrid lean in to re-imagine themselves as a DSO, as this will provide them with a greater flexibility across the distribution network. To achieve this broad objective, Ausgrid will need to:

1. Identify and engage with key internal and external stakeholders;
2. Identify the critical skills required for the future workforce;
3. Develop partnerships with the higher education sector and industry to redesign curriculum to address future skills needs;
4. Acquire, improve and make better use of data;
5. Collaborate with the technology and innovation industry such that various DERs can be integrated into the operation of the distribution network; and

6. Lead regulatory and policy reforms to ensure incentives are in place for DSO's to actively and efficiently manage the grid.

Background

Ausgrid is facing similar challenges and opportunities as other participants in the Australian energy sector, largely influenced by the high uptake of distributed energy resources (**DER**). The growth of DER has given rise to more dynamic, two directional flows of electricity – which the networks weren't originally designed to accommodate. The increase in DER will not only change the way Australia produces and manages electricity, but will change the way customers engage with their distribution network service provider.

The rapid change from thermal power generation to variable renewable generation (**VRE**) has increased uncertainty in availability of critical network auxiliary services such as voltage and frequency support, and compromises system strength by exceeding load available for critical services to operate.

In addition, there are shifts in how customers are using power, with many households frequently changing from net loads to net generators in the middle of the day due to uptake in rooftop solar PV. In fact, rooftop solar photovoltaic (**PV**) is increasing as a large generator on the network. However, the major drawback is the inability of distribution network service providers (**DNSP**) to be able to manage or control the energy flows.

Ausgrid is also facing productivity challenges. The Australian Energy Regulator's (**AER**) benchmarking report on productivity and growth indicate below average performance for Ausgrid over the last three reporting periods. This benchmarking report measures the efficiency of DNSPs and reflects the common challenges facing all DNSPs across Australia:

- Ageing network;
- Low customer density;
- High and fast uptake of unmanaged small solar PV systems;
- System issues resulting from changing demand and supply patterns, and bidirectional power flows; and
- Lagging policy and regulatory reform.

Ausgrid has a unique opportunity to influence its future operating environment and, to some extent, determine the effectiveness of the end product of its own transformation. Ausgrid should consider taking the lead in developing the DSO role in their state to address upcoming challenges and opportunities, rather than having to adapt to a model that is imposed.

Distribution System Operator Model

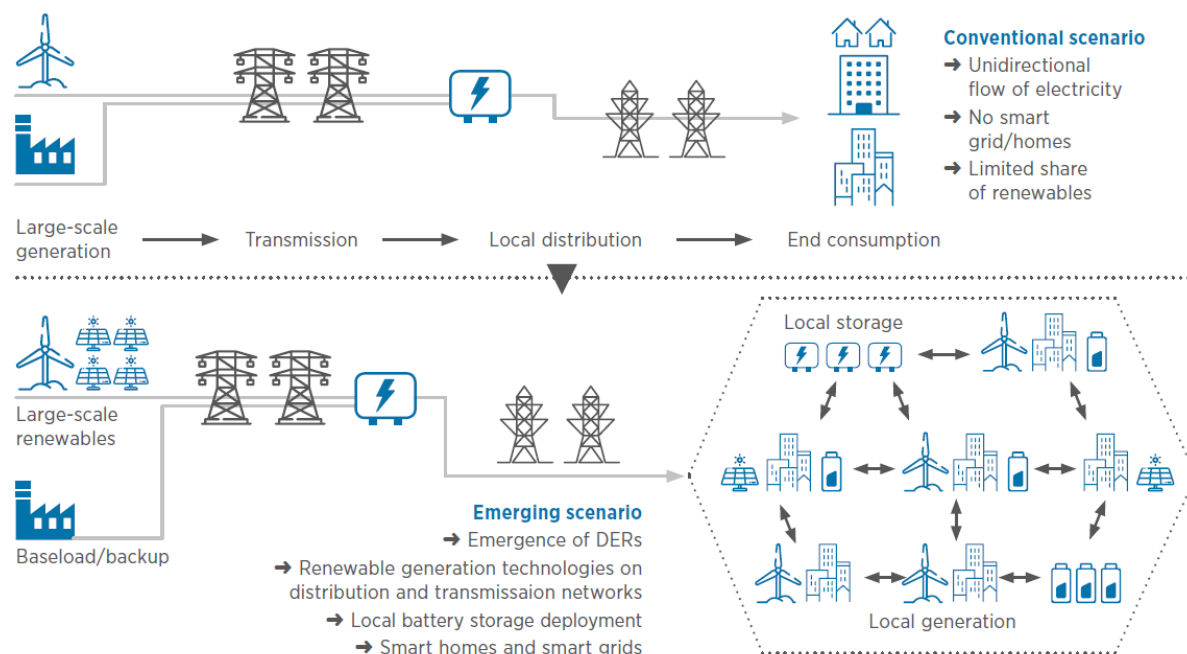
The energy sector is undergoing a transition to a smarter, more sustainable model, powered by more renewables. The traditional one-way flow of energy, across transmission and distribution networks, is being disrupted by the uptake of DER. The safe and efficient operation of the network requires smarter and more flexible management of these resources.

