NATIONAL ENERGY RESOURCES AUSTRALIA

Creating connections for growth

AUSTRALIA'S TECHNOLOGY INVESTMENT ROADMAP: DISCUSSION PAPER

NERA Submission

June 2020

Introduction

National Energy Resources Australia (NERA) commends and supports the Federal Government's development of a national Technology Investment Roadmap (the Roadmap) and considers it to be an important driver for a lower emissions future.

As Australia's Industry Growth Centre for energy resources, NERA has identified priority areas to create structural improvements across Australia's critical energy sector to power a more globally competitive, technology-led and low carbon future for all Australians. NERA's vision is Australia as a global energy powerhouse, a sought after destination for investment and the leading source of knowledge and solutions.

The priority areas where urgent action and intervention is required are:

1. Supporting the role of gas in Australia's energy future;
2. Backing major national incentives for exploration to unlock Australia's resource base;
3. Funding innovative digital and autonomous technology projects; and
4. Removing regulatory barriers to future growth.

NERA's Sector Competitiveness Plan (SCP) provides a 10-year strategic plan for the energy resources sector. This strategic plan translates into eight knowledge priorities that underpin NERA's activities and engagement, one of which is to 'Pursue a sustainable and low carbon energy future.'

NERA is already taking action to support Australia's energy transformation by funding a number of technology-based low emissions projects and progressing Australia's National Hydrogen Strategy by consulting on establishing a National Hydrogen Technology Cluster.

As a trusted independent advisor to Government and with our deep connections across Australia's energy resources ecosystem, NERA would like to be considered as a member of the Ministerial Reference Panel to advise on Australia's technology priorities and identify pathways for efficient deployment.

The challenges, global trends and competitive advantages that should be considered in setting Australia's technology priorities

As the world's largest exporter of both coal and gas, and with coal, oil and gas continuing to drive much of our domestic economy, Australia can and must be a leader in this low emission transition. The fortunate position for Australia is that we have all of the components to maintain and grow our status as a global energy powerhouse.

Challenges

NERA views the key challenges to the success of the national low emissions technology roadmap as follows:

- Australia's geography poses a unique set of challenges with much of the accessible natural gas basins located far away from population and manufacturing centres, making access to this energy source expensive and complex.
- Australia has an excellent record of research but the commercialisation environment is challenged with significant barriers in the transfer of IP from universities and research institutes to the market.
- NERA's industry consultation has identified that there is limited access for SMEs to attract affordable growth capital to innovate and scale-up for technology deployment.

- The International Energy Agency predicts that falling oil and gas prices will place downward pressure on the economics of renewable sources in the short-term, and without policy support, some renewables that have seen rapid deployment may be displaced to cheap hydrocarbons and fossil fuels.[1]
- As part of a systems approach, NERA believes it is important to look across the entire economy to identify and foster the cross-sector transfer of technologies. Many technologies applied in one sector have benefits in other areas, either in creating employment or underpinning adjacent businesses, all while reducing overall emissions.

Global Trends

The world is experiencing a global shift away from coal toward gas and ultimately renewable energy resources. Many nations are still heavily invested in coal fired power generation technology that is years away from retirement. New thermal generation is increasingly both high efficiency, low emission (HELE) coal and gas-based and as a leading supplier of both high quality coal and natural gas, Australia has an advantage in the mid-term.[2]

Renewables such as solar and wind coupled with the emergence of potential new uses of hydrogen may threaten this position in the long-term unless **Australia acts now** to integrate systems across the country.[3] Australia must leverage existing strengths and advantages and effectively utilise a diverse range of energy sources and solutions to achieve affordable, reliable and clean energy. The International Energy Agency (IEA) suggests that a shift from "oil and gas" to "energy" provides operators with a way to manage transition risks and notes that some large oil and gas companies are set to make a switch to "energy" companies that supply a diverse range of fuels, electricity and other energy services.[4]

There are a number of emergent low emissions technologies that align with Australia's historic strengths and offer considerable opportunities for our economy. Most significant among these are:

- The production of hydrogen for both domestic consumption and, eventually, export.
- Growth of our capabilities in the utilisation and/or storage of CO2 produced in both the production and consumption of fossil fuels.
- Leveraging our national leadership in the area of remote operations.
- Exploiting emerging areas in digitalisation where solutions may be readily exported to other jurisdictions.
- The recent parliamentary inquiry into nuclear concluded that the Australian Government should further consider the prospect of nuclear technology as part of its future energy mix.

