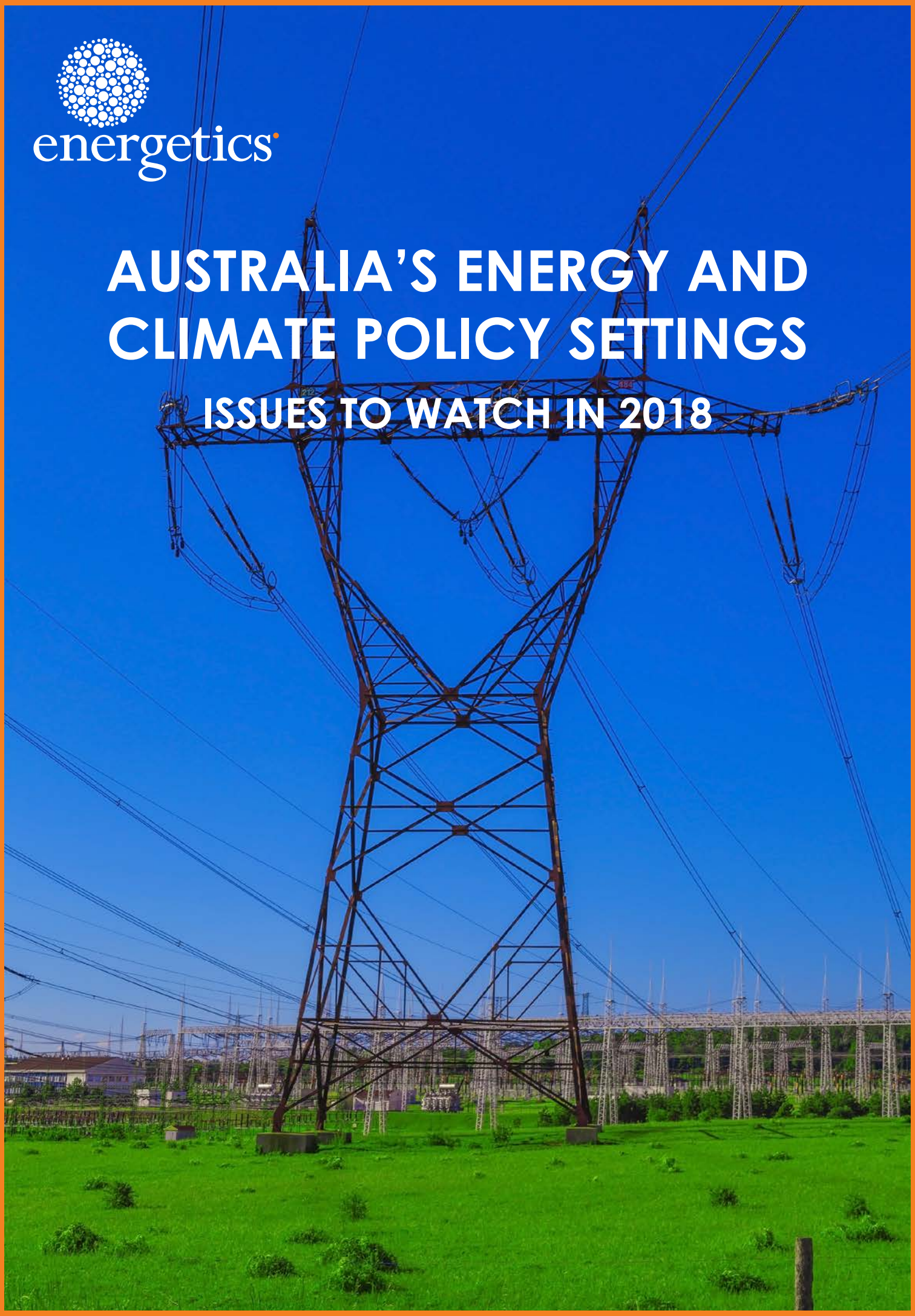
energetics

AUSTRALIA'S ENERGY AND CLIMATE POLICY SETTINGS

ISSUES TO WATCH IN 2018



ARTICLES IN THIS EBOOK

FROM THE CEO

In 2018 the Federal energy and climate change policy suite is dominated by the National Energy Guarantee (NEG). From the Government's perspective, once designed and implemented, the NEG will be the chief mechanism through which stability is restored to the National Electricity Market, new generation is introduced in an orderly manner and a level of emissions reductions achieved across the energy sector that is in step with our commitments under the Paris Climate Agreement. With the energy market transition and national emissions reduction task clearly converging, Energetics' ebook contains the analysis of Australia's energy and climate policies – the NEG, the NEPP, Power of Choice and the ADGSM – and their impact on large energy users. The common thread throughout being our concerns not for the policy frameworks themselves, but their settings and their likely effectiveness.

Please contact me or any of the authors should you have questions or comments. As always, we will keep you informed as the year progresses.

TONY COOPER
CEO, ENERGETICS

OUR EXPERTS

If you would like to connect with an Energetics' expert who wrote the articles in our eBook please follow the link to their LinkedIn profile. All authors are listed in order of article appearance.

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Matt is an experienced advocate for energy efficiency, productivity improvements and projects that deliver cost effective, reliable clean energy supply.

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January 2018

2017 Review of Climate Change Policies – what, if anything did we learn?

Written by Matthew Sprague, Dr Peter Holt and Sally Cook

For more than a decade now, business has been challenged by the lack of certainty in Australia's climate policy. Over time that problem has grown as the gap widened between Australia's policy settings and the far more ambitious efforts of the States and Territories. This has been reflected in the challenges of the cross-jurisdictional management of the National Energy Market. The Australian Government's position also contrasts sharply with global action taken by governments, business and, in particular, the investment community.

Late in December, the Government released its 2017 Review of Climate Policies. The report is a summary of current climate policies and an assessment of the impact of each one. In this article we will step through the key conclusions and consider what the business community should take from this Review.

Additional funding for the Emissions Reduction Fund

The Emissions Reduction Fund (ERF) provides a primary market for the Government to purchase offsets from eligible projects. The report states that the Government will consider further funding for the ERF, in contrast with previous statements. Without additional funding, the ERF was at significant risk of being exhausted as only $213 million of the initial $2.55 billion remains. While the amount of additional funding was not revealed, this public commitment will be welcome news for offset originators as well as those businesses with future compliance obligations who are interested in maintaining liquidity in offset markets to ensure sufficient supply is also available in the secondary market.

What about the Safeguard Mechanism?

A strengthening of the Safeguard would drive further demand for ACCUs. Yet no explicit intention is expressed for tightening the baselines under the Safeguard Mechanism. We instead see plans for further industry consultation and that any changes would apply to the 2018–19 compliance year[1]. The timeframe for this consultation and introduction of legislation before June 2018 suggests that either consultation may be brief or that changes to the Safeguard Mechanism in the near term are not likely to be extensive or transformative. Another review of the Safeguard Mechanism is planned for 2020.

Our article **It's time to get serious about the Safeguard Mechanism** outlines how this scheme could contribute to meeting our current global emissions reduction commitments and establishing a pathway through which deeper cuts can be achieved.

The 2017 Climate Policy Review also discusses the opportunity for international carbon offsets to be used to meet Australian compliance obligations and states in principle support for this to occur. This is not unprecedented as the previous Clean Energy Act allowed complaint international units to be surrendered up to a cap. It also discusses potential export of ACCUs to generate higher revenue for domestic projects. However, they temper any early enthusiasm about external exports of ACCUs, qualifying that "it would be more appropriate to consider ACCU exports once market rules under the Paris Agreement are established"[2]. We see significant value for the Australian economy through the development of international carbon offset trade in line with the Paris Agreement as demonstrated in our **analysis for the Queensland Government**.

Few details about the new kid on the block – the NEG

The Government's latest iteration of its energy policy, released in 2017, is the National Energy Guarantee (NEG). After rejecting the Finkel Review's proposed Clean Energy Target, the NEG aims to achieve similar outcomes by bringing together energy and climate policies whilst improving system reliability. The NEG places reliability and emissions guarantees on the electricity retailers and pushes them to ensure that they have the 'right' mix of generation. The Government estimates that this will reduce power costs by approximately 23%, yet little insight is provided as to how this mechanism will operate. Consultation on the detailed design of the NEG will commence in early 2018 and will be subject to review by the COAG Energy Council[3].

The Renewable Energy Target (RET) is summarised in very limited detail. The Government's historic opposition to this policy and lack of detail in the 2017 Climate Policy Review indicates that it will not form part of the long term policy suite.

Greenhouse gas inventory does not support current performance

The Climate Policy Review concludes that Australia is well on track to meet our Kyoto, Montreal and Paris commitments, and exceed these easily. However emissions are rising across the economy as can be seen in the Government's Quarterly Updates of the National Greenhouse Gas Inventory[4] through to December 2017. See also **Energetics' analysis of the emissions trajectory, 2017**. Our modelling of the emissions reduction trajectory showed that the cumulative abatement task of just over 1 billion tonnes CO_2-e is equivalent to almost two years of business as usual emissions. With rising emissions across the economy the challenge of meeting our 2030 national target is substantially more difficult.

Responsibility for climate change is being assumed by the State Governments and business to drive their own action. This comes at additional risk with no overarching policy, especially with the lack of clarity around the NEG. The RET itself is a contentious political issue and no further confirmation on renewables or future energy pricing has been provided. The uncertainty around RET policy has seen Australia fall behind the renewable energy leaders.

It is positive to see that all states and territories, excluding NSW and WA, are exceeding the RET by 2030 with Vic, SA, ACT and Tasmania surpassing it significantly by 2020.

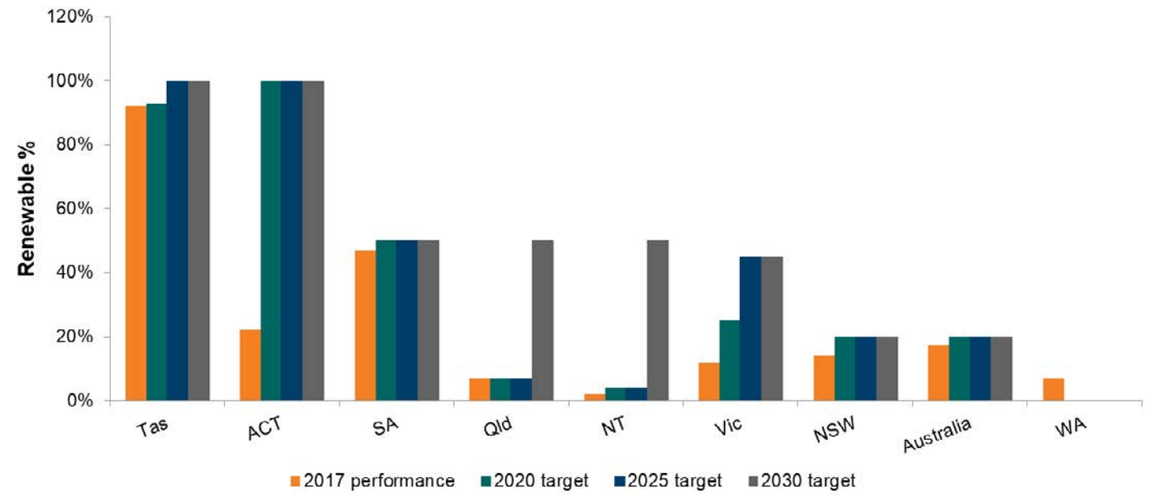

Figure 1: State based renewable energy targets[5]

Challenges for large energy users

A strengthening of the Safeguard The Government's narrative is that coal fired power will provide a stable baseload and reduce electricity pricing. AGL[6] recently announced the closure of its Liddell power station in 2022 to be replaced by a more reliable and cost effective combination of renewable energy, storage and demand management, despite calls from the Prime Minister to keep Liddell open. AGL have shown that operating aging coal fired power stations is not the answer and business should look to lead the development and implementation of cheaper, cleaner technology. Further coal fired power station closures are expected as they age, and internationally we see the number of closures before end-of-life increasing[7].

