Australia's Technology Investment Roadmap

Submission

21 June 2020

Energy Networks Australia

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The Hon Angus Taylor MP
Minister for Energy and Emissions Reduction
PO Box 6022
Parliament House
Canberra ACT 2600

Submitted online via the 'consultation hub'.

Energy Networks Australia welcomes the opportunity to provide this submission to Australia's Technology Investment Roadmap discussion paper.

We are the national industry body representing Australia's electricity transmission and distribution and gas distribution networks. Our members provide more than 16 million electricity and gas connections to almost every home and business across Australia.

This submission highlights three key areas where research and development and new technologies are needed to support Australia's energy transformation.

These components of our system are different in their application, but they need to work together to deliver secure, reliable, affordable and clean energy into the future.

Renewable gas technologies

Our gas distribution businesses manage more than five million connections to Australian households and businesses. The gas supplied through these networks provides 44 per cent of the annual energy consumption of homes around the country.

To date, the focus of decarbonisation has been on the electricity sector, but gas networks are on their own decarbonisation journey. New renewable fuels, such as biogas (upgraded to biomethane) and hydrogen, have the potential to become mainstream and complementary energy solutions that will use existing energy infrastructure.

This opportunity appears to have been overlooked in the Roadmap. Gas networks have a massive capacity to store energy and blending small amounts of renewable gas across the network can be done safely without impacting end-user experiences while building renewable gas production capacity.

Since the launch by Energy Networks Australia and industry partners of Gas Vision 2050 in March 2017, many renewable gas research and pilot projects have commenced. The next step is to look at demonstrating the commercial feasibility of renewable gas options with the aim of converting networks fully in the next 20 to 40 years to renewable gas.

Energy Networks Australia www.energynetworks.com.au
Unit 5, Level 12, 385 Bourke Street Melbourne VIC 3000
P: +61 3 9103 0400 E: info@energynetworks.com.au
Energy Networks Association T/A Energy Networks Australia
ABN: 75 106 735 406

Figure 1: pathway for decarbonising gas networks (Source: Gas Vision 2050)

Biogas

When biogas is produced, this is generally a low-quality gas that can easily be converted to electricity using engines. Alternatively, the quality of the gas could be improved to meet network gas specification, allowing renewable gas to be injected and blended in networks.

Upgrading biogas to bio-methane is supported in many countries. The IEA Bioenergy Taskforce[1], highlights that different financial incentives drive different uses of biogas. For example, Feed-in-tariffs for electricity lead to more biogas being produced for electricity generation while financial support systems for green gas lead to an increased share of biogas in gas networks.

Hydrogen

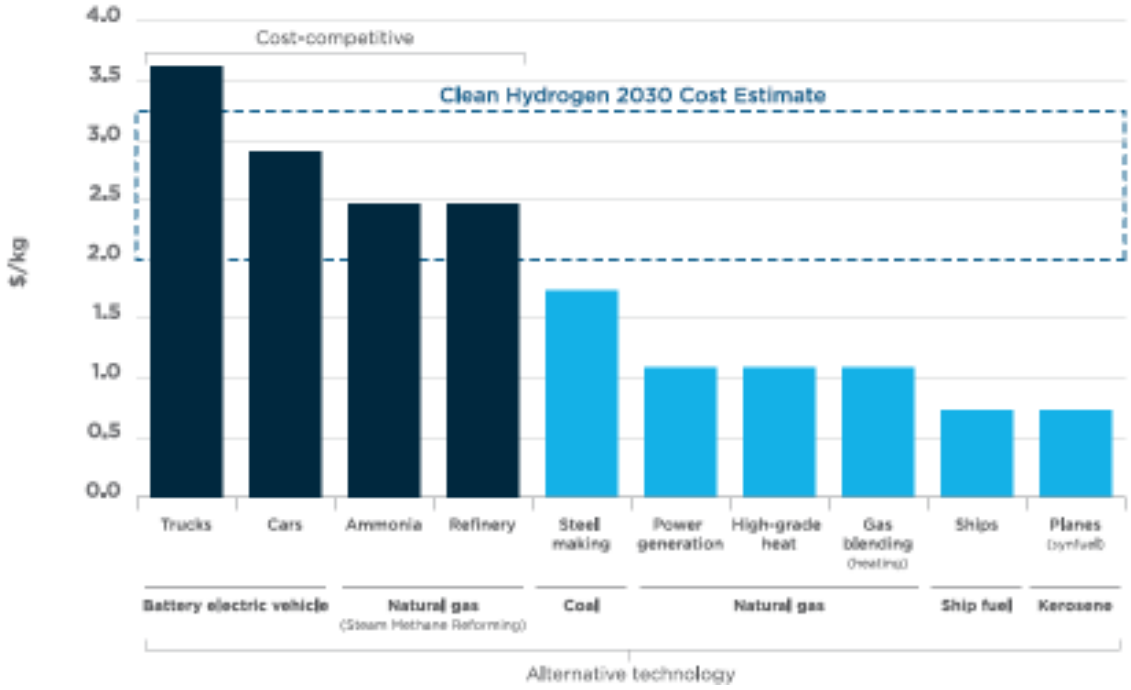
Hydrogen provides another opportunity to decarbonise gas networks.