---

[1] New Atlanticist, "The implications of the coronavirus crisis on the global energy sector and the environment." [Online]. Available: https://atlanticcouncil.org/blogs/new-atlanticist/the-implications-of-the-coronavirus-crisis-on-the-global-energy-sector-and-the-environment/

[2] International Energy Agency (IEA), "Tracking power 2019: Natural gas-fired power." [Online]. Available: https://www.iea.org/reports/tracking-power-2019/natural-gas-fired-power

[3] IEA, "The oil and gas industry in energy transitions." [Online]. Available: https://www.iea.org/reports/the-oil-and-gas-industry-in-energy-transitions

[4] IEA, "The oil and gas industry in energy transitions."

Competitive advantages

Australia has a number of competitive advantages that should be leveraged when setting the nation's low emissions technology priorities:

- In the short term, Australia has a significant advantage as a large producer and exporter of high quality coal for both domestic and export markets. This allows time for the transition to a low carbon economy to occur whilst maintaining domestic grid stability, significant cash inflows and employment.
- Exports of LNG contribute substantially to the economic development of the nation and offer a cleaner alternative to other fossil fuels for our trading partners across the Asia-Pacific.
- Australia has an abundance of renewable wind, solar, wave, tidal, hydro and biomass energy capacity, none of which have been exploited to its full potential.
- As a significant exporter of uranium oxide, Australia is fueling zero emission nuclear energy plants overseas. Add to this our significant rare earth and critical mineral reserves, used in the production of numerous energy technologies such as wind turbines, solar panels and batteries.
- Australia has strong education, training and research systems, including in the energy sector, with the Australian Government already invested in a number of sector-related Cooperative Research Centres.
- Our energy and resources sectors are leading the world in working effectively and safely in remote regions and using technology to support those operations.

The shortlist of technologies that Australia could prioritise for achieving scale in deployment through its technology investments

NERA believes investment in the following technology areas must be prioritised:

Gas extraction: *NERA suggests that a new sector be included in the shortlist relating to technologies that enhance industry's ability to extract the maximum volume of gas from reservoirs as efficiently as possible and is a direct way to improve the emissions profile and is a key energy source to the manufacturing sector.* NERA is supporting the following projects to enhance gas extraction:

- Geosequestrial Techniques - Petrel Plug-in
- Converting Tight Contingent Resources
- Unlocking the Toolebuc Formation
- CSG Wellhead Compression
- Identifying Different Sources of Methane in Groundwater
- The Great Artesian Basin (GAB): New Body of Knowledge
- Enhancing Well Deliverability
- Methanation Study
- Solar LNG
- Solar Hybrid

Carbon Capture, Utilisation and Storage (CCUS): *NERA suggests that CCUS be a stand alone sector with its various applications listed, rather than be included in technologies related to industry-feedstocks/ industrial processes. Figure 12 of the Roadmap illustrates IEA's Tracking Clean Energy Progress report and shows that further effort is needed for CCUS in industry and transformation and in power generation.* Australia is well placed to develop and prove at scale the technologies to capture and both store and reuse the carbon. However, further support from both industry and

government will be required in order to develop commercially sized CCUS applications. NERA is supporting the following CCUS project:

- CO2 – Enhanced Oil Recovery

Hydrogen: *NERA supports the priority technologies associated with Hydrogen.* A key action of Australia's National Hydrogen Strategy tasks NERA to lead the formation and early development of a National Hydrogen Technology Cluster to maximise supply chain development of hydrogen derived from renewables but also in the early years from fossil fuels with CCUS, and across the value chain e.g. production, storage, transport and utilisation.

