AIE INTERVIEW

Matthew Sprague and Sean Trainor, Energetics

Matthew is the leader of a multidisciplinary team of energy and carbon management experts at Energetics. He is an experienced advocate for energy efficiency, productivity improvements and projects that deliver cost effective, reliable clean energy supply.

Sean is a public and climate finance expert, with experience in commercial banking, financial markets, green and sustainable bonds, risk management and government policy.

Sean supports Energetics' clients to understand their energy and climate-related risks and opportunities. His experience spans the rail, energy, utility, port, car fleet, insurance, real estate and agricultural banking sectors, and not-for-profit industries.

AIE: Several commentators have called for investments in the energy transition as part of a stimulus for economies as they recover from COVID-19. How does Energetics see value being created with such investments?

Matt Sprague (MS): We believe there is great value in supporting new low emissions energy technologies. This is also the view of the Australian Government, as seen in the *Technology Investment Roadmap Discussion Paper* (TIRDP) released in May 2020. This positions technology as driving the successful shift to secure, more affordable energy and lower emissions.

Australia has long been at the forefront of innovation and R&D with work being undertaken on technologies such as bioenergy, smart-grids, solar PV, concentrated solar thermal and ventilation air-methane abatement.

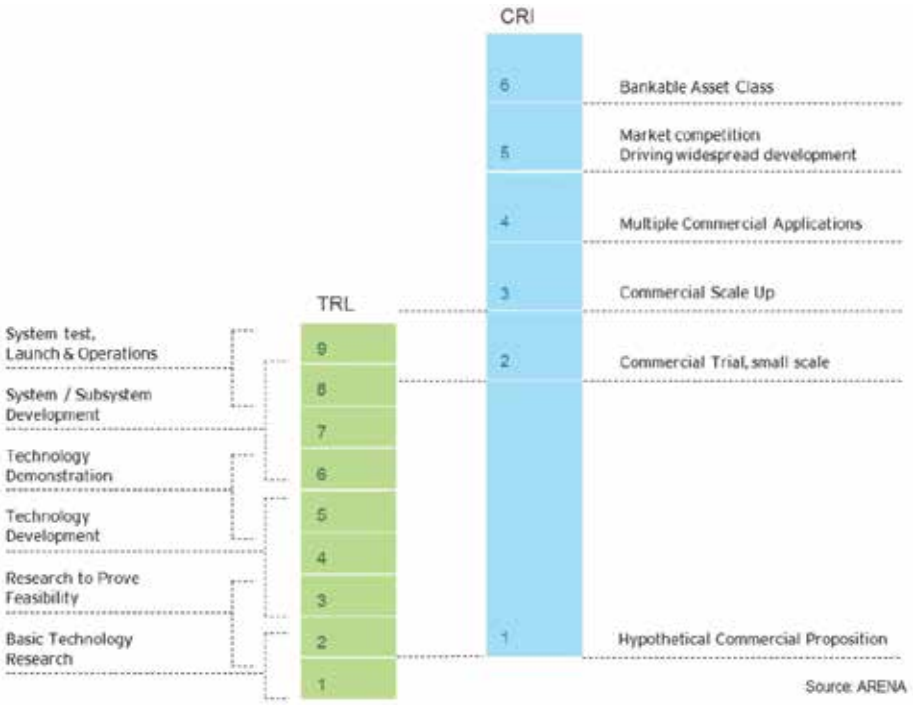
Some of the new low-carbon technologies require significant research and development. For instance, researchers in Japan are exploring highly efficient particulate photocatalysts that use sunlight to directly split water into hydrogen and oxygen. This promises to be a scalable and economically viable route to solar hydrogen production but is currently very low down the technology readiness level.

Others such as behind the meter batteries offering 16 hours storage are well understood technologies that need to be scaled up to reach broader commercialisation.

The TIRDP positions technologies needed for the clean energy transition on the Technology Readiness Level (TRL) or the Commercial Readiness Index (CRI).

We found this interesting as not only does it show the potential for decarbonisation over time but also the positioning aids in the understanding of how developed many technologies are.