Our members are actively leading hydrogen blending pilot projects with more than $180 million allocated to projects located in WA, ACT, NSW and SA.

The National Hydrogen Strategy illustrated that replacing gas in networks with renewable hydrogen is not competitive based on 2030 cost estimates.

[1] IEA Bioenergy Task 37 (2019), *Country Report Summaries 2019*

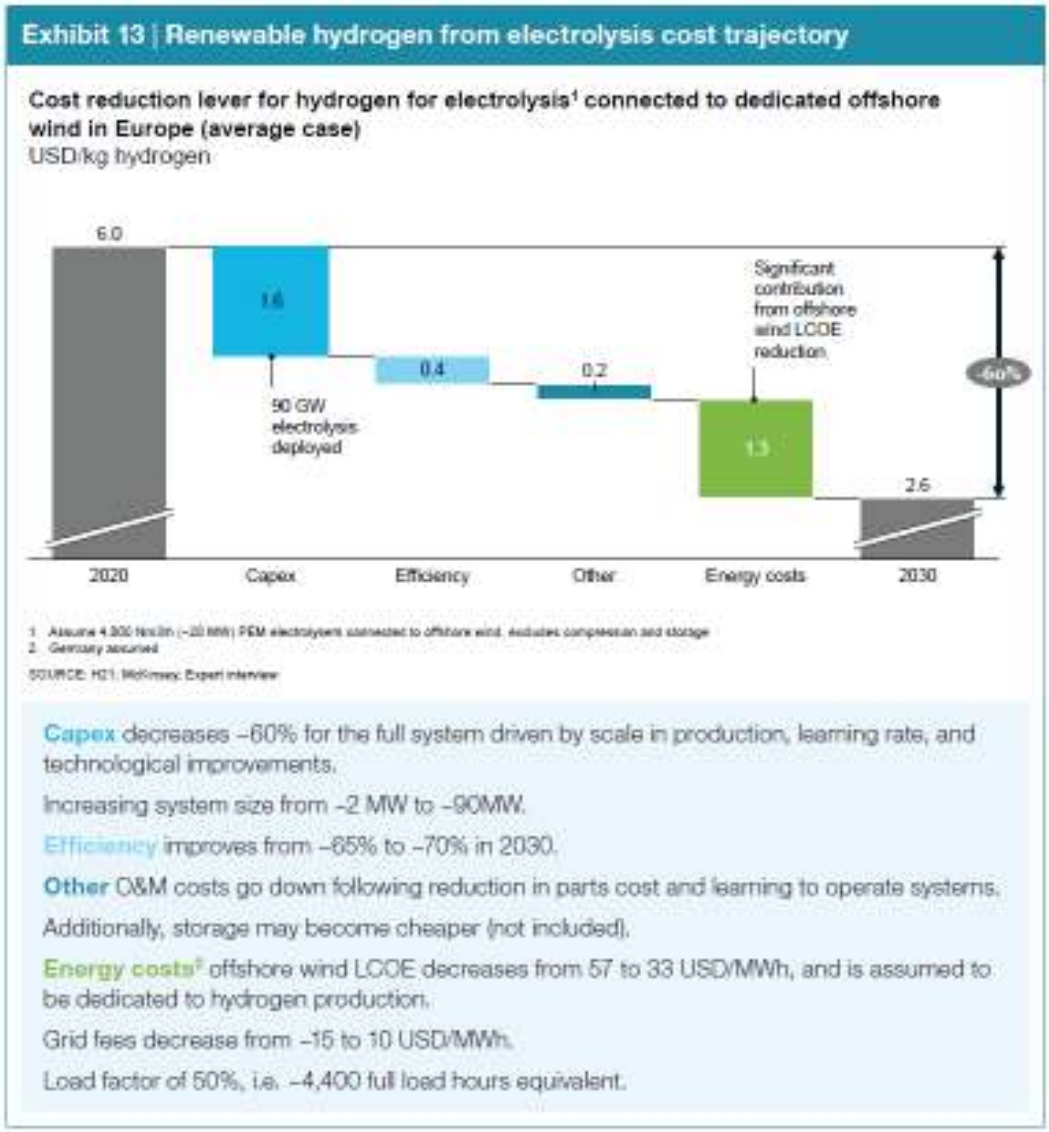
Figure 1.3 Breakeven cost of hydrogen against alternative technology for major applications, in 2030.