The transition to a DSO model will make it possible to maximise the integration of DER and accelerate the decarbonisation of the economy, providing benefits to customers, the economy and the environment.

A DSO is responsible for distributing and managing energy from the DER and providing the corresponding auxiliary services such as frequency control, voltage control, reactive power supply and

black start capability (see Figure 1). Control and digitalisation are the key to implementing a DSO model, requiring investment in automation, smart meters, real-time systems, big data and analytics, and human resources and capability.

Figure 1 – Conventional scenario versus emerging scenario in the power system due to increase in DER



Source: IRENA Future role of DSOs – Innovation Landscape Brief

A DSO model that builds on the DNSP role will bring the following benefits:

- Scalable and reusable architecture;
- Clarity on asset ownership and maintenance responsibility;
- No ambiguity of auxiliary services responsibilities;
- Greater capability to address localised network issues effectively;
- Provide the ability for local suppliers to innovate; and
- Integrate existing customer and stakeholder priorities to manage the new requirements of a DSO.

However, it should be noted that regulation will be required to standardise the approach across DSOs. This will provide national customers and retailers the ability to operate fairly and equitably across the country, and DNSPs would need to adapt their roles to become market facilitators on a real time basis.

Opportunities for Development

The transition to a DSO role will look different for every DNSP. The change process is new and challenging, but also offers a multitude of opportunities to expand the horizons of a traditional DNSP. The key value proposition for allowing the DNSP to become a DSO is to maximise the benefit of investment in DER technologies and reduce the impacts of curtailment.

Rather than allow for a potentially separate body to be established, a DNSP will be to:

- Work with key stakeholder groups (already established through the reset and other processes) to design, develop and implement an efficient market framework for all DSOs,

aggregators and other service providers to operate in, regardless of the type or vintage of the DER;

- Work with regulators and government policy makers to ensure DSOs have adequate scope for provision of auxiliary network services, and flexibility to respond to changing market landscape;
- Secure industry participation in developing new technologies needed for safe and efficient integration of high volume of DER, such as monitoring and control platforms, mechanisms to alter legacy DER settings, big data management, etc;
- Secure partnerships to develop the capability of future workforce by partnering with higher education, and tertiary institutions to develop future workforce capabilities; and
- Lean in to convert the goodwill of its customers into performance outcomes. As “Give us a wave” campaign demonstrated, there is a significant amount of goodwill in the community towards Ausgrid as a common service provider, owned by the people of the NSW. Through well thought out education and advertising, this could be converted into tangible performance improvements by improving a customer’s understanding of: how patterns of demand affect the network; how PVs, electric vehicles (**EV**) and batteries are impacting the network now and how that might change in the future, and; how this ultimately impacts the network prices and our net zero targets (both electrification and decarbonisation).