Other issues to monitor:

- The **lack of detail surrounding the NEG** and proposed policy will need to be assessed for its impact on energy markets.
- The ERF commentary mentions that the Government will explore additional funding; however no clarification regarding the level of funding for this initiative is provided
- Interaction between the RET and the NEG
- The evolution of the Safeguard Mechanism in particular the tightening of baselines and changes to the way baselines are calculated.

Energetics can assist your business to assess the impact of proposed policy changes and with responses to Government consultation.

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2 **http://www.environment.gov.au/climate-change/publications/final-report-review-of-climate-change-policies-2017**

3 **http://www.coagenergycouncil.gov.au/sites/prod.energycouncil/files/publications/documents/Report%20on%20the%20National%20Energy%20Guarantee.pdf**

4 **http://www.environment.gov.au/climate-change/climate-science-data/greenhouse-gas-measurement/publications/quarterly-update-australias-national-greenhouse-gas-inventory-jun-2017**

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Corporates bring energy procurement and climate risk strategies together

Written by Dr Peter Holt

January 2018

For years Australia's largest businesses have called for policy certainty and bipartisan political support for a national climate change response. Yet the 2017 Climate Policy Review simply states that Australia is on track to reach our 2030 national target without presenting firm details on a pathway. The Review also provides no guidance on how deeper emissions reductions will be achieved as required under the Paris Agreement. In the past, the political turmoil around climate change policy has resulted in large energy users scaling back or even abandoning a dedicated climate response. However a significant shift is underway in businesses' strategic priorities. Climate and energy strategies increasingly reflect the changes in Australia's energy mix resulting from the penetration of renewable energy sources. Energetics argues that businesses are turning their attention away from local climate politics and instead looking to the many commercial drivers and innovative risk management strategies through which large energy users can take control of both their energy supply and spend through renewable energy supply agreements, and at the same time drive down greenhouse gas emissions.

In this article we share our insights gained from advising some of Australia's largest companies over the course of 2017.

Energy cost increases and market volatility have become risks to manage

Over the last decade, the Australian energy market has been undergoing fundamental changes and this confluence of factors has led to record increases in the cost of energy. Over 2017 Energetics commented extensively on these drivers. In summary they are:

- The **east coast gas shortage** and lack of competition has **driven up gas prices** at a time when demand for synchronised and dispatchable gas-fired power generation is needed to support the growth in renewable energy generation. This has had significant flow on effects to electricity prices in the National Electricity Market (NEM).
- We are exposed to higher and more **volatile power generation prices** due to the disruption caused by the integration of renewable energy supplies, the increasing reliance on gas-fired power generators as marginal dispatching units and the lack of capital investment to replace ageing coal energy generation assets.
- **Network charges** currently account for about 40-45% of electricity prices. Over $46b was invested between 2007 and 2012 to replace and augment existing electrical network infrastructure. Passing through these costs arguably led to the first energy price shock for consumers. Although over the past few years these charges have been stabilising.
- **Environmental charges** include all compliance obligations from the Renewable Energy Target (RET) and State-based schemes. The RET was reviewed and re-set to 33,000 GWh in 23 June 2015. During the review, investment into the renewable energy sector paused but is now rapidly catching up. This 'pause' drove up renewable energy certificates prices, particularly those related to commercial grade renewable generation, resulting in higher environmental pass-through charges in the short term.

Energy supply security dominated policy developments over 2017

Wholesale electricity prices are influenced by a range of factors including weather, local economic activity, global financial outlook, international energy commodity prices, resource availability, investment in future resources, government policies and market sentiments. This complicated mix can result in significant price volatility in the electricity futures markets of 5% or more over a few days, and moves of ± 20% in a single month are possible.

The extreme example of this was the State-wide blackout of South Australia in 2016 where many influences combined to cause the blackout. The political storm that followed ensured that energy supply security would be a paramount consideration for governments. However, investment in Australian energy generation renewal has been fragmented over the last decade as potential investors in generation capacity sought clarity and certainty in Australian policy frameworks. In 2018 we will see a significant number of utility scale renewable energy projects developed and constructed easing the pressure on our energy supplies.

As discussed in the preceding paragraph, the Government and Regulators will be challenged to ensure security of supply and lower the cost of electricity, unless more gas is made available, and cheaply, as gas-fired electricity supports intermittent renewable energy supply.

Clear long term market signals – a clean energy future and a market in transition

The world is transitioning to a low carbon energy supply. The clear market signal was the Paris Climate Agreement where global leaders agreed to limit temperature rise to "well below 2 degrees". Globally, Australia is one of 147 parties (out of 192 UN listed countries) which are signatories to the Agreement. The pace of ratification made the Paris Climate Agreement the fastest global agreement in the history of the United Nations. Australia has committed to a 26-28% emissions reduction target from 2005 levels. For Australia this requires a significant transition of our energy generation mix given our heavy dependence on coal fired power.

Even with President Trump's announced withdrawal from the Paris Agreement, the market signal for a clean energy supply is clear. BlackRock, responsible for over US$5 trillion of investment funds, is listening as they seek to understand how Boards' manage climate change risk[1] - declaring that "coal is dead"[2] as they look to invest in renewable energy projects here in Australia.

Australian businesses have also read the market signals. Pragmatically we are seeing businesses re-evaluating their risk profiles using science based targets, reassessing their markets, investing in low and zero carbon technologies, electrifying and optimising operations and examining offsite renewable energy supply opportunities. Most attractive currently are **corporate Power Purchase Agreements for low cost renewable energy purchasing**. The prime drivers here are commercial considerations and the desire to take control of their energy supply and spend.

What are the business levers? Managing the risks and investigating renewable energy supply options

Leading Australian businesses have recognised the market signals and more and more we see strategies with common themes. These are:

- **Intelligently sourcing energy** supply to control cost and reduce budget volatility by employing progressive purchasing and **renewable power purchasing contract instruments**.
- **Optimising energy productivity** by investing additional capital in process improvements and new technologies that are not only highly efficient, but deliver a range of productivity improvements. These new technologies encompass core operations, air conditioning, lighting and integrated behind-the-meter solar PV and battery storage technologies.
- Innovating through **design** to future proof business operations by creating resilient, efficient and intelligent infrastructure.
- Capturing **growth opportunities** through the development of new products and services of value in a low carbon economy.

The long term global market signals for business are clear. The energy markets are transitioning to a low carbon energy generation mix. However, with no consensus on national energy policy, the outlook for large energy users is continued medium term high energy costs and market volatility. The other consequence is business taking steps to proactively manage energy, taking more control, both 'behind the meter' and in the marketplace to not only manage volatility and risk but also capture and enhance competitive advantage.

References
1 Reuters: **"BlackRock vows new pressure on climate, board diversity"**, 2017
2 Wiggins, J: **"BlackRock says coal is dead as it eyes renewable power splurge"**, Australian Financial Review, May 2017

January 2018

Solutions developed to address the gas supply crisis of 2017 will be tested in 2018

Written by John Bartlett

When the gas crisis unfolded over the course of 2017 threatening the viability of large industrial consumers on Australia's east coast, particularly in manufacturing and food processing, the Federal Government intervened to restore confidence in supply and to create the conditions under which gas prices would start to fall. To do this, the Government developed the Australian Domestic Gas Security Mechanism (ADGSM). The Mechanism was designed to force SE Queensland gas producers to release gas into the domestic market at times when supply was deemed to be insufficient - effectively a 'sword of Damocles' to hang over their heads. The first assessment of supply sufficiency was made shortly following the enactment of the ADGSM and the Mechanism was not invoked. So has the supply crisis gone away?

What did the ADGSM achieve? (without 'doing' anything)

In 2017 the forecast supply shortfalls and increasing reliance on natural gas to fuel the production of electricity, led to a contraction in competition and a sharp rise in retail consumer prices. While the ACCC reported that retail offers for very large users (1PJ+) reached $16/GJ in early 2016, smaller commercial and industrial users were receiving much higher offers, approaching the $19/GJ mark. The price shock was particularly challenging for this group of consumers as they looked to secure contracts by 1 July 2017, with no room to negotiate.

The ADGSM came into effect 1 July 2017 and was designed to direct how gas producers and exporters allocated gas sales between domestic use and gas available to the lucrative LNG export market. The effort to see exporters deliver a net contribution to the domestic market was bold, considering the existing contractual commitments to offshore buyers, and given the number of both domestic and international stakeholders making up the ownership structure of the export gas.

Fortunately the pressure applied by the threat of the ADGSM seems to have delivered a result for domestic users, without having to invoke the legislation. Gas exporters appear to have committed additional gas into the domestic market on the basis of their agreement with the Federal Government.

This outcome has seen retail offers fall dramatically in the last six months, closer to the $10/GJ mark even for small commercial and industrial consumers, which is reasonably consistent with the observed spot prices across the east coast markets.

What can we expect in 2018? Will the threat of invoking the ADGSM be enough?

Looking forward we expect reasonably priced retail offers to continue for all gas users. The ADGSM will be reviewed following the first two years of operation in 2019 to see if it delivered the necessary domestic energy security. But given that it was the mere threat of the activation of the ADGSM that drove prices down and revived competition, we rely on the Federal Government maintaining pressure on a system which has already proven to be strongly shaped by global economic drivers rather than domestic policy. Also, while the efforts to increase supply and ultimately competition on the east coast have delivered a positive outcome, the 'fix' for some came too late, as we saw many consumers pressured into contracting expensive gas over the current financial year.

To avoid exposure to any reactive policy decisions this year, business needs to look ahead to see when their energy contract expires and consider negotiating early to take advantage of the current downward pressures on price. Here's hoping it can be sustained.

In Australia's climate wars, the market has already won

Written by Dr Gordon Weiss

February 2018

Australia's greenhouse emissions are on the rise. The Government's latest figures show a 1% increase from the previous year to 550 $MtCO_2$-e. Despite this concerning trend, climate policy remains languid with no sign that the torpor will be shaken by any new, vigorous initiatives from the current Federal leadership team.

However Australia can look to other forces which are set to shape national emissions as the economics of low carbon technologies makes for increasingly compelling commercial propositions across key sectors. We see national energy markets in transition and disruption pending within the Australian transport sector with the expected rapid expansion of electric vehicles. In this article, Energetics argues that the pace of technological change will not only deliver economic benefits, the forecast uptake of low emissions technologies makes the obstructive arguments of conservative climate nay-sayers, simply irrelevant and redundant.

