Energy Vision

Networks delivering net zero

March 2022

Energy Networks Australia

Energy Vision: Background & Context

Energy Networks Australia (ENA) is seeking to develop a vision that describes how energy networks will work together and with customers to enable Australia's net-zero energy future.

Background and context

The development of this vision is intended to serve as an agreed statement of the future roles of energy networks.

In doing so, the vision seeks to define a single vision of how transmission, distribution and renewable gas will work together in the energy grid of the future to enable greater customer choice and flexibility and support system security and reliability to enable energy decarbonisation at lowest possible cost to customers.

The shared vision will allow networks to articulate a collective pathway to net zero, identifying the activities, investments and timeframes necessary to reliably and affordably deliver the future energy system.

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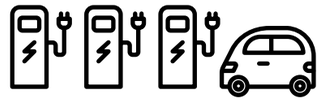


Our energy networks are Australia's electricity transmission and distribution and gas distribution companies. Together they provide more than 16 million electricity and gas connections to almost every home and business across all Australian states and territories.

Our members are

ACT
- evoenergy

NSW
- Ausgrid
- Endeavour Energy
- Australian Gas Networks
- essential energy
- Jemena
- TransGrid

NT
- Australian Gas Networks
- PowerWater

QLD
- Ergon Energy Network
- Australian Gas Networks
- energex
- Powerlink

SA
- Australian Gas Networks
- ElectraNet
- SA Power Networks

TAS
- TasNetworks
- TasGas

VIC
- Australian Gas Networks
- CitiPower
- united energy
- Powercor Australia
- Jemena
- Multinet Gas Networks
- AusNet services

WA
- western power
- Horizon Power
- ATCO

Associate member
- apa
- POWERCO
- unison The Powerlines People

Networks delivering a net zero energy system

The mandate to decarbonise is clear. Governments, investors and consumers across Australia and globally are driving a target of net zero by 2050. The energy sector will need to move earlier, accelerating pathways for other sectors to decarbonise.

To achieve net-zero we must transform the way energy is produced, stored, shared and consumed. At all levels this will require investment, innovation, new technologies, additional infrastructure, and policy and regulatory reform. This transformation must be delivered affordably, while maintaining system security and reliability.

Electricity and renewable gas networks will play a foundational role. Smarter, more dynamic networks will connect new sources of production, storage and consumption distributed across our regions, industries, cities and households.

In doing so, **networks will underpin new possibilities;** the uptake of clean and digital technology, the delivery of new energy services, and the equitable sharing of benefits across all.

At this point in time, **some pathways to net zero are still emerging**. This will evolve through time as technology costs, consumer preferences and policy positions become clearer.

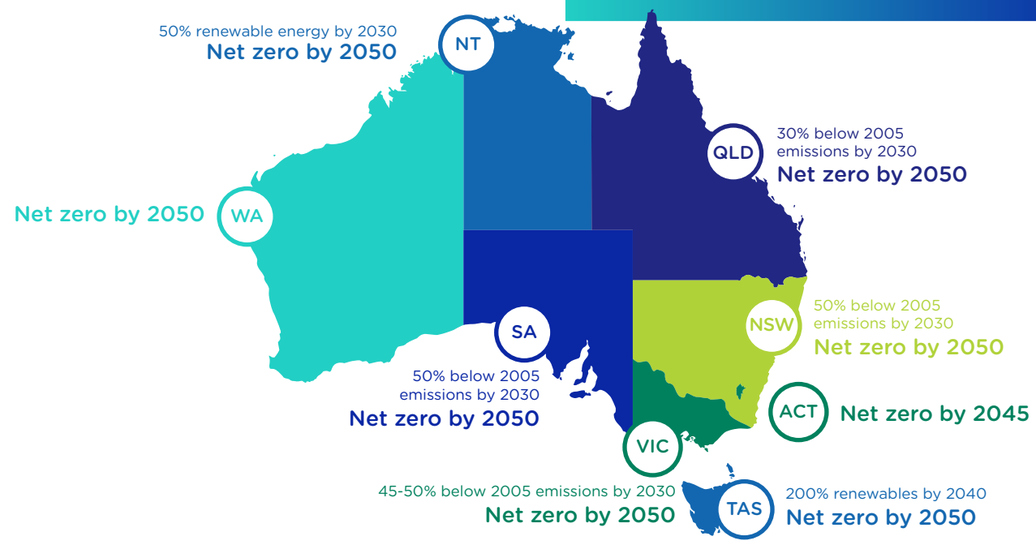
Retaining **flexibility and optionality within energy networks** will not prematurely constrain opportunity. This will allow networks to act proactively towards net zero emissions, while the decarbonisation pathways become more certain.

This aligns with networks' responsibility to act proactively towards net zero emissions, while ensuring the transition is orderly and consumers' interests are protected.