New technologies

By leaning in on the expertise of the industry to develop new technologies, Ausgrid can leverage for a smoother transition to a DSO model, where some of the potential areas of focus include:

- Technologies that would efficiently provide more real-time monitoring and control, to dynamically manage network constraints;
- Technologies that would enable effective orchestration of large volumes of DER of different types and vintages (PV, EV, batteries, unknown new technology);
- DER technologies that will be capable of periodic, remote and global settings updates corresponding to DSO requirements;
- Technologies and constructs to collect, organise, store and manage the big data associated with aforementioned technologies; and
- Tools to enable customers to effectively manage their choices in terms of power use, generation, export and storage.

To further develop and understand emerging technologies, Ausgrid could consider some collaborating with the Australian Renewable Energy Agency (**ARENA**) to undertake targeted research with external developers of smart technologies to manage the two-way flow of energy between transmission and distribution networks.

Data

The amount of data that will be generated as part of the required monitoring and measuring technologies will be large and will also include information on the automated responses from artificial intelligence. Ausgrid has partnered with Future Grid to provide real-time monitoring and analysis of their network operations and to better assist with network planning.

However, despite the advances with their Future Grid collaboration, identifying data gaps in some areas of data would improve services to customers. These include:

- Ensuring accuracy of life support customers register;
- Improving DER visibility, including EVs; and

- Identification of business sectors connected to the low voltage network to help with understanding of consumption and demand.

The Energy Security Board (ESB), recently released a data strategy report¹ that identifies gaps in data that are impacting analysis now and will impact in the near future. Ausgrid could consider testing the usefulness of this data by undertaking surveys of existing customers in areas of the network where there are constraints. This could then be matched to existing data to provide additional insights and assessed for beneficial outcomes.

People and Place

The transition from DNSP to DSO will require Ausgrid to determine its place within its community and its essential workforce. This will require a strategy to ensure all stakeholders are engaged on Ausgrid's journey towards a DSO.

The key external stakeholders identified are shown in Figure 2 below:

Figure 2 – Key stakeholders



There are several key components to a successful strategy to engage and influence change, which require different levels of involvement.

- **Consultation:** this level of engagement is where stakeholders are informed of progress.
- **Engagement:** requires stakeholders to comment on or make decisions, or co-design/develop solutions.
- **Collaboration:** where partnerships are developed and joint service delivery.

We recognise that stakeholder engagement is an evolving process and will be dependent on the diversity of the stakeholders, their knowledge of the electricity network, and their understanding of the challenges and opportunities. As a result, any engagement approach will evolve and mature throughout the process.

¹ <https://esb-post2025-market-design.aemc.gov.au/32572/1630275857-esb-data-strategy-july-2021.pdf>

People and resource capability

Emerging technologies present DNSPs with the opportunity to take initiative to drive new business models. Of particular interest are the skill requirements of occupations within the technical trade's workforce group.

Existing large field workforces within DNSPs have skill sets aligned to the construction and maintenance of legacy poles, wires and cable networks. Emerging technology presents Ausgrid with the opportunity to evolve and redefine their future workforce.

A 2017 report from Energy Skills Queensland identified broad technical and business-related requirements that DNSPs need to successfully integrate emerging technologies. The report identified eight key skill groups required to position DSOs for the future:

- Engineering.
- Engineering Technical Officer.
- Technical Trades.
- Information, Communication and Technology (ICT) Specialists.
- Data Specialists.
- Executive Management.
- People, Culture, Communication and Change Officers.
- Customer Services.

As an example, for electrical tradespeople of the future to work in a safe and efficient manner on new technologies (such as battery energy storage systems), some of the new capabilities required include:

- Increased telecommunication skills and associated protocols.
- Isolation of multiple electricity feeds.
- Increased working knowledge of direct current (DC).
- Increased chemical knowledge.
- Product installation knowledge.

There are opportunities for Ausgrid to deepen partnerships with higher education and industry to redesign curriculum to address future skills needs. This is critical to ensure that Power Systems Engineers and Technologists of the future possesses the necessary skills that are reflective of industry needs. Further, collaboration with higher education and industry may increase innovation that will support the integration of emerging technologies.