Figure 1 shows the sources of Australia's 550 Mt CO_2-e per year of greenhouse gas emissions[1]. Just over one third of emissions are due to electricity generation, and an additional third come from other uses of energy – stationary energy and transport. After electricity generation, the single largest source of emissions is road transportation. Emissions from these sources must be reduced or eliminated significantly if Australia is to make its proportional contribution to the reducing greenhouse gas emissions.

The technology trends that are unstoppable – and disruptive

Several disruptive technologies will result in reductions in emissions regardless of government intervention. Only properly functioning markets and supportive economic and social policy settings are required for this transformation.

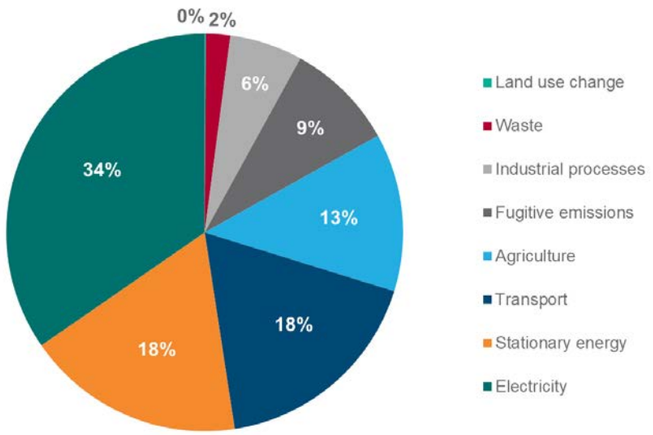

Figure 1: Australia's emissions sources 2017[1]

Electricity – low cost renewable generation means that the market, not government, should rule

The largest source of Australia's emissions is electricity generation, and the current debate appears to be on the role of government in reducing these emissions while maintaining the stability of the grid and electricity prices. In 2018 and as we look into the future, wind and solar are the cheapest sources of electricity from new power stations. Some examples demonstrating the new economics of renewable generation include:

- In October 2017, Saudi Arabia received offers to supply solar electricity for the cheapest prices ever recorded – US1.79c/kWh or AU$23/MWh[2]
- Tucson Electric Power will buy solar energy from a new 100MW array for less than US3c/kWh[3,4]
- The Kauai Island Electric Cooperative and AES Corp. plan to combine a 28 MW solar array with a 20 MW, 100 MWh battery system to deliver dispatchable renewable generation to the Hawaiian island. KIUC will pay $0.11/kWh[5] for power delivered from the solar-plus-storage system, below the cost of oil-fired power that comprises the island's current baseload generation[6]
- Spain has allocated 3 GW of new onshore wind power capacity at a price of €43/MWh[7]
- ReGen Power Tech Company had bid for Re3.42/kWh[8] per unit for a capacity of 200MW in Tamil Nadu in India
- Origin Energy committed to a long-term power purchase agreement of below $60/MWh for the 530MW Stockyard Hill Wind Farm in Victoria[9]

These prices are well below the cost of electricity from a new coal fired power station. This is reflected in Figure 2, which provides a comparison between coal and gas fired generation with wind and solar coupled with batteries for firming capacity. Here a gas peaking plant provides the firming capacity, and this increases the levelised costs of $65/MWh for wind and $75/MWh for solar to about $100/MWh and $125/MWh respectively. This higher figure is still below the cost of electricity from a new coal fired power plant, and below the cost of power from a Combined Cycle Gas Turbine (CCGT) power plant.

At the 2017 AGM of AGL, CEO Andy Vesey confirmed this economic reality when he announced AGL's intention to replace Liddell power station with up to 1,600MW of renewable generation (primarily wind farms), plus 750 MW of gas fired generation to provide firming capacity. A 250 MW battery will also provide firming capacity plus demand response[11]. Despite repeated calls from the Australian Government, AGL confirmed its intention to close Liddell in 2022[12]. AGL's position merely reflects the changing economics of electricity generation. While most of the firm capacity (MW) to replace the Liddell power station comes from the gas turbines, three quarters of the actual electricity will come from the wind and solar farms. The emissions intensity of electricity from the 'new' Liddell will be 80% less than Liddell's emissions intensity[13].

And as the economics of energy storage improves, more of the firming capacity will be taken up by batteries, further reducing the volume of fossil fuels (in this case, natural gas) used for power generation. The technical performance of batteries for firming has already been clearly demonstrated by South Australia's 100MW battery[14].

Over the next two decades, the majority of Australia's coal-fired generator fleet will be retired[15]. By 2050, 85% of the existing coal fired generators will be retired[16]. Coal fired generation cannot compete against new technology solutions including a combination of solar PV, wind, batteries and gas-fired generation for short term operation when power prices are high, as demonstrated by AGL. The retiring coal-fired power stations will be replaced by the cost-effective low emissions alternatives.

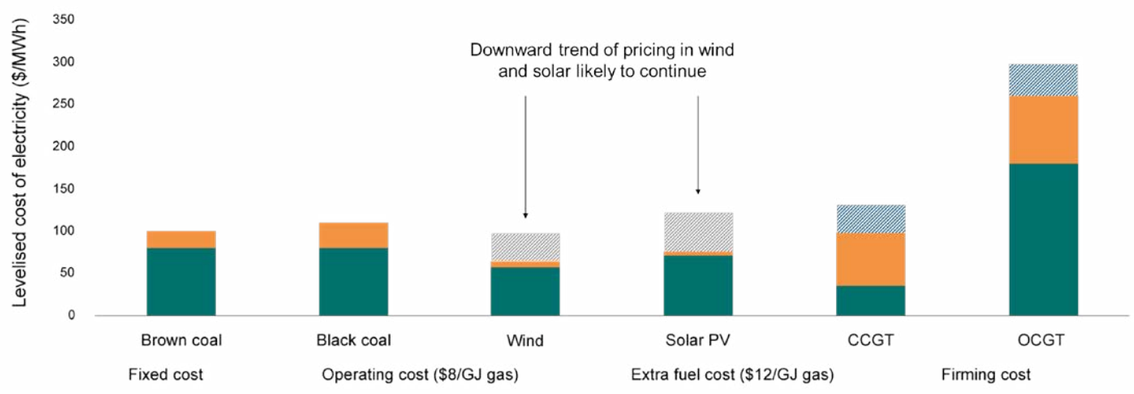

Figure 2: Implied cost of new generation[10]

The effect of this technology trend will be clear. Energetics' analysis of the NSW electricity grid has shown that greenhouse gas emissions associated with electricity use in NSW will fall by more than 90% by 2050. This will happen through the response of the market to the closure of the coal-fired power stations and the resultant shortfalls in electricity supply. Measures introduced to support the on-going operation of the aging coal-fired generators are both unnecessary and will result in economically inefficient outcomes. The role of government here is to ensure that the rules of the electricity market reflect the new economics of power generation.

Electrification of transport – the next disruption

Tony Seba[17], renowned forecaster of the impact of disruptive technology from Stanford University explains how autonomous electric vehicles supported by 'car transport as a service' business models will result in a ten-fold reduction in the cost of personal transportation. He also showed that throughout history going back to the time of the invention of the printing press, every instance of a ten-fold reduction in cost resulted in a disruption to the markets and that the low-cost alternative is rapidly adopted.

Energetics has outlined the economics of electric vehicles in a related article[18]. It explains how EVs are already significantly cheaper to operate and maintain than internal combustion engine (ICE) vehicles, that within a decade first the total cost of ownership and then the purchase price of light EVs[19] will fall below those of light ICE vehicles. We will see a rapid switch from ICE vehicles to EVs in terms of new vehicle sales, and the eventual replacing of the light vehicle fleet.

Light vehicles are currently responsible for emissions of 58 Mt CO_2-e, or just over 10% of Australia's greenhouse gas emissions. The adoption of EVs will see these emissions largely eliminated. This will occur without government intervention beyond ensuring that the market is able take advantage of the economic benefits of EVs.

Building on renewable electricity – the electrification of heating

Natural gas use in the commercial and residential sector is responsible for 2% of national emissions. Most of this natural gas is used for heating applications – space heating and water heating. Natural gas use in industry is responsible for a further 3% of Australian's emissions. The adoption of cost effective heat pumps (e.g. reverse cycle air conditioners) coupled with low emissions electricity will see these emissions fall. Work by the Australian Alliance for Energy Productivity (A2EP) showed that high temperature heat pumps may generate heat with 50°C+ temperature lift at a cost of the order of $10/GJ below the current cost of natural gas.

The falling demand for natural gas in the residential and commercial sectors due to the electrification of heating will in turn place cost pressures on the residential gas distribution networks, further driving the withdrawal of gas from those sectors.

Stepping up to the 2050 zero emissions challenge. Where should policy makers focus their attention?

The technology developments such as those discussed above may lead to a halving of Australia's emissions out to 2050. However, the year 2050 is also the time when global emissions need to be zero if temperatures are to be contained to within 2 degrees of pre-industrial levels. Therefore policy makers should be turning their attention to other sources of emissions; from agriculture; from industrial process; methane emissions from coal mining and gas extraction; and emissions due to land-use change.

The view of the Turnbull Government is that the contribution of the electricity sector to meeting our targets under the Paris Accord should be restricted to a 26% reduction in emissions from that sector. This is unfortunate in several respects, including;

- electricity has the clearest pathway to zero emissions and so is in the best position to provide abatement to 2030;
- Australia's emissions reduction targets are likely to become more stringent as the global community re-examines the trajectories to the two-degree world.

"Emissions from the electricity sector fall by more than the Government's 26% target"

On the other hand, the unstoppable march of rooftop solar PV[20], the rise of the corporate power purchase agreements (PPAs)[21] and the planned closure of some coal-fired generation is expected to see emissions from the electricity sector fall by more than the Government's 26% target.

We can also see that nominally restricting emissions reductions in the electricity sector to 26% will force Australia to consider where emissions can be reduced outside of the electricity sector.

What business should be doing?

Business should remain aware of the pace of technological change, and that the new low emissions technologies are rapidly becoming the low cost technologies. For example, opportunities for the electrification of heating coupled with renewable energy supply solutions whether onsite or offsite via a corporate renewable power purchase agreement, can secure low cost electricity for years. Energetics can advise on the options available, and help establish a strategy for a technology driven, low emissions future.

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3 $AU37.50/MWh

4 **"TEP to Power 21,000 Homes with New Solar Array for Historically Low Price"**, Tucson Electric Power, May 2017.

5 $AU137.50/MWh

6 **http://www.utilitydive.com/news/hawaii-co-op-signs-deal-for-solarstorage-project-at**

7 $AU64.25/MWh

8 $AU65/MWh

9 **"Origin stuns industry with record low price for 530MW wind farm"**, reneweconomy

10 AGL Energy, Presentation to Macquarie Australia Conference 2017. Assumes capacity factors of 40% for wind, 25% for solar, 75% for CCGT and 10% for OCGT; heat rates of 8 for CCGT and 10 for OCGT.

