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BETTER IDEAS

THE FUTURE OF ENERGY
IN QUEENSLAND

Better Ideas

THE FUTURE OF ENERGY IN QUEENSLAND

Wednesday 14th July

7:30am – 9:00am

Customs House, 399 Queen St, Brisbane

PANELISTS:



JAMES HARMAN

Chief Executive Officer
EDL



MAIA SCHWEIZER

Chief Executive Officer
CleanCo Queensland



TREVOR ST BAKER AO

Founder and Deputy Chairman
St Baker Energy
Innovation Fund



CECILE WAKE

Chief Executive Officer
Arrow Energy



**MODERATOR:
GUY CHANDLER**

National Energy
and Utilities Leader
PwC Australia

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SNAPSHOT

The key theme from the 2021 Queensland Futures Institute *The Future of Energy in Queensland* forum was the state of the energy transition in Queensland and the global and national drivers of this shift. The panel outlined opportunities to advance the transition include the adoption of storage technologies such as batteries, and the continued use of pumped hydro energy storage. However, while hydrogen production remains a long-term opportunity in its early stages for storage and export, natural gas still plays a role in energy security in the State; however, there is opportunity to decarbonise gas through use of biogas and methane. Additionally, the need for strong investment and policy certainty remains a key challenge for the industry.

Panel Comments



Moderator - Guy Chandler, National Energy & Utilities Leader, PwC Australia

- Queensland is a fantastic state for energy - it produces 27% of Australia's gas and 35% of solar. Additionally, \$234mn of economic value is generated per petajoule consumed.



Cecile Wake, Chief Executive Officer, Arrow Energy

- Arrow Energy is a joint venture between PetroChina and Shell, with Surat Gas Project a current major project for the company.
- We are currently at a major inflection point in the energy industry as we address the intersecting issues around the global pandemic and improving the quality of life for a billion people around the World without access to electricity.
- The gas industry has played a major role in providing affordable and secure energy around the World. However, electricity only comprised 20% of energy demand. Despite the penetration of renewables, the energy system needs to shift towards electrification and support the emergence of hydrogen and other future fuels. This will require radical new leadership.
- Gas will be the backbone of the energy transition as the energy system pivots towards renewables. However, there is work to be done in developing hydrocarbon supply chains. The development of blue hydrogen will play a larger role as costs decrease and supply chains and business models are established. Queensland is uniquely placed to take advantage of hydrogen export to Asia.
- Natural gas will continue to earn its place in the energy mix if it meets three strategic imperatives - cost competitiveness, carbon competitiveness and management of methane fugitive emissions. Only in this case will it maintain a strong social license to operate.
- Society is going to continue to play a leading role in the energy transition. This includes energy producers, consumers as well as government. Amplifying this, COVID-19 has only accelerated the pace of transition and decarbonisation.



James Harman, Chief Executive Officer, EDL

- James is the CEO of EDL, a global sustainable distributed energy company based in Brisbane. We believe that innovation is needed to ensure a smooth transition.
- Queensland is in a position to lead the transition and provide a reliable electricity supply to Australia. The transition will be clunky unless it is led by innovative approaches; it is worth noting that Australia is relying on large solar, large hydro and large wind while other countries adopt policies around green gas.
- Green gas can play a major role in Queensland as the State is well set up to embrace this technology and lead decarbonisation efforts. Other countries use methane converted to electricity for direct use; Queensland can lead the charge if industry and government embraces this.



Maia Schweizer, Chief Executive Officer, CleanCo Queensland

- CleanCo is the Queensland Government's newest electricity generator, with a low emissions portfolio which includes pumped hydro, hydro and gas. We also partner with new wind and solar projects to offer customers electricity that's cost competitive and 90% lower emissions than the grid.
- Queensland has what it takes to be incredibly successful as the world decarbonises at a rapid pace of change, given the abundance of renewable and non-renewable resources. But electrification comes first. This will multiply the energy usage coming from our grid in Queensland by anywhere from two to 10 times. This could happen in the next 10 to 15 years and require large-scale investment.
- The interconnectedness of transport, water, infrastructure, energy industry, agriculture, climate and environment mean that these sectors share the same challenges, and need to be addressed by the same solutions; there is value in this vertical integration of solutions. We need courageous leadership to make the most of the opportunities that this presents.