External engagement

Ausgrid's "*Give us a wave*" campaign demonstrated a different engagement approach with their stakeholders to explain Ausgrid's role to maintain reliable connection to the network. The campaign's three key objectives included:

- Educating the public about Ausgrid's role;
- Humanising Ausgrid's workforce; and
- Developing a unified purpose.

As demonstrated through the development and execution of this campaign, having clarity about the message, clearly identifying stakeholders and determining the platform in which to deliver the message will achieve greater success and acceptance.

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Appendix – Risk benefits

Strategic Pillar	Action	Benefits	Risks	Mitigation
Engagement	<ul style="list-style-type: none"> ➤ Identify and engage with key internal and external stakeholders. 	<ul style="list-style-type: none"> ➤ Collaboration with different stakeholders. 	<ul style="list-style-type: none"> ➤ Failure to achieve support for the proposal. ➤ Number of stakeholders. 	<ul style="list-style-type: none"> ➤ Clear goal with key stakeholders to achieve outcomes.
Resourcing	<ul style="list-style-type: none"> ➤ Identify the critical skills required for the future workforce. 	<ul style="list-style-type: none"> ➤ Workforce has the necessary skills to construct, operate and maintain new technologies. 	<ul style="list-style-type: none"> ➤ Uncertainty of core skills required due to rapid pace of change in power industry. 	<ul style="list-style-type: none"> ➤ Develop partnerships with the higher education sector and industry to redesign curriculum to address future skills needs. ➤ Upskilling of existing resources.
Data	<ul style="list-style-type: none"> ➤ Introduce more real-time data and monitoring of network. 	<ul style="list-style-type: none"> ➤ Ability to dynamically manage network. 	<ul style="list-style-type: none"> ➤ Management and security of large data. 	<ul style="list-style-type: none"> ➤ Data management platforms are established.
Technology	<ul style="list-style-type: none"> ➤ Collaborate with the technology and innovation industry. 	<ul style="list-style-type: none"> ➤ Integration of DERs to operate distribution network. 	<ul style="list-style-type: none"> ➤ Uncertainty of behaviour of DERs. 	<ul style="list-style-type: none"> ➤ Research and trials into new DER technologies.
Policy & Regulation	<ul style="list-style-type: none"> ➤ Early regulatory and policy development. 	<ul style="list-style-type: none"> ➤ Framework in place to ensure DER penetration is managed. 	<ul style="list-style-type: none"> ➤ Regulation slows down investment in the sector. 	<ul style="list-style-type: none"> ➤ Striking the right level of regulation and innovation freedom.

Author Profiles

Amra Rullo

Amra is a professional engineer with more than 20 years of experience within the power industry. She has held a range of technical and non-technical roles, and delivered a number of large projects and strategic initiatives over the years. She is currently involved in the implementation of the Western Australia's DER Roadmap, with focus on the back-stop solution for the emergency solar management, Amra is passionate about renewables and sustainable energy future for all.

Julie Morrison

Julie has worked in numerous industries over the last 20 years, including logistics, investment banking, higher education and most recently the power industry. Julie is responsible for both transmission and distribution pricing at TasNetworks and is currently preparing the pricing strategy for the 2024-29 regulatory control period.

Justin Marshall

Justin is an experienced professional with more than 20 years of engineering, project management, operational and leadership experience within Western Power. Justin is currently the Distribution Design & Standards Manager where he leads an area responsible for the development and management of engineering standards and specifications associated with distribution plant and equipment, internal and external distribution design services, as well as engineering advice and services for related operational activities.

Elizabeth Tait

Elizabeth is an experienced electrical engineer in the areas of secondary systems and substation design. Elizabeth is currently working at SA Power Networks as Technical Lead in the Secondary Design team. Elizabeth's core responsibilities include providing technical direction for regulated projects and facilitating the development of standard secondary designs and procedures.