11 AGL also intend to upgrade the nearby Bayswater power station to provide an additional 100 MW of capacity.

12 **www.abc.net.au/news/2017-12-09/liddell-coal-plant-closes/9243180**

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14 **http://www.ecogeneration.com.au/a-month-in-teslas-sa-battery-is-surpassing-expectations/**

15 **www.news.com.au/technology/environment/climate-change/dark-future-ahead-for-coalfired-power-in-australia/**

16 Applying the 50-year retirement rule. Commissioning dates for power stations are available form AEMO.

17 **https://youtu.be/2b3ttqYDwF0**

18 **https://www.energetics.com.au/insights/thought-leadership/electric-vehicles-**

19 That is, cars and light commercial vehicles. The situation with heavy vehicles is more complex.

20 **http://reneweconomy.com.au/9-solar-pv-records-broken-in-australia-in-2017**

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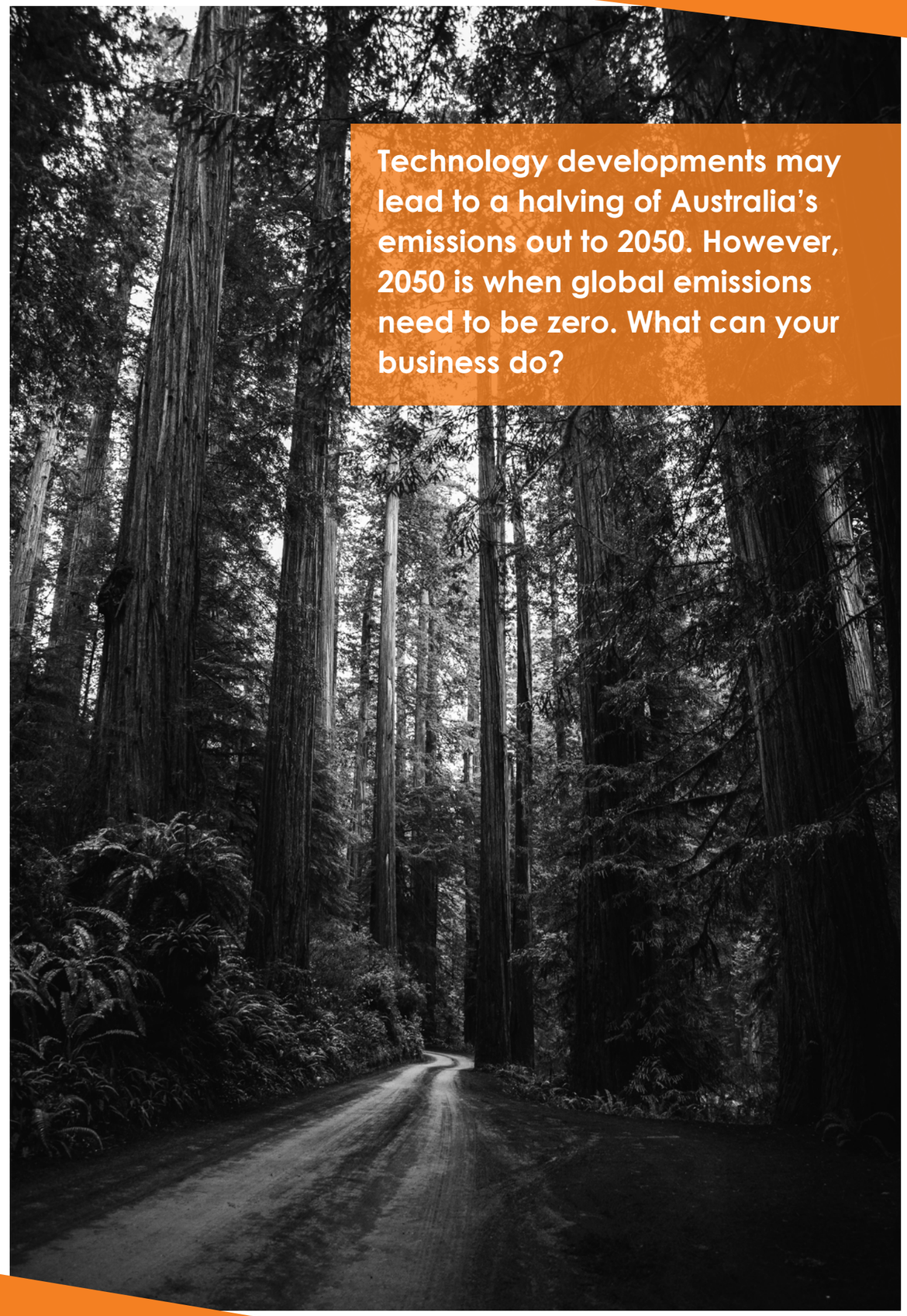

Technology developments may lead to a halving of Australia's emissions out to 2050. However, 2050 is when global emissions need to be zero. What can your business do?

February 2018

Climate change – a $7 trillion investment opportunity

Written by Dr Peter Holt

With the forging of the historic Paris Agreement, the global finance sector turned its attention to climate change issues. The most far reaching development came with the report addressing climate risks issued by the **Financial Stability Board's Task Force on Climate-related Financial Disclosures (TCFD)** in 2016. Yet where there are risks, there are also opportunities. Today we see the sector focusing on the opportunities associated with climate change and its solutions. From the investment in clean technologies, to disruptive technologies – such as electric vehicles, batteries, Blockchain – to the transitional impacts on workforces, communities and broader societies. In this article we comment on the statements made at the recent World Economic Forum in Davos, the disruptive forces in motion and the implications for Australian business.

Davos highlights the challenges and business opportunities

At the World Economic Forum held at the end of January, the challenges of climate change were presented as an economic opportunity equating to AUD 7.45 trillion[1] over the next two decades. Anand Mahindra, chairman of the Mahindra Group stated that "Climate change is the next century's biggest financial and business opportunity"[2]. Mahindra, the $19 billion Indian conglomerate operates globally across a diverse range of sectors and is seeking to seize the business created.

Governments are also seeing climate change as an opportunity to reform their agenda. President Emmanuel Macron announced that France would shut all coal fired power stations by 2021.

Macron is seeking to drive innovation, reinvigorate the economy and position France as an innovative and competitive country. Even though France only produces 1% of its electricity from coal based generation, what we see is a recognition of the geo-political economic opportunities associated with climate change issues. As President Macron stated, "I want to make France a model in the fight against climate change[3]"

Also reported were statements from the head of insurance giant AXA, Thomas Burberl who declared that a global temperature increase in the order of 3-4 degrees "would not be insurable" and that the company would both divest from coal and no longer provide insurance to coal projects[4].

All eyes are on China with continued investment in clean technology, the introduction of carbon trading and its status as an economic powerhouse. For example, China is becoming the market leader in electric mobility[5]. Not only does the nation's strategy support efforts to address local air quality issues it harnesses the country's extensive, low cost manufacturing capability.

In Australia, we are seeing commitments across a range of sectors. Sanjeev Guptav's investment in the Arrium steel works coincided with a commitment to invest $700m in renewable energy, batteries and pumped hyrdo storage[6]. This aligns with his controlling stake in renewable energy business Zen Energy signalling the convergence of heavy industry and renewables. Urban development is also seeking the advantage of renewable energy. Sekisui House's Orchard Hills' development in Sydney will generate over 1GWh of electricity for its residents[7]. This will effectively provide the residents of the estate with 'free energy'.

What does this mean for business?

Increasingly capital is flowing towards investments aligned with the Paris Agreement's two degree global warming objective. As clean energy technology costs fall, we see a confluence of commercial return and climate risk mitigation that provides businesses with a sweet spot. The commerciality of investments in renewable energy is clear and businesses are investing into renewable energy - **regardless of domestic policy settings**.

An immediate and effective step for businesses to take should be to align with the Paris Agreement and establish a **science-based target**. That is what Mahindra has committed to do as can be seen in his tweet below.

> A call to action: Step up & align your business strategies with the Paris Agreement.Set a science-based target by the Global Climate Action Summit in September.I'm committing to working with ALL Mahindra companies to do it.
>
> #WEF18 @GCAS2018 @sciencetargets

The development of science based targets provides a readily accessible measure for businesses and financiers to determine climate performance. When combined with the **TCFD's recommendations**, businesses can disclose their climate related risks. Using this information, investors will be better informed to assess their investments and their risk profiles.

What does this mean for finance?

Beyond energy transitions, the opportunities are far more bespoke. Tomorrow's business will be impact based. What does this mean? Increasingly businesses and **corporations are aware of their broader roles within society**, and are being held accountable for their actions. No longer are simple metrics suitable for the assessment of performance. The finance sector has recognised this and require a broader suite of analytics. In 2015, the United Nations Environment Programme Finance Initiative (UNEP FI) released its Positive Impact Manifesto[8] see below. The application of the Manifesto's principles to date has been for investments from social housing to climate adaptation financing measures.

Greater transparency of investments and the articulation of their value to society, not only the financial returns, is expected. The challenge will be to do this in a robust, transparent and accessible manner. UNEP FI is continuing to work through these issues under the Positive Impact Investment initiative

Principles of Positive Impact Investment

PRINCIPLE ONE: Definition Positive Impact Finance is that which serves to finance Positive Impact Business. It is that which serves to deliver a positive contribution to one or more of the three pillars of sustainable development (economic, environmental and social), once any potential negative impacts to any of the pillars have been duly identified and mitigated. By virtue of this holistic appraisal of sustainability issues, Positive Impact Finance constitutes a direct response to the challenge of financing the Sustainable Development Goals (SDGs).

PRINCIPLE TWO: Frameworks To promote the delivery of Positive Impact Finance, entities (financial or non financial) need adequate processes, methodologies, and tools, to identify and monitor the positive impact of the activities, projects, programmes, and/or entities to be financed or invested in.

PRINCIPLE THREE: Transparency Entities (financial or non financial) providing Positive Impact Finance should provide transparency and disclosure on:

- The activities, projects, programs, and/or entities financed considered Positive Impact, the intended positive impacts thereof (as per Principle 1);
- The processes they have in place to determine eligibility, and to monitor and to verify impacts (as per Principle 2);
- The impacts achieved by the activities, projects, programs, and/or entities financed (as per Principle 4).

PRINCIPLE FOUR: Assessment The assessment of Positive Impact Finance delivered by entities (financial or non financial), should be based on the actual impacts achieved[9].

Energetics can support the development of a comprehensive climate response that assesses the risks and ensures that the opportunities for your business are explored within the context of the expectations of the global finance community.

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Is 'social licence to operate' the hard science?

Written by Hannah Palma

February 2018

In the age of social media and broader social consciousness, what is the significance and value of the 'social licence to operate'? Energetics considers how the term has evolved and what strategies, metrics and measurements have developed alongside it to allow businesses to build, maintain and measure a 'social licence to operate'.

Traditionally, when we think of 'social licence to operate' (SLO) we might think of open cut mines and NIMBYism[1]. However, the term has evolved quite significantly since being coined in the 1990s by a Canadian executive in the context of a mine site[2]. A SLO refers to informal community and stakeholder acceptance or approval of a project or development. It is an unwritten contract that exists between businesses or projects and the communities in which they operate, permitting them to exist. It's hard to define and even harder to measure. What is clear is that once you have lost your SLO, you have lost your commercial value.

As we become more connected in a digital economy, particularly through social media and globalisation, our characterisation of our 'community' expands to include a range of stakeholders outside of the localised community and company[3].

The power of the people

A SLO falls between 'acceptance' and 'approval' with considerable grey area[2]. The lower level of 'acceptance' is reflective of a project the community might simply permit.