Figure 1: How TRL and CRI scales work together



Energetics' own research and analysis highlights the importance of new and developing technologies to address many of the hard to abate energy-related emissions.

These include high temperature heating; never mind really tough sources such as some emissions from agriculture and the reduction of metal ores.

AIE: You just introduced two terms that readers may not be aware of: the TRL and CRI. Can you explain what they are?

MS: The TRL was developed by NASA to score technologies from lab to basic research through to demonstration plants.

The technology risk decreases as the TRL increases, as further evidence of the technology's suitability for commercialisation is demonstrated.

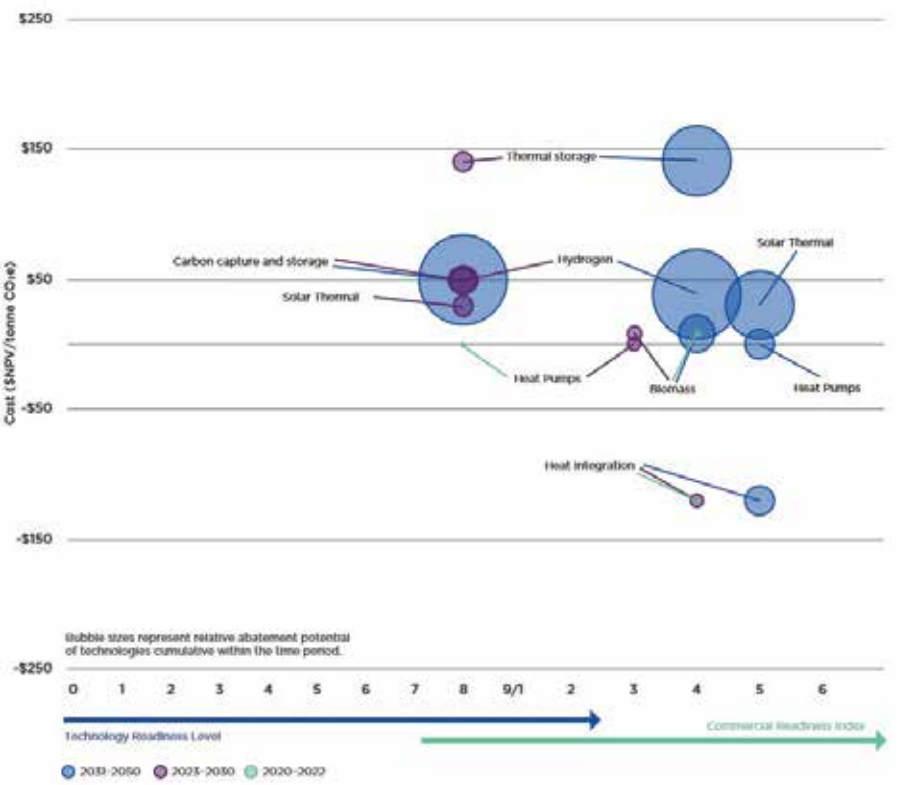
There is still significant commercial risk with even post-demonstration scale projects. This is where the CRI provides further insights.

CRI was developed by the ARENA to assess the commercial maturity of the technology from initial commercial deployment to when it has become a bankable asset.

The CRI uses a scale of 1 (commercial proposition) to 6 (bankable grade asset class).

The score is based on evidence in the market. Technologies are often given a technology readiness level (TRL) or a commercial readiness index (CRI) value based on the technology progression towards commercialisation. Figure 1 shows how the two scales work together.

Figure 2: Current development status of low emissions technologies for process heating



Source: Figure 14, Technology Investment Roadmap Discussion Paper, Government of Australia, May 2020

Looking at technologies for the energy transition, onshore wind and solar PV supported by gas-fired generators for firming sit at 'CRI 6 – bankable', meaning commercial banks will fund them. Whereas hydrogen for heating sits around TRL 7, meaning the process has been demonstrated but is well short of being a commercial proposition.

Sean Trainor (ST): It is interesting to reflect on the TIRDP. Figure 2 captures the current development status of low emissions technologies for process heating.

We see how thermal storage, currently near TRL 8, will move to CRI 4 (multiple commercial applications) in the period after 2030. The figure also shows the estimated cost of the technologies both now and beyond 2030.