All Australian states, territories and federal Government have committed to achieving net zero targets within varying levels of ambition – from 2030 to 2050. These goals are driven by stakeholders and in some cases legislation. Networks are committed to delivering, as a minimum, the targets as mandated by law and demanded by our customers, shareholders and stakeholders. Doing so efficiently and in a way which delivers the greatest value to all customers will be critical.

This Energy Vision is intended to serve as an agreed statement of the future roles of networks and inform regulatory structures required to deliver this in the long-term interests of customers.

States targeting net zero CO_2 emissions



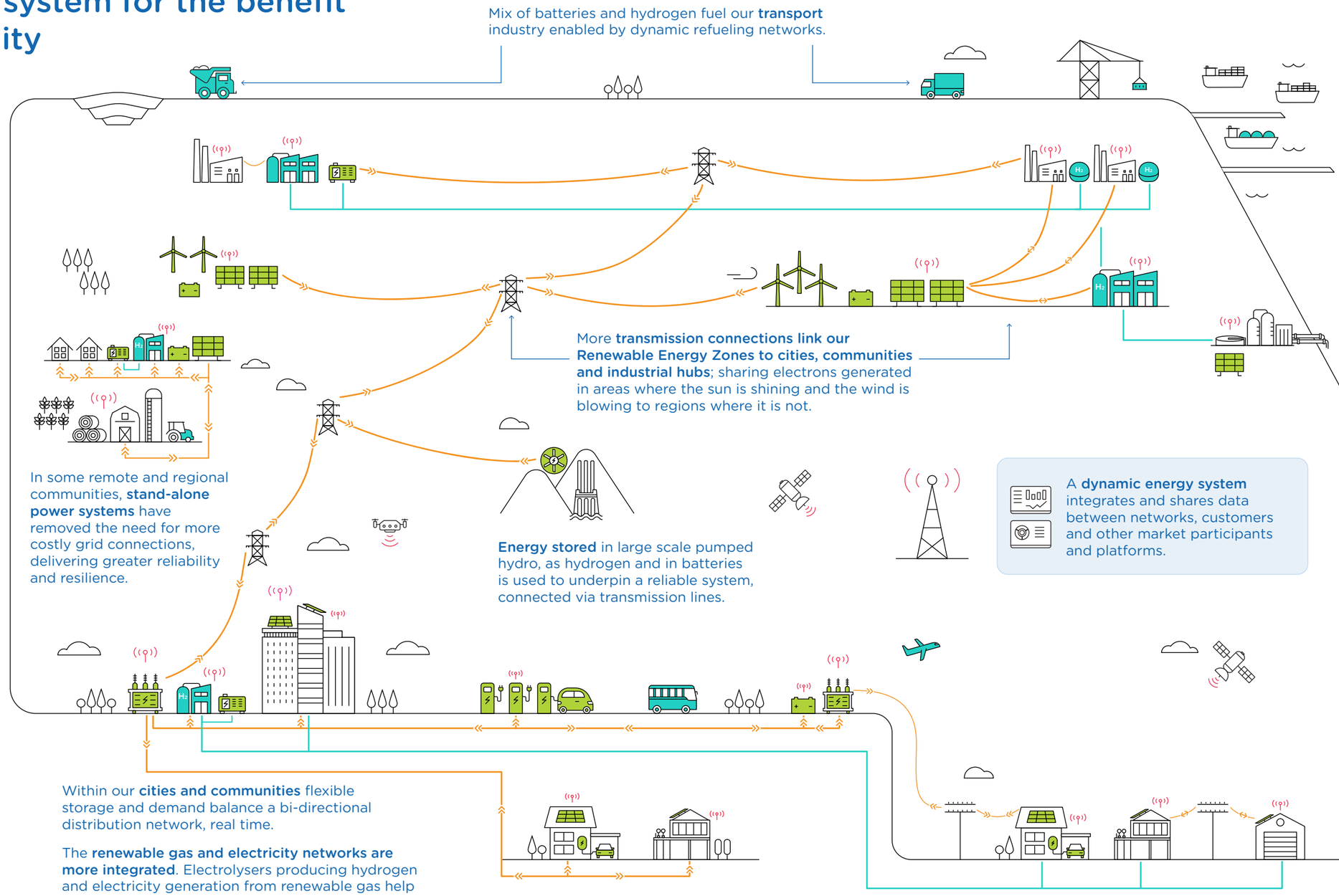
Energy networks will work together to deliver an affordable, secure, reliable and equitable net zero emissions energy system for the benefit of customers and community

To do this, electricity and gas networks will be far smarter and more integrated than today. Customers and their different energy uses will be at the centre of networks' activities.

Our electricity and gas **networks will proactively explore a range of *smart, integrated* solutions** and services. ***Investments*** will unlock the value in new technology while **maintaining flexibility and optionality**.

Consumers will be central throughout. Therefore our activities will seek to balance the **provision of *safe, reliable, clean and affordable* energy across the short and long-term**.