The higher level of 'approval' is associated with a project the community supports and endorses. Some projects may surpass this level of SLO entirely with cases in which the community takes on ownership and advocates for a project as part of their collective identity; this phenomenon is sometimes characterised as 'psychological identification'[3].

An example is the Hepburn Wind Farm which despite initial strong, local opposition, went on to be driven by community support to overcome a variety of financial, governance and administrative obstacles and be the first project of its kind in Australia[4]. The broader community's engagement and support was earned through the ongoing efforts of a small group of vocal proponents. Their efforts included and continue to include street information stalls, personal home visits, a positive presence on social media, site visits to nearby wind farms, project update letters and sponsorship of numerous events. The success of this project is a testament to the enormous power of community backing (of course, this is a project in which the community quite literally took ownership).

Knowledge is power – change can occur very quickly

A SLO is a dynamic, finicky concept. The acquisition of new information can readily shift public sentiment from approval to disapproval. For example, following the collapse of global milk prices in 2016, shoppers' negative response to the impact of pricing on the struggling domestic dairy industry damaged the SLOs of large supermarket chains which were years in the making.

Similar controversies and growing community focus on broader sustainability considerations have driven companies in many diverse industries to consider their SLO and potential reputational damage more closely. Corporate players now take a sophisticated, multi-pronged approach to build and maintain their SLO, incorporating initiatives that align with their business values and ethics, as well as material sustainability exposures such as supply chain standards, disclosure of sustainability strategies and targets, renewable energy projects, waste reduction programs and social investment partnerships.

Building and then maintaining your own SLO

A SLO relies heavily on the building of trust between community and company, and once achieved it must be carefully maintained. A well-established SLO might come to thrive relatively untended; other SLOs might never quite put down roots (despite all the attention in the world).

A powerful example of a nurtured SLO is that of IKEA's. Their long term commitment to a 'people and planet positive' strategy is evidenced in the integration of sustainability into core business. Initiatives include[5]:

- In FY16 IKEA produced over 2.3TWh of renewable energy
- In FY17 IKEA ensured that Forest Stewardship Certified or recycled wood made up 50% of all wood used in its products
- An IKEA foundation devoted to improving opportunities for the world's poorest communities
- IKEA works with farmers to help produce more sustainable cotton in just one of many supply chain programs
- IKEA's catalogues are filled with suggestions to improve the energy, health and financial performance of the spaces we live and work in.

With retail sales for the global company continuing to grow, ultimately IKEA does speak to us; the sort of goodwill that returns considerable and lasting benefits[6].

When you try and don't succeed – Adani

The broader and more widespread the impacts of a project, the harder it is to be granted and then preserve a SLO[7]. This issue is being faced by Adani's Carmichael project. As a society, our analysis of a project's impacts began with the immediate local landscape surrounding, specifically, a mine site. However, with an ever widening understanding of climate related impacts, we look to broader space and time continua in considering the effects of a diverse range of projects.

Currently there is enormous hostility directed at Adani's Carmichael coal and supporting rail and port development. This enmity is as far reaching as Poland where the 'Fight for our Reef' campaign travelled for the UNESCO World Heritage Committee meeting in July 2017[8]. So too, some argue, are the negative impacts of the project[9, 10]. Opposition to the project on various financial, reputational, climate-related and ecological bases is apparent, with detractors as diverse as grass-roots environmentalists through to Australia's big banks[11]. On the other hand, others are vocal in their support of the project citing the short and long term benefits new industry could bring to the North Queensland region[12]. It is a hotly contested development.

What is not contested here is the investigation of a large range of stakeholders into the project, and how powerful the associated public conversation has been in impacting the ability of the company to do business.

From zero to hero

So exactly how might you turn your SLO position around? For the FY16 period, AGL Energy was Australia's single largest emitter of scope 1 greenhouse gases. The company was responsible for a total of 43.3 million tonnes or just over 10% of all of Australia's scope 1 emissions[13]. Fast forward to 2017 and AGL is 'getting out of coal' under a program aligned with the 'best available science on climate change', the Intergovernmental Panel on Climate Change (IPCC). The program is set to commence in 2022 and end by 2050[14].

The company's website states that 'it makes good business sense to properly plan for climate change' and 'prioritise investment in renewables and complementary near-zero emission technologies'[14]. With this in mind, AGL must ultimately act in the best interests of stakeholders and shareholders alike.

In addition to being one of Australia's biggest emitters, AGL is also Australia's biggest generator of renewables including solar and wind. The company has announced a $2 billion plan for development of renewable, gas and demand response capacity[15]. AGL's plan to exit coal comes ahead of the Australian Federal Government's energy policy roll out, if not ahead of the pack (a sizeable portion of Australia's thermal coal chain companies now feature on the Global Coal Exit List[16]). The resultant public debate regarding the planned closure and conversion of AGL's Liddell coal fired power plant, highlights competing tensions between key stakeholders. Despite questions around the details of the company's coal exit plan, in the court of public opinion, the commentary suggests that AGL is winning for now.

Addressing stakeholder expectations

In this day and age, stakeholders expect detailed and diverse information from the companies with which they engage. In late 2017, the Australian Prudential Regulation Authority (APRA) following the Financial Stability Board's Taskforce for Climate-related Financial Disclosures' (TCFD)'s recommendations warned banks and insurers to ignore climate-related risks at their own peril and highlighted the need for greater transparency[17]. Globally, systems such as the Carbon Disclosure Project (CDP) have developed to assist companies in disclosing their environmental impacts and to support communications with stakeholders. Other initiatives such as the London Benchmarking Group (LBG) also aim to facilitate engagement and education around key corporate social responsibility metrics in the broader community. Large corporates are publishing reports detailing broader sustainability strategies, environmental and social targets and associated key performance indicators, in addition to the more traditional budgeting and forecasting metrics, as part of their community engagement platform. All these and more become aspects of a comprehensive strategy to proactively and even innovatively manage positive and negative reputational factors essential to winning and protecting a SLO. This strategy could encompass any number of activities, but ideally need only include those most effective in achieving and maintaining the SLO.

Measuring a SLO, is an attempt to measure a volume of 'warm and fuzzies', albeit 'warm and fuzzies' with very real and tangible implications for a business' ability to successfully do business. However, we are called upon to assist in this process as corporates experience growing pressure to not only develop a SLO strategy, but to validate the success and efficiency of that strategy.

Be prepared – don't be stuck in reverse

The SLO continues to be, a complex, organic construct. It is tied up with factors such as reputational risk, financial risk, marketing and branding, leadership, technological developments, political and regulatory concerns, corporate social responsibility and company core business. However, in modern times, the SLO is arguably as important to a company's operation as any regulatory licence, and has the potential to become a critical impasse if not managed appropriately. If managed well, the SLO can drive a company or project forward on a platform of broader community engagement and support. The first and most important step in managing what is a truly complex beast, is to prepare appropriately.

The development of a robust, holistic approach to acquiring and maintaining a SLO of the highest level is essential. Be it a smart partnership, actions for mitigation of climate-related financial risk or aligning company targets with the United Nations' Sustainable Development Goals –there are a broad range of activities you can undertake to improve the quality of your SLO. These activities should align with the broader SLO strategic intent, scale and timing. There are structured methodologies and tools that can be used to understand and evaluate the benefits of your efforts in the arena of social sustainability. Outputs form valuable feedback loops to guide community investment decisions and ultimately assist companies in mapping out the future of their SLO and broader operations.

Please contact any one of Energetics' experts for more information and advice on .

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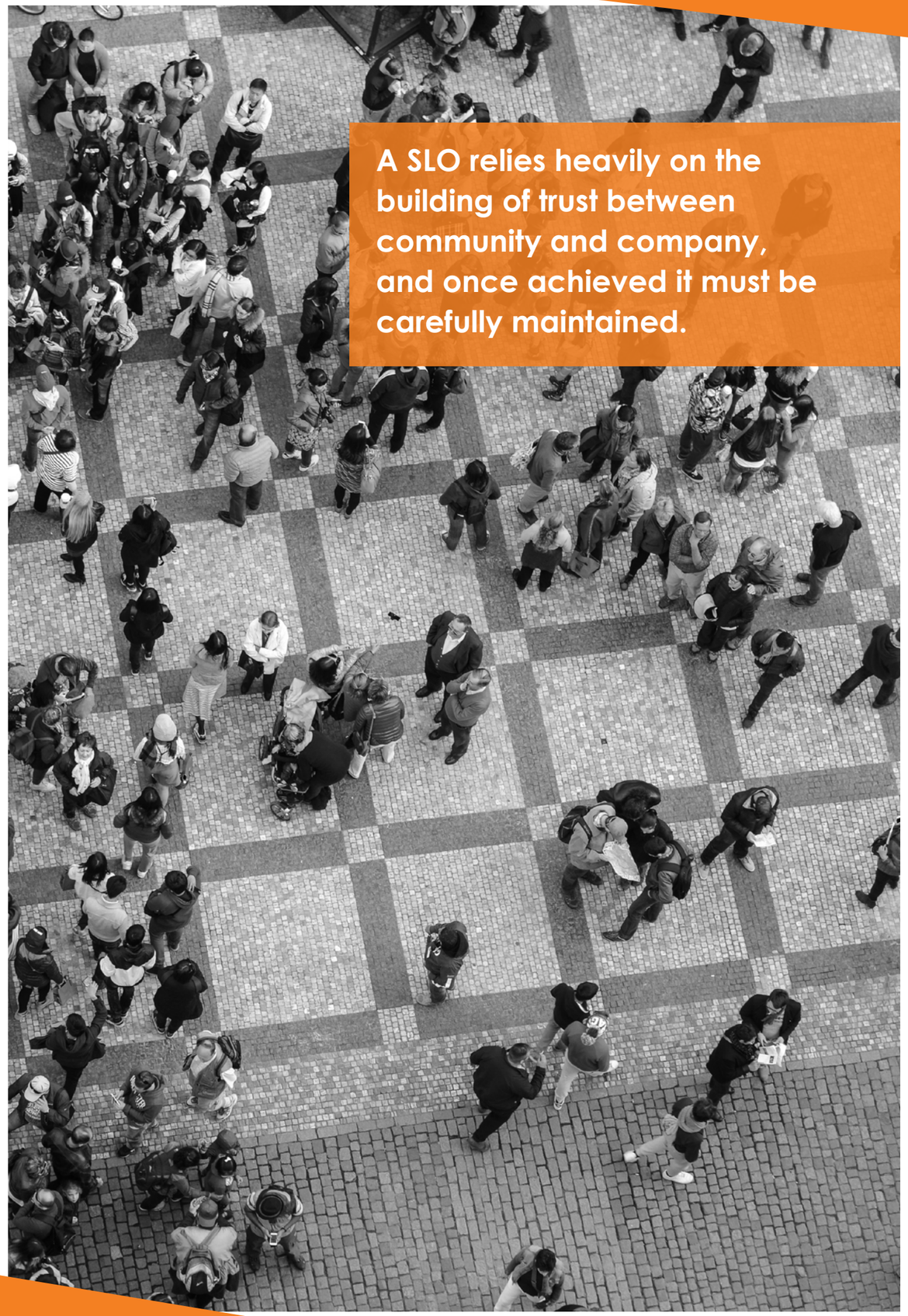
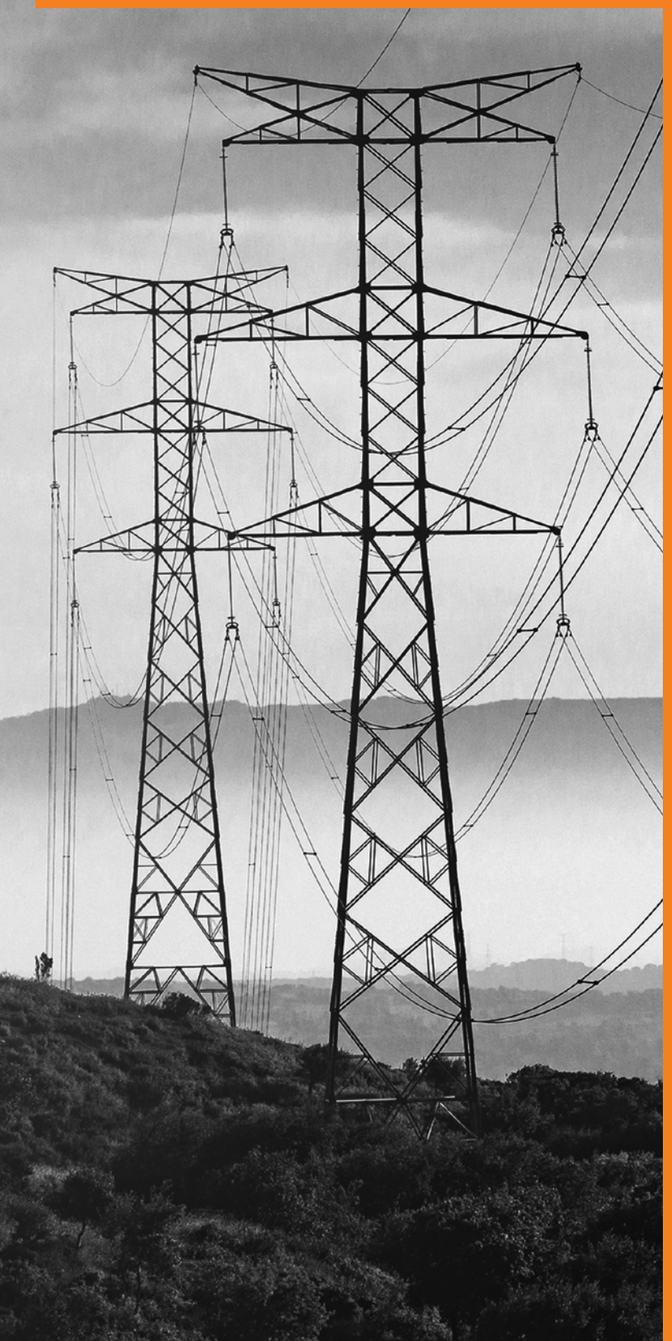