Trevor St Baker AO, Founder and Deputy Chairman, St Baker Energy Innovation Fund

- Trevor has been in the energy transition for 60 years, spending two decades in the electricity commissions of New South Wales and Queensland.
- Historically, the public energy enterprises did a successful job in Australia, in shifting the electricity system in the 1950s after the war into the most economical and competitive electricity supply, bringing industry and jobs to Australia and giving us the standard of living we have today. Additionally, this created an international terminal and coal trade which has become a competitive advantage for Queensland.
- Trevor led a successful power planning consulting practice for a decade and a half which helped to unlock this, until public sector management gave rise to innovative enterprising energy.
- During this period of privatisation during which the national market continued to develop, Trevor spent a decade and a half leading ERM Power, creating six coal power plants across Australia, three in Queensland, one in New South Wales and two in Western Australia, before expanding downstream into retail, becoming the third largest electricity retailer in Australia within five years, and the second largest retailer to business with two thirds of the market. The company was later bought by Shell. The first head office of a national energy company was in Brisbane.
- Trevor has created a now internationally leading electric vehicle charging company soon to be listed on the U.S. stock exchange for \$2bn. Being technology agnostic, he founded SMR Nuclear Technology in 2009, as it was clear if climate change is real, nuclear is a necessity.
- Australia is a global leader in renewable generation, with five times the per capita utilisation of wind and solar than America, the EU and the UK.
- The investment in the hydrogen industry is in the early stages as there are many hurdles to the development of energy to create the hydrogen and then create the electricity. Rather, investment should be made on financial metrics and to ensure affordable, reliable and secure electricity supply throughout the transition. We can keep jobs here throughout the transition, moving slowly and gradually and not driven by distributed rooftop solar, led by technology agnostic generators, developers and retailers, not the activists.

Panel Discussion

You have said publicly that you are a fairly recent convert to Queensland's ability to deliver globally competitive green hydrogen. How are we going with that and what do you need to see to keep up your confidence?



Maia Schweizer

- Despite a high level of scepticism around hydrogen, there is a massive scale of commitment by a number of private sector stakeholders and large governments to making this a reality.
- The use of hydrogen or ammonia as an energy carrier when direct electricity cannot be used has recently gained international consideration.
- In Queensland, 10-15% of its ultimate final energy use will be best decarbonised by hydrogen. As such, a domestic hydrogen story exists in Queensland, regardless of what you believe about export or foreign markets. This represents 500,000 tons per year, just for these first few applications, which includes transport and heavy industry. This requires a 3GW electrolyser to produce, which requires 5-8GW of energy.
- When considering export opportunities, this is possible for Queensland given our sufficient, high-quality solar and wind resources that could allow our green hydrogen production to be globally cost competitive. However, this is an inefficient process as you lose 75% of the input energy. But there are places around the world where hydrogen would still be valued. The question is how we use our renewable bounty, is that the highest value use of the energy that we have here in Queensland, because hydrogen is clearly part of the picture, but so are our Queensland minerals.
- There may also be opportunities along the value chain in the resources industry, in smelting, production of fuel cells or batteries, solar panel production or recycling. It is clear hydrogen sits amongst these potential opportunities. This is exemplified by the \$2bn fund announced by the Queensland Government, highlighting the opportunity for jobs in hydrogen and renewable energy.



Cecile Wake

- Despite previous research and development of hydrogen in recent years by Shell, we are now at a time when this research can be applied given the reduced cost of electricity driven by renewables. Shell has invested in 6 of the 7 largest global hydrogen projects, none of which are in Australia. This is partly due to the policy environment. These projects are heavily subsidised and incentivised in the way that renewable technologies here originally were. This shows that there is a role in policy settings, to encourage innovation and new technologies.
- We need to find the highest value application of our energy resources here in Australia, and to service a domestic need with hydrogen, which should be technology agnostic. Finally, this development requires short-term investors as well as long-term investors, who have the social license to apply themselves to these challenges over the coming decades.

In your business and specifically in Queensland, you have had some challenges with the wholesale electricity market, particularly the spot market. What do you see are the opportunities for your business and how is Queensland comparing relative to other jurisdictions where you operate?