Our prudent investments will move us collectively toward the establishment of **a dynamic, integrated energy system that equitably shares the opportunity and benefits across all.**



Uses of energy networks in a net zero economy

While some of the pathways to net zero are still emerging, in all scenarios networks will play a crucial role in enabling possibilities and facilitating the transition.

There are many changing use cases within the future energy system that are broadly understood. For example, enabling customer connections of distributed energy resources. However, some are yet to play out, such as the role of renewable gas in households.

What is clear is that to affordably and reliably decarbonise, our existing energy delivery systems will need to adapt to facilitate the evolving energy mix. Today, our networks transport gas and electricity. In the future, a mix of renewable gas and renewable electricity will support peak summer and winter demand, as well as storage requirements.

Use cases may vary across different customer groups but could include the following:

Possible energy use futures

Households and business – Rooftop solar generation complemented by batteries, smart home devices and electric vehicles are linked with intelligent platforms. These new platforms are enabled by a dynamic two-way network, allowing households a range of options for engaging in markets.

Customers have the choice to use renewable gas or electricity for heating, hot water, cooking.

Transport – Electric vehicles (EVs) create new nodes of electricity demand and mobile storage on the network. Distributed charging stations and car parks maintain dynamic relationships with the network through the use of smart, automated platforms.

Heavy vehicles, long haul, buses, shipping and planes switch to hydrogen or hydrogen bi-products. Refuelling requirements are provided by multiple pathways (e.g. on site production, tube and trailer, pipeline).

City and community – Dynamic integration of fast EV charging stations, batteries, distributed renewable gas production and other new demand (e.g. data centres) on the network will create new value streams while balancing loads and servicing evolving societal needs.

Our networks will be more resilient to the increased bushfire risk and frequency of severe storms resulting from climate change.

Industrial processes – Heavy industry has electrified where cost-effective to do so, driving a significant expansion in the demand for renewable generation. Heat intensive industry and refining has transitioned to renewable gas or clean alternatives.

Networks link renewable generation zones with industrial users and hubs, including for the production and distribution of hydrogen or clean alternatives, creating new industrial opportunities and underpinning a strong economy.

Energy exports – Energy importers have increased demand for clean fuels such as hydrogen. The scale of this new export industry drives investment into renewable electricity generation capacity which dwarfs domestic demand.

Wires and pipelines that link export supply chains to domestic uses allows the economy to benefit from an abundance of cheap energy.

Energy generation and conversion – Hydrogen electrolysis is a catalyst for the integration of gas and electricity, allowing small and large scale production to integrate with a dynamic regional and urban energy system. Net zero electricity networks are underpinned by renewable gas, that can be flexibly converted to balance loads and ensure continuity of supply.

We will work collaboratively on the prudent development of policy and infrastructure to enable these futures, maintaining affordability and reliability and allowing for the optimal long-term solution to be determined as greater certainty emerges.

Principles of the net zero energy system

Delivering a net zero future will require changes to how networks operate. The core values of safe, secure, reliable and affordable energy will remain at the heart of networks' role. As networks' role and services evolve, they will also be guided by the following principles to ensure the best possible outcomes for customers.

Clean, customer-centric, equitable, integrated, resilient, investable

Clean

Networks will proactively look to the future zero-carbon energy technologies, and undertake efficient investment in the smart services and infrastructure required to facilitate its reliable and affordable integration.

Network planning will also consider non-technology zero-carbon enablers such as demand response.

Customer-centric

Networks will deliver in the best long-term interest of customers. Services and experiences will continue to efficiently deliver against evolving customer service needs and expectations.

Networks will ensure that customers have the opportunity to engage and have genuine input into decision-making processes.

Equitable

Customers' ability and desire to access and benefit from new technologies and platforms will vary through time.

The new capabilities and services required from networks will be delivered and recovered in a way that provides fairness between those who gain value from new services and those who don't, between those who take up technology first and those who do later, and between energy users today and those in the future.

The application of these principles should guide decisions by networks and inform broader public policy, regulations and standards.

Where trade-offs arise between principles, decisions should always be made which account for the perspectives of customers now, and their interests within the energy future.

To ensure we get this right, we will work together with government, customers and other stakeholders.

Integrated

Successful network operation will extend beyond individual network infrastructure. A single energy system will integrate decentralised generation, storage and demand as a whole system with customer needs, equity and long-term interests at its heart.

Resilient

Networks will be strengthened to manage new and emerging risks. Replacement of assets and construction of new networks will seek to appropriately mitigate risks associated with climate change. Enhanced cyber security capability to protect the system and customer data, as we shift towards a more digital and automated network.

Investment into resilience will be informed by customers views and preferences.

Investable

Enabling the transition to a zero carbon economy, while ensuring continued safety, reliability and security of a more complex energy system, will require investment over many years. The regulatory framework must efficiently, sustainably and equitably incentivise and reward this investment, while ensuring the fair and efficient allocation between those who manage costs and risks and those who benefit.