A SLO relies heavily on the building of trust between community and company, and once achieved it must be carefully maintained.

What more do we know about the National Energy Guarantee?

Written by Olivia Kember



February 2018

The Energy Security Board released its **consultation paper on the National Energy Guarantee** at the end of last week. To follow is some analysis of the National Energy Guarantee (NEG) from the perspective of its role as a facilitator of the transition from high-carbon to low-carbon electricity generation (we will have a lot more to say about the NEG over coming days and weeks, as the mechanism itself has major implications for electricity pricing, competition within the market, and energy market governance and reform).

The NEG has two broad 'requirements'; an emissions requirement and a reliability requirement. While these may deliver lower emissions and a more reliable electricity system there's no guarantee that they will do so in the most cost-effective way.

The emissions requirement may be set too low to be of any use, but imposes significant compliance costs and complexity

The ESB's consultation paper notes that the Commonwealth Government supports a target for electricity emissions of 26% below 2005 levels by 2030, matching the national target. However, as is widely known

- the ALP has a more ambitious national target (of 45% by 2030)
- achieving the government's national target really needs greater emissions reductions in electricity (because sectors like agriculture are unable to match the national rate of reduction, and decarbonisation of electricity is required to reduce emissions through electrification of sectors like transport and parts of industry)
- moreover the proposed exemption of electricity consumed by emissions intensive trade exposed industries (EITEs) means that EITEs could potentially contract directly with cheap high-carbon generation while other energy users cross-subsidise their electricity emissions
- the impetus of a pro-rata target of 26% is so little that such an emissions target would probably lag rather than drive investment. We find that even without a NEG this level of emissions reduction would be achieved. If, as the consultation paper canvasses, carbon offsets from outside the market also become eligible to count towards the emissions target, it would drive even less change than business as usual.

With no effective investment signal the emissions requirement is pointless, except to the extent that once it exists it's easier for future governments to ratchet it up. This means a weak emissions requirement does nothing to reduce policy uncertainty. At the same time, the administrative demands of complying with the emissions target are onerous and extremely complicated. Most electricity contracts do not specify the source or emissions intensity of the contracted electricity, and so the consultation paper has set out a range of methods of trying to work this out, as well as proposing the AER establish a registry of electricity contracts so that it can stitch together emissions, generation and retail contracts.

The reliability requirement could favour incumbent electricity 'gentailers' and hinder renewable energy investment

A big question is whether the reliability criteria are set in ways that facilitate innovative solutions that capitalise on the range of technologies becoming available, or whether they lock in traditional sources of dispatchable power. An even bigger question is what the reliability requirement would add to both the existing market based signals for dispatchable energy and the other interventions the ESB is working on, which include a strategic reserve, a day-ahead market and increasing demand response, as well as a modification of the Reliability and Emergency Reserve Trader (RERT) arrangements.

Broadly, the reliability requirement sets first a signal for market investment in, and then if needed a binding trigger for AEMO to ensure the procurement of, a set amount of 'dispatchable' megawatts (MW) to be brought in in any NEM region.

This additional dispatchable generation could be new generation, or demand response, or existing generation that has been un-mothballed or subject to efficiency improvements. Another option is for generators to postpone their retirements. Presumably transmission capacity could also qualify if it brings the desired dispatchable capacity from another NEM region, but this option is not actually canvassed in the ESB paper, which seems like an important gap. All of these options have different features and provide many different versions of dispatchability. Orchestrating the optimal combination would be a very difficult task for a government body.

Turning to the market, who would be expected to benefit from this policy? What investment will it encourage? And how will the market respond?

From our initial review the incumbent "gentailers" will have the greatest market advantage. Due to their diverse portfolio mix and market share, they are relatively well-positioned to satisfy the multiple objectives of the NEG

Smaller retailers will have to rely on the market for all these components. Renewable energy retailers will have a greater need to access the "reliability requirement market" to ensure they meet the NEG's requirements. The extent and liquidity of the reliability requirement market is expected to be small, leading to higher prices for the reliability component. This will drive up costs for renewable energy retailers and hinder investment in future renewable energy generation.

Whilst the ESB has recognised that market competition will be addressed later, we view this potential lack of competition as a key policy issue to be addressed in the design of the NEG.

Nonetheless, given that existing trends in technology and state policy are already driving a shift from coal generation to renewables, storage and gas, the reliability requirement is more likely to shape this shift than stop or change it.

Does the NEG do anything to reduce climate policy uncertainty? And does that matter?

The major challenge to the electricity system is to more smoothly manage the retirement and replacement of the ageing coal generators that have been dominant for so long. A weak emissions requirement will not do this; the reliability requirement may drive replacement capacity but adds no clarity regarding retirements. Indeed, if it incentivises ageing generators to hang on for as long as possible, it could make the timing of retirements even harder to predict.

The Finkel Review proposed a solution to this but it is actually outside the NEG – a requirement that generators must provide three years' notice before they exit the market. This recommendation has been accepted by the government but not yet translated into policy or regulation). This would signal the need for investment in replacement generation ahead of time, in order to avoid a repeat of the price and security shocks associated with the sudden shut-down of Hazelwood in Victoria.

If it works though, it suggests that at least part of the reliability requirement might be redundant. This goes to a major problem in assessing the NEG – defining what it should do is hampered by its own lack of detail and the broader context of multiple other policy changes underway.

Finally, one problem with all the policies discussed above is that they are based on an expectation of incremental and somewhat reactive change. Is this a wise approach? The scale of transformation of electricity systems both expected over time and required by the global commitment to limiting climate change to 1.5-2°C is vast. Two areas where a more proactive longer-term view might be more effective are transmission investment – to open up renewable energy resources or connect regions – and preparation for a flurry of coal generator retirements in the early 2030s. Unfortunately the NEG consultation paper sheds no light on either.

January 2018

The National Energy Productivity Plan could unlock the full value of the Trans-Pacific Partnership to Australian manufacturers

Written by Roger Horwood

Australia's National Energy Productivity Plan (NEPP) needs to be revived – and urgently – if the full value of the newly signed Comprehensive and Progressive Agreement for Trans-Pacific Partnership (commonly still referred to as the TPP) is to be realised for Australian manufacturers. With some US$9 billion in tariffs on Australia's dutiable exports to be removed[1], this trade agreement will help Australian manufacturers exporting food, resources and energy to both maintain and grow business in the TTP region. In this article, Energetics discusses the opportunity and the energy productivity measures that can both drive down costs and increase a business' output.

Trade opening up and demand for Australian exports will grow

On 23 January 2018, Australia, together with Brunei Darussalam, Canada, Chile, Japan, Malaysia, Mexico, New Zealand, Peru, Singapore and Vietnam, reached agreement on the final Comprehensive and Progressive Agreement for Trans-Pacific Partnership (TPP) at an officials-level meeting in Tokyo, Japan. Signing of the agreement is expected to take place in March. The headline news for Australian manufacturers is that the deal will eliminate more than 98% of tariffs in the TPP region[2].

The timing of the breakthrough on the TPP couldn't have been better for Fonterra Australia as in January they announced expansion and efficiency plans totalling $165m. The business will double the size of its flagship cheese plant in northern Victoria with a $125m investment, enabling Fonterra to increase sales of cheese to Japan where demand is already high – and now could grow further.

Projects that improve energy usage – lowering costs and increasing production

For all Australian manufacturers, the expected increased demand requires greater production output which represents an opportunity to improve plant energy productivity.

This can be achieved by introducing new processing and energy equipment, alternative energy supplies, advanced energy monitoring and control systems, and use of robotics and artificial intelligence.

Plans for upgrades and expansions need to include a detailed assessment of the energy productivity options available. This is particularly valuable for those plants where energy costs have been rising rapidly over the last few years. Manufacturers have an opportunity to make a step change in the productivity of their operations and accelerate the move to renewable energy supplies.

Some key opportunities that can improve production levels and lower energy costs include:

- alternative energy supplies such as biomass thermal systems, solar PV, solar thermal and biogas
- distributed energy generation such as heat pumps to boost temperatures in waste heat flows, condensing boilers for hot water, and motors drives to replace compressed air use
- upgrading or replacing old equipment using variable speed drive compressors, pumps and fans
- lighting upgrades using LEDs and smart control systems
- use of robots in production lines and packaging /storage areas
- use of Cloud-based energy monitoring and reporting
- supervisory control of key plant and equipment using remote expertise and artificial intelligence.