James Harman

- All grid-connected projects are susceptible to spot pricing on the electricity grid in Australia. They have all seen challenges this year due to the volatility of the grid. This was exemplified when three gigawatts of power came out of the grid when Callide failed, causing blackouts across Queensland and extremely high power pricing.
- There is large opportunity for distributed energy in Australia. EDL have built Australia's biggest remote micro grid (56MW) in Western Australia, for the first mine in Australia to be powered predominantly by wind. The reliability of this micro-grid is underpinned by a hybrid model with wind, solar, battery, some gas and some diesel, achieving up to 70% renewable penetration and averaging about 55%.
- Micro grids around remote areas in Queensland could provide reliable, sustainable and affordable electricity, particularly given network losses and the subsidies that the State Government provides electricity security in these regional areas.
- Queensland's emissions are growing, driven by Queensland powering the rest of the Country through coal seam gas and distribution to other parts of Australia, and energising the World through LNG exports. This brings jobs and energy security for Queensland and for Australia. But with that comes significant emissions, so decarbonisation needs to be considered. This can be achieved through green gas – biomethane from waste. According to a recent Deloitte report, about 84 petajoules or a third of Queensland's gas demand could be satisfied by biomethane.
- A bioenergy roadmap, about to be released and supported by ARENA, is about to outline how this can be achieved. There needs to be a policy mechanism to support this. For example, the introduction of gas electricity certificates could assist in achieving this, which could begin the decarbonisation of the gas industry while hydrogen continues to be developed. This certificate needs to be available to natural gas producers and retailers to help dilute the amount of fossil fuels in their gas.
- There is about 1,500 petajoules of fossil fuel gas across the Eastern states of Australia. Supplementing 1% of that amount can help industry, with costs being passed on to the producers of fossil fuels, not making a difference to the end price of their product, as it can pass through to the consumers in Australia and overseas.
- This happens in the U.S. currently – last year, 2.3bn litres of diesel were displaced in transportation through a similar scheme. Queensland could lead the way in Australia in developing and implementing this. We are investing \$500 million in further developments of green gas in the U.S. and we would rather spend that money in Queensland and provide opportunities in Queensland, particularly regional jobs that would come with this distributed energy and green energy. But this requires State Government policy to support the greening of the gas industry.

What do we need to do in Queensland to get the investment climate, right?



Trevor St Baker

- It will always be difficult to forecast trends and make investment decisions based on future outcomes. Trevor had a view to electrify transport in 1963. A successful example of investment is EV penetration and charging in Australia; Tritium has a long-term investment plan and this is currently being implemented through the rollout of charging stations across the country. This relies on an affordable electric car being sold in Australia. This allows Tritium to build 45 ultra-fast charging stations along highways and 160 in metropolitan areas. Additionally, there will be 200 stations across every township of Victoria. This is the infrastructure required to transform the transport sector.
- Academic studies led by a University of Queensland professor, have shown that to reach net zero, hydropower, nuclear, sun and wind (which will not reach 50%) are needed. Pumped hydro, whilst profitable in Australia, will play a minor role.
- Heavy incentivisation has facilitated investment in wind and solar which has had positive flow-on effects for pumped hydro, which is finding opportunity to be used to manage the grid.
- Existing coal will remain the cheapest fuel source while we transition.
- The electrification of transport must be facilitated through the charging infrastructure. These must be enabled to be charged off-peak. Once this transition occurs, there will be batteries on wheels.
- The transition will be messy after Post-2025 Market Design as there has been no analysis to the relative costs of keeping existing coal generators running to provide system services.
- Clear investment signals must be maintained; the pool price must remain the price signal for energy dispatch and energy investment. Given renewables place decreasing pressure on this, it has been increasingly difficult to maintain these investment signals. As such, the National Electricity Market has become totally not fit-for-purpose. The market therefore needs to be reformed to maintain clear and appropriate investment signals, and secure, reliable and affordable electricity supply.

Audience Questions

What is the role of electricity storage in our energy future and how can this support renewable penetration?



Maia Schweizer

- The challenges of renewable penetration arise once it comprises 80% of generation. The remaining 20% requires carbon pricing or new technologies, such as hydrogen. One advantage for Australia, compared to other countries, is that we have space for onshore wind, which is a challenge for many other countries. Further, our onshore wind has a complementary profile to our solar, such that we need less storage for intraday smoothing, but still significant amounts for longer duration. Our analysis shows up to 20GW of storage by 2050 to electrify our own economy and decarbonise what is already electrified
- Batteries have a role in providing services across different durations of battery storage. But a technology agnostic approach means there are also roles for pumped hydro and gas, which is still the most effective for a long duration solution when renewables do not produce for over a week.



