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Submitted online

**21 June 2020**

### **Response to Technology Investment Roadmap Discussion Paper**

AGL Energy (**AGL**) welcomes the opportunity to make a submission in response to the Commonwealth Government's Technology Investment Roadmap Discussion Paper: A framework to accelerate low emissions technologies (**Discussion Paper**).

#### **AGL supports technology as a key driver of the energy transition**

AGL is committed to meeting the needs of its energy customers both now and through the transition to a net-zero emissions future. AGL is one of Australia's largest integrated energy companies and the largest ASX listed owner, operator and developer of renewable generation. Our diverse power generation portfolio includes base, peaking and intermediate generation plants, spread across traditional thermal generation as well as renewable sources.

AGL currently has \$1.9 billion of new energy supply projects under construction and \$1.5 billion of additional projects subject to feasibility, comprising pumped hydro, battery, gas firming, solar, and wind generation projects, as well upgrades to coal-fired power stations and a proposal to build a gas import terminal. We are involved in trials of solar and hydro with grid applications and behind-the-meter orchestration of distributed energy resources through initiatives such as our Virtual Power Plant to capture value for our customers from services they can provide to the grid. We are involved in a trial in the LaTrobe Valley which aims to trial the production of low-emissions hydrogen for export. AGL invests in a range of innovative technologies and partners with a range of cleantech startups both domestically and overseas.

AGL is also a significant retailer of energy, providing energy solutions to around 3.7 million customers throughout eastern Australia. We are leaders in driving innovative solutions for our customers, having recently deployed over \$300m in technology to support improved customer experience, including through the development of new products and services that utilise smart analytics and distributed energy resources.

In short, AGL believes in the critical role technology will play in the upcoming energy transition, and the potential it holds to contribute to Australia's prosperity.

#### **The Technology Roadmap provides a good foundation for the development of low emissions technology**

As such we strongly support the Government's vision for a Low Emissions Technology Roadmap. The principles are sound, particularly the focus on technology neutrality, private co-investment and unlocking the benefits of competitive markets. We also support the approach to develop data-driven and expert informed advice on the Roadmap through the proposed governance and consultation approaches.



## Priority low emissions technologies

We consider the approach taken to prioritising low emissions technology is generally sound. This involves looking at the potential of technologies to meet emissions reductions in Australia's particular circumstances, its areas of unique advantage and potential export strengths. The list of 140 technologies that are being considered during the initial phasing of the Roadmap is appropriately broad for this stage, and many warrant some further consideration especially given the difficulty in making predicting the course of technology over the long term.

However, we recognise the need to prioritise these technologies further, especially for early stage research and development (R&D) funding allocations.

As the Discussion Paper makes clear, for the electricity sector many low-emissions generation technologies are already well established and approaching or exceeding cost parity with new thermal generation. For example, combinations of renewables and firming technology such as pumped hydro, batteries and fast start gas can provide reliable and affordable low emissions power in the current grid. As noted within the Roadmap, low-emissions electricity generation can also contribute to the considerable abatement opportunities associated with electrification of other sectors, notably transport and manufacturing.

A technology R&D pipeline should therefore focus on developing technology that can expand and complement Australia's renewable resource base. In relation to the electricity generation sector, we consider there is value in further focus on:

- **Battery storage technology:** Australia is well placed to contribute to the development of advanced storage technologies, including grid and distributed batteries, which will play an increasingly important medium- and long-term role in firming renewable power. These will provide both load-shifting potential and energy security services to the grid to support the uptake of intermittent renewable generation;
- **Hydrogen production:** Hydrogen provides a strong potential to integrate with renewable energy and provide capacity for flexible and weather-independent load, domestic industrial and transport applications and export; and
- **Grid and system integration and orchestration:** The ability for generation and storage technologies to integrate into the existing energy ecosystem is critical to ensure their potential is maximised.