Trade opening up and demand for Australian exports will grow

Published in 2015, the Government describes the Plan as "a framework and an initial economy-wide work plan designed to accelerate action to deliver a 40% improvement in Australia's energy productivity by 2030"[3]. The target is widely regarded as weak, yet significant economic benefits could be generated especially as a range of projects to improve **energy usage can be delivered quickly**. The value is particularly enhanced for the manufacturing sector in the eastern states which has struggled under the impact of high and volatile energy prices. It is positive to see that all states and territories, excluding NSW and WA, are exceeding the RET by 2030 with Vic, SA, ACT and Tasmania surpassing it significantly by 2020.

What we see in the NEPP are statements about helping industry to self-manage energy costs, recognition for leadership and "support" for voluntary action, and assistance to help reduce barriers for financing. However, there is little else that points to a preparedness to help industries with export markets seize an opportunity of the magnitude we see in the TPP.

Manufacturers have seen their energy budgets blown out over the past five years or so with little hope for improvement. With the signing of the TPP, now is a great time to put in place a long term solution for energy productivity and secure business revenue into the future. The Government can bring the NEPP to life to support our manufacturers.

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Power of Choice and embedded networks – there's no need to jump ship!

Written by Mark Asbjerg

February 2018

Energetics doesn't believe that the Power of Choice reforms should be seen as a catalyst for all embedded network customers to suddenly jump ship and seek a contestable on-market retail contract. A well run embedded network can deliver value for both its operator and its customers. In this article we discuss the features of the new provisions under Power of Choice and how they apply to operators and customers – and the opportunities for both.

Shopping centres, commercial buildings, apartment blocks and caravan parks have all commonly on-sold electricity to their tenants. The Australian Energy Regulator (AER) refers to these arrangements as Embedded Networks. Embedded networks allow for tenants to aggregate their loads under a single 'Parent' meter, taking advantage of their combined consumption when negotiating a retail electricity contract. The embedded network operator, typically the landlord (parent meter), will generally administer the electricity contract directly with a retailer, and thereafter apportion the costs between tenants (child meters). This arrangement is illustrated in figure 1.

To date, many larger embedded network operators have had to register with the AER and comply with a number of conditions, as set out in their Exempt Selling Guidelines (**Retail** and **Network**). These conditions are primarily aimed at ensuring that tenants/customers are adequately protected, and include:
an obligation to supply

- minimum information provisions
- billing and payment arrangements
- methods for billing estimations
- pricing guidelines
- under and overcharging guidelines
- maintenance of records

As of the 1 December 2017 a number of additional rules have however come into effect. Part of the broader Power of Choice reforms, the rules have placed additional obligations on embedded network operators, and reduced the barriers for tenants wishing to leave an embedded network and seek a contestable on-market retail contract.

These rules are intended for jurisdictions covered under the National Electricity Customer Framework (ACT, NSW, SA and Vic). Their application in Queensland will be dependent on the state government making the relevant legal changes to the Electricity Act 1994, expected during 2018. A summary of the broader Power of Choice reforms, the involvement of various government agencies, as well as a timeline of their implementation is provided in figure 2.

So what do the Power of Choice reforms mean for your business?

Embedded network customers

If you have a site that is currently part of an embedded network, the reforms will make it much easier for you to seek an alternate on-market, contestable retail contract for the site. This access to retail competition will allow you to seek a broader range of electricity offers, some of which may be lower than that offered within the embedded network. Importantly, should you choose to leave, it is important to check you aren't

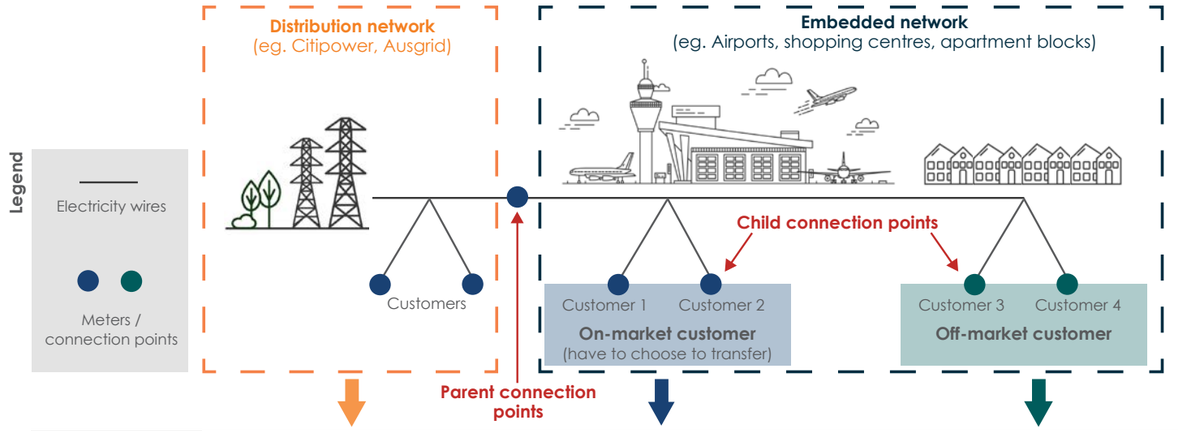

Figure 1: Embedded network operations[1]

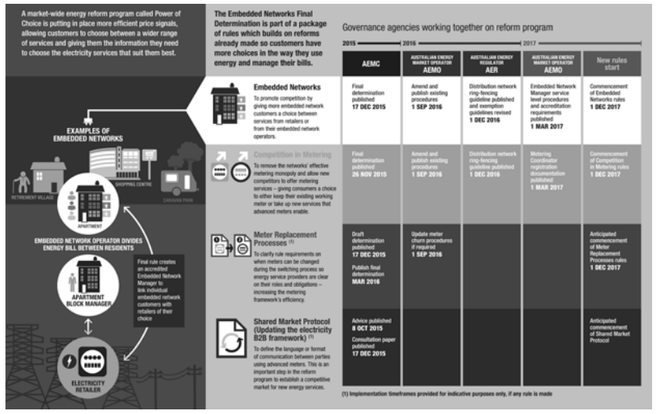

Figure 2: Australian Energy Market Commission – Embedded Networks Final Determination 17 Dec 2015

double charged for distribution network charges. Previously, these would have been apportioned and passed through by the embedded network operator based on what they were charged, however a retailer may similarly include these charges on their invoice.

Embedded network operators

One of the fundamental rule changes introduced by the AEMC is the creation of the role of an Embedded Network Manager (ENM). An ENM will be the entity responsible for facilitating the relationship between customers of an embedded network (child meters) and the broader National Electricity Market (NEM). Effectively the ENM will provide a NMI to customers of the embedded network, who want to go on-market, ensuring that these customers are accurately appearing in NEM systems (MSATS).

The embedded network owner will be responsible for appointing the ENM. The ENM will then be contracted by the embedded network owner to administer the embedded network – or at least to fulfil the obligations of the ENM. The Australian Energy Regulator (AER) has introduced a grace transitional arrangement period extending the deadline to appoint an ENM up till 31st March 2018 for eligible embedded network operators. AEMO publishes an up to date list of accredited ENMs on its **website**.

Importantly embedded network operators now need to account for the risk that some of its customers may start to seek on-market contracts. This risk will therefore needs to be accounted for in the load forecasts and volume flexibility of any future large market electricity negotiations.

Embedded networks can benefit both property owners and end users

The aggregated loads of tenants, through the use of a single parent meter can give access to electricity rates that each party otherwise wouldn't be able to access independently. The challenge then comes in finding an optimal price of electricity for tenants; one which can provide both an income stream to the operator (covering the additional costs of operating such a network) whilst still providing tenants with greater savings than they would otherwise be able to negotiate independently with an on-market retailer.

Energetics can provide further insights and advice on your business' individual circumstances. Please contact the author or any of our experts for more information.

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Solving tomorrow's problems with yesterday's thinking: why are we fighting over the NEM?

Written by Dr Gordon Weiss

March 2018

The Australian recently reported "Electric car plans spark showdown"[1] with the article stating, "Liberal MP Craig Kelly, backed by Nationals MPs Andrew Broad and John Williams, would raise government support for electric cars at the next party room meeting and argue there should be no further subsidies given to the sector. It is not clear what subsidies Mr Kelly was concerned about because few have argued for subsidies for electric vehicles. It seems that the Federal Energy and Environment Minister Frydenberg had something different in mind: "... what we will need to see is some of the infrastructure issues solved because when people come to make a decision about the vehicle they purchase they want to make sure that if they do purchase an electric vehicle that they can plug it in when they go on a long road trip and the infrastructure is consistent throughout the country"

The Minister appears to be arguing for proper planning in preparation for the inevitable rise of elective vehicles. However, the conservatives, having lost the debate over the future of coal-fired generation, seem determined to carry the fight to electric vehicles irrespective of facts. Why else would Mr Kelly be worried that "We need to be very careful that any subsidies or concessions we give to electric cars in Australia will not increase CO_2 emissions rather than decrease them", when up to this point, Craig Kelly hasn't shown much interest in Australia's emissions.

Whatever the reasons for the sudden concern about the rise of electric vehicles by the Right of the Australian Government and its supporters, the debate itself risks distorting the market's response to the changing economics of electric vehicles, especially if it goes the way of the debate about Australia's electricity supply and generation mix.

Hence to the topic of this paper – the future of Australia's electricity supply and generation mix.

In an earlier paper[2], we explained how the market is driving the implementation of the technologies needed to reduce Australia's greenhouse gas emissions. This is most clearly seen in the role of new cost, low emissions power generation technologies.

A trajectory for Australia's generation mix and emissions intensity of electricity out to 2050

The analysis is based on two key premises discussed in the earlier paper:

- The unit cost of electricity for new solar farms and wind farms is already well below the unit cost of electricity from a new coal-fired power station.
- The additional cost of gas-fired generators to provide firming capacity for low cost variable renewable generators does not result in the total cost of wind/solar firmed by gas-fired generation exceeding the cost of new build coal-fired generation.

Note that these two cost comparisons exclude any consideration of a carbon price or equivalent. We also assert that these premises about relative costs are not assumptions, but current reality[3].

As the economics of energy storage improve, more of the firming capacity will be taken up by batteries, further reducing the volume of fossil fuels (in this case, natural gas) used for power generation. The technical performance of batteries for firming has already been clearly demonstrated by South Australia's 100MW battery[4].

The evolution of the generator fleet

Power generation in Australia is dependent on old, low efficiency coal-fired power stations[5]. Over the next two decades, most of these coal-fired generators will be retired[6], see Table 1. The date of withdrawal for each power station is either the announced retirement date or the result of the application of the '50-year retirement rule'. The volume withdrawn is the total amount of electricity generated by the power station in 2016. The retiring coal-fired power stations will be replaced by the cost-effective low emissions alternatives.

The evolution of Australia's generation fleet will be influenced by other, additional factors. These include requirements for grid stability and the demand for electricity.

The demand for electricity determines the total generation capacity that must be installed. Forecasting Australia's demand for electricity in 2050 is challenging. Table 2 shows projections of future power demand based on two

separate approaches. One looks at projecting 'business as usual' and the other pre-supposes a gradual improvement in the ratio between GDP and electricity demand (the 'electricity productivity') so that the electricity productivity in 2030 is double that of 2010. This will require an uplift in the rate of improvement of electricity productivity by around 40%.