Source: National Hydrogen Strategy, Figure 3.1.

However, the Hydrogen Council[2] has showed that hydrogen production costs can decrease by 60 per cent by 2030, driven by the reductions in capital costs for electrolysis plants and lower costs of renewable energy.

[2] Hydrogen Council (2020), *Path to hydrogen competitiveness – a cost perspective*



Source: Hydrogen Council (2020), *Path to hydrogen competitiveness – A cost perspective.*

The National Hydrogen Strategy 10 per cent kick start project[3] identified there were no significant regulatory and technical barriers for blending up to 10 per cent hydrogen in gas distribution networks. This represents more than 15 PJ of hydrogen, requiring more than 500 MW of electrolyser capacity supported by renewable electricity from the grid.

[3] COAG Energy Council (2019), *Hydrogen in the gas distribution networks – a report by FFCRC, GPA Engineering and the SA Government*

Recommendation: Blending target

Setting renewable gas blending targets in networks offers an opportunity to build scale and contribute towards cost reductions of these technologies. A renewable gas blending target for networks and appropriately developed incentives could facilitate the introduction of renewable gas in Australia. Over time, these incentives should be adjusted as the technology becomes widely deployed and becomes commercially competitive.

Transmission Infrastructure

Improved transmission infrastructure and interconnection between states is essential to support renewable power generation, keep electricity supply secure and reliable and link markets to keep customer costs down. Renewable generation is often built in remote locations and transmission infrastructure is essential to enable the clean energy it produces to be delivered to customers. Around the world, the response to more intermittent renewable generation is to build a more connected grid.

The Australian Energy Market Operator's (AEMO) mid 2020 Integrated System Plan (ISP) is a holistic plan for the transition as large coal fired generators retire and are replaced with smaller renewable generators in many different locations. The optimal development path for transmission infrastructure is selected by AEMO and is robust to a range of possible future scenarios. The inclusion of a stable long-term emissions policy would be a helpful input into the ISP as would stable long-term state government development plans.

The consultation paper notes the need to build more storage capability into the National Electricity Market (NEM) and the need for more transmission infrastructure to enable increased levels of variable renewable energy and a lower emissions economy. Large pumped hydro projects, like Battery of the Nation and Snowy 2.0, need transmission infrastructure to provide this firm dispatchable capacity to meet demand when there is no sun or wind.

The significant amount of transmission investment identified in the ISP will create jobs in local communities and assist with economic recovery from COVID-19. However, where other large-scale infrastructure projects also proceed, civil, electrical resources and other skilled labour will be in higher demand. Pricing will be based on the sellers' market and it is likely that costs will increase. The new rules framework developed to action the ISP is designed to ensure this infrastructure does not proceed at any cost, providing safeguards to consumers.

Where projects are built by one region and benefit others, the current NEM inter-regional charging arrangements are not considered adequate. Fairer cost allocation needs to be resolved for large interconnector projects such as Marinus to proceed. This could occur via broader customer funding or government support. Transmission network service providers (TNSPs) welcome the opportunity to work with the Energy Security Board and governments to address this issue through an agreed method of billing between the TNSPs.