## Combining and integrating technologies

The first and second priorities above represent more singular 'breakthrough' technologies that offer potential for step changes in emissions reduction. The third priority outlined suggests an ongoing focus on R&D and public-private collaboration that improves the operation of the electricity system as a whole. As is illustrated in Figure 4 of the Discussion Paper, many of the lowest cost gains come from the combination of technologies, especially renewables and firming generation in the form of batteries, pumped hydro and fast start gas, and through the use of advanced information and data systems. Under all scenarios the market and its participants will need to operate a portfolio of assets and technologies.

This systems approach applies particularly to the orchestration of distributed generation and storage systems, which are playing an increasingly important role in our energy system. This is projected to expand enormously over the next decades. Increasingly, this will link with the transport sector via growth in electric vehicles, which will provide for both mobility and flexibility. Australia will lead in some of these specific technologies, though many individual elements will be developed by others. Equally, some of the most significant gains will arise from finding new ways to integrate and optimise different technologies, and to improve system functioning. Trials will remain critical to proving up these combinations, and in the important parallel task of fully engaging customers in the



energy transition. The latter task is critical to building trust and confidence in this transition, given that ownership of energy technologies will be increasingly distributed.

This suggests an ongoing need for experimentation and adjustment, including support for piloting technological combinations with public policy significance. Sometimes these technology combinations will not directly reduce emissions – they will shift load during the day, provide greater system security, or enable and expand electrification. Nevertheless, these approaches can lay important foundations for overall emissions reduction, through addressing reliability, security and affordability obstacles to such a transition, and through increasing optionality and system resilience.

We therefore welcome the inclusion of a range of integration technologies in the Discussion Paper. Rather than picking individual configurations to be on the final short list, we would suggest maintaining a general focus on energy systems integration in the final roadmap, with a particular focus on distributed energy resources given the particular evolution of the Australian energy system.

### **Setting objectives**

We welcome the development of stretch targets to focus some technological development efforts. This assists particularly for ‘breakthrough’ technologies such as hydrogen production or carbon capture and storage (CCS) where narrowing cost metrics are central to their potential. These should be complemented by other metrics for success or mission objectives. These could be set in terms of solving a particular defined problem relevant for Australian conditions, such as finding low-emissions alternatives for long haul transport. Or missions could be set in terms of achieving systems objectives; for example, in the case of the integration type technologies emphasised above, ensuring a range of proven options for electricity system security or reliability under high rates of distributed energy penetration.

### **Leveraging early-stage funding and mobilising capital investment**

Effective funding frameworks are critical to supporting the multi-stage technology ecosystem that has been described above.

AGL agrees that the Government should seek high levels of private sector leverage for technology development where appropriate. This should not be prescriptive but adjusted for the stage of technology development and where the technology is on its cost curve. Higher private sector leverage can be expected where policy frameworks incorporate incentives for the deployment of lower emission technologies.

Given the long-term nature of the issue it will be important that funding sources are predictable, so that industry and the research community can plan developments.

We agree with the judgement that Australia is well served by existing research and technology institutions, although we accept there is scope for continual improvement within the methodology suggested in the Discussion Paper; consistent evaluation frameworks and attention to the balance of the overall portfolio. Changes should build on, rather than replace, the current range of mechanisms.

The work that ARENA has done to support technology pilots and innovation has been critical in determining the potential value and scalability of many early-stage technologies. AGL has partnered with ARENA on numerous trials that have provided invaluable information regarding the viability of certain prospective technologies such as Virtual Power Plants, demand response capability, large-scale solar integration, and peer-to-peer blockchain trading. The insights from these projects have been shared publically and provided a substantial amount of value in shaping the future uptake of these various technologies. We therefore support continuing ARENA funding or equivalent. Similarly, we support the important role of the CEFC in mobilising capital investment in renewable energy, low-emission technology and energy efficiency in Australia.



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In these and other funding sources, in keeping with the overall approach in this Roadmap process, it is important that decisions on support for particular technologies are evidence-based, and allocated on technical merit according to the mandates of institutions.

Should you have any questions in relation to this submission, please contact Aleks Smits (Senior Manager Policy & Strategy) on 03 8633 7146 or myself on 03 8633 6514.

Yours sincerely,

A handwritten signature in blue ink, appearing to read 'B Sterland', written over a faint horizontal line.

Barry Sterland

GM Policy & Strategy, AGL Energy