James Harman

- Storage will have a continued and growing role to play as costs are coming down.
- On the topic of renewable hydrogen, we have recently considered whether it is economic to make green hydrogen to store energy. We consider that excess renewable electricity is more effectively stored in a battery rather producing hydrogen. This is due to inefficiencies, with 75% lost in the electrolysis process. Other studies show that we can reach 90 - 95% penetration with batteries before requiring hydrogen, due to the cost.



Cecile Wake

- Part of our energy mix is difficult to decarbonise. This includes gas; we need to keep it in the pipe from wellhead to customer to ensure emissions measurement and reporting of the fugitive methane emissions through the supply chain. We should also consider carbon capture and storage. While this technology is expensive, its effectiveness means it is certainly an opportunity to explore. Additionally, nature-based solutions such as carbon sinks should also be explored.



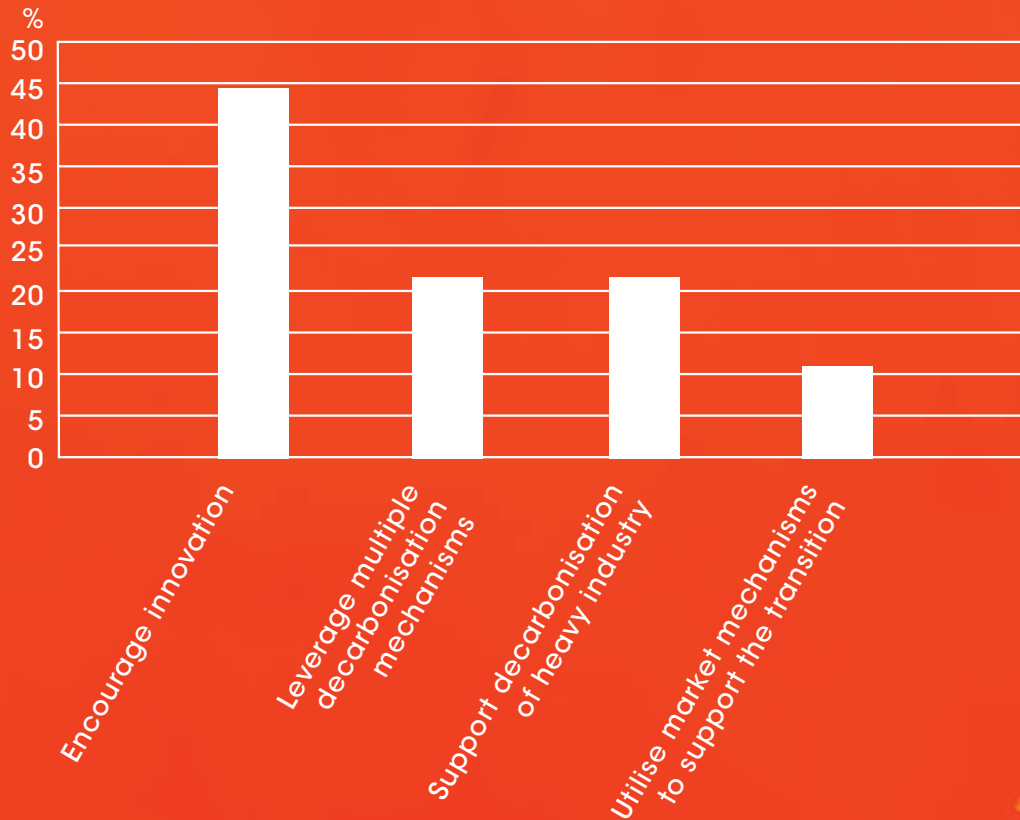
Trevor St Baker

- The markets for batteries need to be better defined and established to allow pricing for the system services which they can provide, such as frequency control, ramping, and dispatchability. Existing generators should be paid to run at minimum safe loads until other solutions are developed.
- One potential idea would be to use grid-scale batteries behind-the-meter of existing generators, which has already been done overseas. This could provide a technology agnostic approach to coal generators to support the transition as the coal industry fades out in the coming decades.

SUMMARY OF

Attendee Comments

TOP IDEAS AND INITIATIVES



SUMMARY OF

Ideas

- There needs to be consideration around the transition and the broader implications, including those on the workforce. This should also be considered in the shifts in industry caused by innovation and disruption.
- Innovative technologies should be explored, such as those used as fringe-of-grid solutions. Additionally, other methods of emissions reduction, such as carbon sinks and carbon capture and storage should be explored.
- Decarbonisation efforts should be underpinned by market mechanisms such as green certificates.

QFI Members





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FOR FURTHER INFORMATION

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