The consultation paper notes that 'ultra-low-cost' transmission technology also shows promise in delivering cheaper supply but is in the early stages of development and would require long term R&D support to bring to market. The paper provides no definition or description of such a technology. If the intent was to adopt high voltage direct current technology (HVDC) then this option could be considered in the options assessment undertaken by transmission networks as part of the regulatory investment test. HVDC is often cheaper than high voltage alternating current interconnectors (HVAC) for long distances, though this depends on the number of connections and converter stations required.

As synchronous generators retire there will be less inertia to help keep the power system stable. HVAC interconnectors help to share the synchronous generation or inertia between regions as the grid becomes tighter. HVDC does not provide this same benefit.

Energy networks have proposed supporting innovation and technology through the application of a demand management incentive scheme for TNSPs. The Australian Energy Regulator is expected to make the guideline to support this incentive scheme by mid-2021. Further research and development can assist to reduce the cost of network services to consumers.

Recommendations

1. The inclusion of a stable long-term emissions policy would be a helpful input into the ISP, as would stable long term state government development plans.
2. Fairer cost allocation needs to be resolved for large interconnector projects. This could occur via broader customer funding or government support.
3. A demand management incentive scheme for TNSPs would support R&D to help reduce the cost of network services to customers.

Distributed Energy Resources

Distributed energy resources (DER) have a significant role to play in the categories of electricity, transport, built environment, industry and enabling technologies identified in the roadmap.

The integration of these technologies will be essential to maximise their benefits. This is particularly true in distributed energy, where a range DER will need to be managed and coordinated, eventually in real-time.

While Australia is more likely to import new DER like solar PV panels, batteries and EVs, the nation has a significant record in software development and enabling the "smarts" of these technologies. This is not one "big" new technology, but lots of small innovations and new technologies that will make the "whole" operate effectively, making a very real impact on the lives of Australians and the entrepreneurs developing new approaches.

Work by Chief Scientist, Dr Alan Finkel, identified the need to "see" the distribution network in real-time in order to manage its system-wide impact and maximise its benefits. This visibility is critical to facilitate new approaches, such as dynamic connection arrangements.

Open Energy Networks, a joint project between Energy Networks Australia and the AEMO, highlighted distribution network service providers' (DNSP) requirements for visibility, which will maximise the paid participation of consumer owned DER in both the wholesale market and providing services to support the efficient and secure operation of distribution networks.

Australia has an opportunity to develop these new products and services such as peer-to-peer trading platforms, community energy platforms, energy management, smart inverters (particularly retro-fitting smarts to unsmart older inverters), provision of services, metering and network visibility. Australia is an ideal test bed for these new approaches given its world-leading deployment of DER. Indeed, some of this software development work is already underway.

This data from many small disconnected DER will also be essential for mapping, forecasting and modelling electricity networks, to support planning and secure operation.

As the electricity system decentralises, the solutions are likely to also be decentralised and come from multiple innovative sources, rather than a single source. Additionally, the diversity of individual networks and multiple different approaches to these integrating technologies will naturally deliver resilience by avoiding a single point of failure through a single provider or approach, noting that interoperability and cyber-security is key.

While regulation is not in the roadmap's scope, it is important to note that it can stifle the deployment of smarter solutions (e.g. the rollout of smart meters and Power of Choice metering reform) and limit NSP investment in visibility solutions (e.g. determination decisions by the AER). Also critical are standards that will ensure that all these many new technologies can talk to each other safely (interoperability & cybersecurity). This is a key issue to ensure customers are protected and not locked out of markets due to proprietary software.

It is important that work to support the transformation of our energy system is not made the sole responsibility of a single entity. The decentralisation underway is best supported by joint accountability and collaborative effort by network service providers, market bodies and other stakeholders.

Recommendations

1. NSP efforts to increase visibility to enable DER integration and system management should be supported.
2. Management of a future distributed energy system is best facilitated by collaboration and accountability by all stakeholders, rather than centralised decision making.
3. Regulation should prioritise the long-term interests of customers and encourage, not stifle, innovation.