Heat integration and heat pumps are already cost effective but thermal storage is not. The combination of the TRL/CRI level and the cost of the technology can give investors a good idea as to the financial viability of the technology.

It all comes down to matching the level of risk associated with investing in the technology, to an investor's appetite for risk.

AIE: Can you expand on that last point? How does risk affect investment in clean technology and how does the CRI impact the funding options available?

ST: The level of risk perceived by an investor gives them an idea of how likely the capital invested, as well as any return on that capital, will one day be returned.

The CRI is a useful way of looking at the technology risk of an investment proposition but that is not the only risk with novel business ventures.

There are many market risks, such as counterparty and liquidity risks, which are typically greater for the companies developing low CRI technologies.

Emerging technologies are not on a level playing field when it comes to assessments of risks. Also, although we all know that past performance is no indicator of future performance, even the most forward-looking assessments of risk have a strong historical basis.

Incumbent technologies have long track records of success, ready customers and established markets for their assets.

Low CRI technologies by their nature have limited past performance, questionable liquidity, and few

universally adopted methods for assessing their unique characteristics.

This bias in common risk management approaches may not only crowd-out investment in the technologies we need today but could underestimate the climate-related risks currently in the financial system.

The market needs better information. Robust and consistent environmental risk disclosures, as well as taxonomies of green and brown assets, can enable the market to fairly compare the technology risks of new technologies with the long-term climate-related risks facing their current portfolios.

New approaches to risk management won't lead to all investments shifting to these new technologies overnight. Investors still need to ensure adequate diversification of income – but it will help level the playing field for clean technologies, so they can attract more investor interest today.

Banks play an important role in our economy. They are stewards of our financial infrastructure, make up a large proportion of the share market and on-lend our savings.

It is understandable that their appetite for risk has an upper bound which may not be consistent with large-scale, direct investments in early-stage clean technologies.

That said, there are many other investors who will go further up the risk curve: governments, venture capitalists, family offices and philanthropists.

These investors differ in their investment time horizons, investment objectives, minimum investment sizes and readiness to forego financial returns in pursuit of social benefits.

These kinds of investors may lower the threshold for what is 'bankable' for lenders as blended finance arrangements introduce patient, loss-absorbing, and impact-seeking capital into project balance sheets.

The co-investment proposed in the Government's Roadmap, including the CEFC and ARENA, are examples of blending traditional finance with more patient capital.

AIE: You mentioned a couple of government agencies in the last answer – ARENA and the CEFC. Can you expand a bit more on what sources of government funding are available in Australia and how they fit in?

ST: Government funding or more broadly, government policy can assist the energy transition in several ways. At one end of the scale, government policy can create a market for the private sector to operate in.

Examples are the Renewable Energy Target (RET) and the acquisition of Australian Carbon Credit Units (ACCUs) through the Emissions Reduction Fund and now Climate Solutions Fund. Governments can provide more patient or risk-tolerant capital that supports private sector investments.

Governments can also provide grants to private sector developers and entrepreneurs, which acts as a form of equity capital with no expectation of a return.

ARENA provides support in this way. It will invest in a new technology with the hope of a return and will expect to be repaid if the project is successful but is not as concerned as say a venture capitalist if the project is not successful.

State governments also provide grants for technologies that are well advanced. For instance, the Physical Sciences Fund operated by the NSW Chief Scientist offers funding for technologies that have moved beyond early stages of development (TRL 1-2).

Finally, early stage research is supported by the Australian Research Council and CSIRO. Larry Marshall, CEO of CSIRO, recently announced a series of national missions to address Australia's challenges and create the basis for a strong recovery from COVID-19.

One of the missions, Sustainable Energy and Resources, seeks technology pathways *"to create new growth industries and jobs for Australia and ensure the ongoing global competitiveness of Australian resources, agriculture and regional communities by developing the tools to achieve Net Zero Emissions".*

Energetics is proud to be named as an early collaborator in this mission. While in the early stages of development, these missions will be backed by CSIRO's funding, and we may yet see new technologies supported through stages of development.