Recent proposals for policies to manage the Australian power systems recognise the importance of stability and also acknowledge that the rise of variable renewable generation such as wind and solar introduce new challenges. While the purpose of this article is not to discuss the National Energy Guarantee[7], Energetics feels that the NEG may be seeking to solve tomorrow's problems with yesterday's thinking, and as such will perpetuate the systemic problems in the management of Australia's power systems. Our modelling of the future generation fleet addresses the requirements of the NEG by specifying the mix of renewable and dispatchable generation that replaces the retiring coal-fired power stations.

Decade ending	Volume withdrawn (TWh)	
	Black coal	Brown coal
2020	4	13
2030	23	12
2040	47	
2050	19	24
2060	20	

Table 1: Coal-fired capacity to be withdrawn

Scenario	2014	2020	2030	2040	2050
Business as usual	248	258	268	276	283
Doubling electricity productivity	248	242	228	211	196

Table 2: Trends in electricity consumption (TWh)

	2015	2030	2040	2050
Emissions due to the use of electricity (Mt CO2-e)	189	147	112	61
Electricity generated (TWh)	252	268	276	283
Intensity - all electricity (t CO2-e/MWh)	0.75	0.55	0.41	0.22
Intensity - grid electricity (t CO2-e/MWh)	0.79	0.58	0.44	0.23
Renewable fraction	14%	33%	48%	64%
Variable renewable fraction	7%	27%	42%	58%

Table 3: Electricity in Australia – Business as usual projection of electricity productivity

	2015	2030	2040	2050
Emissions due to the use of electricity (Mt CO2-e)	189	133	96	43
Electricity generated (TWh)	252	228	211	196
Intensity - all electricity (t CO2-e/MWh)	0.75	0.59	0.45	0.22
Intensity - grid electricity (t CO2-e/MWh)	0.79	0.62	0.50	0.25
Renewable fraction	14%	32%	47%	65%
Variable renewable fraction	7%	24%	38%	56%

Table 4: Electricity in Australia – Higher EP projection of electricity productivity

Initially that dispatchable generation is biased towards gas turbine generators but over time, we expect to see the dispatchable component taken up by storage technologies such as batteries and pumped hydro. For instance, a recent study[8] that looked at Ireland's electricity system demonstrated that capacity of batteries to stabilise a grid is significantly smaller than the capacity of gas turbine generators to perform the same task.

Our analysis does not specifically address the impact of the electrification of transport. Electric vehicles will have two impacts; EVs will increase the demand for electricity and they will introduce a very large volume of battery storage into the networks. Our preliminary analysis suggests that the volume of additional storage that comes with the EVs is the more important issue and if managed correctly will see EVs as a positive development in the context of Australia's electricity networks.

Table 3 and Table 4 present some results.

Figure 1 shows the trend in emissions due to electricity generation.

The trend is clear. Emissions fall, and the variable renewable component rises as the coal-fired power stations close.

What does this mean for policy makers?

If the business as usual trend for improvements in electricity productivity continues out to 2030 and if coal-fired power stations reach their 50-year life during the decade to 2030, and if these are replaced by wind/solar firmed by gas with some battery storage (as AGL is proposing for Liddell) then emissions due to electricity generation will be around 147 MT CO_2-e. This equates to 25% below the corresponding figure in 2005 and is close to our commitment under the Paris Agreement. Two questions are raised:

- Why is the nation having a heated debate on the impact of the commitments to reduce emissions when business as usual will see electricity make its proportional contribution to the necessary reduction in Australia's emissions?
- What happened to ambition to go beyond business as usual to reduce emissions?

Either improving electricity productivity above the business as usual trend or bringing forward the closure of certain coal-fired power stations (most notably Bayswater or Eraring) will see deeper cuts in emissions from electricity generation. The former brings with it the benefit of reducing costs to business. It may therefore be better for the nation to be debating the best ways to reduce electricity consumption rather than arguing over the structure of the generation fleet. The market will address the latter.

Perhaps now is the time for policy makers to turn their attention to emissions due to electricity in the period after 2030. The residual emissions after 2050 are largely due to the remaining coal fired power stations (12 MT CO_2-e) and the gas fired generators (39 MT CO_2-e). Much of this gas fired generation was introduced to firm the variable renewable generators. Perhaps now is the time to consider the appropriate technologies to meet the intent of the NEG (or equivalent policies) without a knee-jerk response of installing new fossil fuel fired generators to provide appropriate 'dispatchable' generation.

What does this mean for policy makers?

Our earlier advice stands. Renewable generation now provides the lowest cost electricity and businesses can take advantage by:

- exploring options for on-site renewable power generation; and
- entering into a power purchase agreement (PPA) with a suitable renewable energy developer.

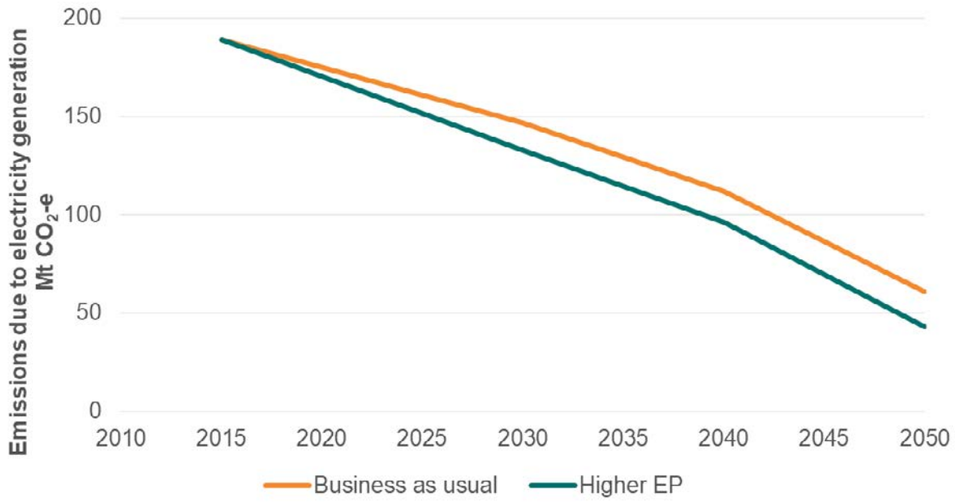

Figure 1: Forecast of Australia's trend in emissions due to electricity generation (2010 – 2050)

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Perhaps now is the time for policy makers to turn their attention to emissions due to electricity in the period after 2030

March 2018

How can governments support climate change innovation and energy solutions?

Written by Olivia Kember

'Innovation' as a term comes in and out of fashion, but actual, sustained innovation is critical to the success of climate mitigation and adaptation efforts. How can Australian companies maximise their innovative capabilities and what should Australian governments be doing to support them?

It's worth looking at what Australia is getting right and where we need to raise our game.

A little-known player in the UN climate change negotiations is the Technology Executive Committee (TEC). The TEC's job is to promote technology policies that can accelerate the development of low-emission and climate resilient technologies and their transfer to developing as well as developed countries. Energetics' Chief Operating Officer and Executive Director **Dr Mary Stewart** is an observer on the TEC's Innovation Taskforce.

It has long been noted that Australia struggles to commercialise its innovative research. This has hindered our ability to play much of a role in international technology transfer as well as domestic clean tech-driven transformation.

Where we are doing best is in renewable energy, and the pay-offs are becoming obvious.

The existence of an 'ecosystem' of policy support from early-stage research to financing for market deployment to market pull-drivers like the RET has enabled Australia to bring solar, wind and storage technologies from the fringes of the energy system to become mainstream, low-cost, smart energy options. That this has happened despite some truly destabilising policy reversals along the way is a testament to the importance of the ecosystem as a whole.

Can Australia do what has been done in energy elsewhere?

The incentives to do better aren't just the benefits that arise for the climate, but the more immediate financial returns that could accrue to Australian businesses.

The TEC has formulated 10 recommendations for policymakers to guide effective policy for innovation in climate-related technology. These are summarised in the table below. It is worth highlighting the first principle in particular: "Strategy for technological innovation is required". From this, all the other recommendations flow.

1. Strategy for technological innovation
2. Need to accelerate and strengthen climate technology and innovation
3. Policy needs to be country specific and appropriate for different sectors
4. A systematic approach is required
5. Clear objectives and operating together to make best use of limited resources
6. Facilitate private sector involvement and expansion
7. Innovation is in business model, finance structures and new policy mechanisms
8. Stakeholder involvement and ownership
9. Leverage international relationships and successful partnerships
10. Understand what the UNFCCC can do for you

Why have a national strategy for innovation in climate-related technology?

It is important to understand what national strategy means in this context. Innovation can be considered valuable in itself, but without a defined objective innovation efforts can result in a lot of wasted resources.

On the other hand constraining innovation too rigidly to a fixed goal can stifle it altogether.

An advantage in defining innovation strategy for climate-related technology is that some of its necessary objectives will be very clear: sectoral decarbonisation – reducing the emissions and emissions intensity across all sectors of the economy – requires technological advancement in some obvious areas, such as electricity storage and system management, as well as in areas that are more speculative, such as industrial carbon capture and storage.

Innovation in technologies for adaptation to climate change can also be framed with regard to some obvious needs: ensuring infrastructure, buildings and equipment can withstand greater weather extremes, modifying agriculture to maintain food productivity in the face of higher temperatures and changes in rainfall, managing ocean acidification and sea level rise.

Interestingly, Innovation and Science Australia recently released a **roadmap** for the Australian innovation, science and research system out to 2030, to direct the federal government's $10 billion annual spend in this area. It is clear that a more strategic approach is desperately needed.

ISA chair Bill Ferris AC noted that while Australian innovators have made world-leading breakthroughs (and won 15 Nobel Prizes over the last century), we have failed to capture the full value of many of our inventions, including "the black box flight recorder, heart pacemaker, photovoltaic cells, X-ray crystallography" all of which were commercialised overseas. Worryingly, even as innovation becomes even more important to deal with challenging megatrends (of which climate change is only one), Australia is falling behind in areas like business investment in R&D.

The ISA roadmap has proposed a number of "National Missions" – long-term goals supported by sustained resources and collaborative efforts and framed by a simple, compelling storyline (think of President Kennedy and the moon landing). The headline National Mission is for Australia to become the "healthiest country on Earth" – itself a goal that cannot ignore climate change's threats to health. But ISA also suggested two other potential National Missions: "Restore the Reef" – "build on Australia's position at the forefront of reef management and marine research to deliver the world's largest reef re-engineering program to increase its resilience to climate change"; and "Hydrogen City – "lay the groundwork for decarbonisation of direct combustion sector, currently responsible for 18% of Australia's greenhouse gas emissions, by converting the gas supply of an entire Australian city from natural gas to clean hydrogen".

Both of these unapologetically tackle climate change, offer clear and ambitious objectives and would require innovation and progress across multiple sectors, over decades, to succeed. As yet, neither is government policy.

But while Australia's climate policy uncertainty has been widely bemoaned, the lack of a strategy in which that policy would operate is less well recognised. Even when we had a carbon price, we didn't have a long-term vision for decarbonisation. Even if we implement a National Energy Guarantee we will still lack an agenda for the rest of the economy. Australia's lack of strategy and its supports is a key factor in our failure to leverage our innovation talent and research findings.

Energetics has created a self-diagnostic tool out of the TEC's innovation recommendations and has assessed Australia's current performance. This assessment – and the priority areas for improvement we have identified – will be discussed in a future article.