Enabling technologies: *NERA supports the inclusion of digital technologies as enabling technologies with automation technologies in the mining and oil and gas industries presenting tremendous opportunity for Australia.* NERA is supporting the following projects in this sector:

- Distributed acoustic and seismic sensing
- Virtual operating environments

Technology enablers: *NERA recommends the inclusion of 'Technology enablers'* as a sector in the *Roadmap to enhance adoption and deployment of low-emissions technologies in Australia including areas such as the development of appropriate standards and testing facilities for experimentation*. NERA is already supporting key projects in this domain:

- Open Industrial Interoperability Ecosystem (OIIE)
- Hydrogen Standards
- Test laboratories and facilities
- Repurposing offshore infrastructure for renewables
- Metal 3D printing via cold spray technology (SPEE3D)

Small Modular Reactors (SMRs): *NERA welcomes the inclusion of Small Modular Reactors (SMRs) as a shortlisted technology with the potential to overcome some of the traditional nuclear power development barriers and believe that a proactive approach is needed to remove legislative barriers to enable all technologies to be assessed on their merits, site suitability and level of community support.* This will enable Australia to capitalise on R&D, develop skills and adopt the technology once proven in other jurisdictions.

Goals for leveraging private investment

Private investment in low emissions technologies occurs along the entire technology value chain, from R&D to technology commercialisation to deployment and use.

Matched Funding model

NERA's experience shows that for every dollar we have applied to projects has resulted in additional $1.71 of private investment in the energy resources sector. This matched funding model incentivises industry and researchers to collaborate with an independent organisation such as NERA to demonstrate, deploy and commercialise technology into the market. NERA recommends that figure 10 of the Technology Investment Roadmap include reference to NERA and the overall Growth Centres Initiative as key enablers and investors in the demonstration and deployment of innovation and technology in Australia.

The matched funding model is an example how public funds can leverage and attract private investment creating a force-multiplier for collaboration and innovation in Australia. This includes building connections for growth, sharing of

non-competitive IP, skills and future workforce development, commercialising technology and research, and implementation and support of alternate business models such as clusters and export hubs.

Incentives

Setting clear, bipartisan policies around the management of carbon and incentives to support the reduction of emissions will facilitate private investment. This could include providing incentives toward the development, commercialisation and use of low emissions technologies. This may include governments committing to use lower emissions technologies, such as through the purchasing of low or zero emissions vehicles for public transport, particularly where this is supported by the development of necessary support infrastructure using locally produced, manufactured or supported technologies.

What broader issues, including infrastructure, skills, regulation or, planning, need to be worked through to enable priority technologies to be adopted at scale in Australia

Optimise the regulatory framework for future growth: We believe that a stable and consistent regulatory landscape is fundamental to the development and adoption of low emissions technologies in Australia. This includes both removing regulatory barriers (e.g. harmonising standards to align internationally) and implementing fit for purpose regulation that will ensure social licence.

Back major national incentives for exploration to unlock Australia's resource base: Energy producers who are working to bring additional volumes of gas to market could be provided with fiscal incentives tailored to the most prospective basins, and R&D incentives to suppport the identification and commercialisation of solutions that address the cost challenges of extracting gas from Australia's complex geological formations.

Work with industry and education to develop and nurture a pipeline of skills: This is particularly the case in the emerging digital and automation areas where there is an ongoing significant shortage of those appropriately skilled in fields such as machine learning and artificial intelligence. There is also an emerging shortage of skills in remote and regional Australia associated with the support of remote autonomous systems and robotics. These skills will be increasingly needed in other fields such as agriculture as technology advances. Collaboration of industry, universities and the VET sector will be pivotal to build the domestic capability needed to support emerging low emissions technologies. In the absence of local capability, skills would need to be sourced from competitors or overseas, raising costs and slowing the rate of deployment.

Support development of regional and technological clusters: The cluster model has been shown to be particularly effective in a number of other nations, though requires long-term government support as well as a significant and new skillset among leaders and members of clusters and their associated industries.

Where Australia is well-placed to take advantage of future demand for low emissions technologies, and support global emissions reductions by helping to deepen trade, markets and global supply chains

Maximise our strong energy trading position within Asia Pacific: There is opportunity to become a recognised source of low emissions technologies such as those used for carbon abatement. Alongside this is the potential for Australia to exploit its depleted natural gas reservoirs for the storage of not just our own CO2 but also that of our regional energy partners.

Become an exporter of hydrogen and the associated technologies from Australia to regional markets: NERA has built momentum and interest in the formation of a National Hydrogen Technology Cluster. We have completed key pre-cluster engagement and scoping activities and will submit a Business Case to the Federal Government for funding support to fully activate the cluster to accelerate this emerging industry.