

Hydrogen Jobs plan:

Powering
new jobs
& industry

For
the
Future



Artists Impression

South
Australian
Labor



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Source: Getty Images/iStockphoto

Foreword

South Australia's history is forged in a free people taking every opportunity at their disposal to build a prosperous, forward thinking society. As the global economy rapidly transitions to a low carbon future, South Australia has an unprecedented opportunity to lead in this transition and in doing so, set up a future generation of prosperity for the people of our state.

The former Labor government established South Australia not only as a world leader in **renewable** energy generation but also as an energy storage technology leader when it contracted Tesla and Neoen to build the Big Battery at Hornsdale. The battery fast tracked the development of grid scale battery storage in Australia and throughout the world. We were prepared to invest in a new technology to tackle the emerging energy security issues facing South Australia, but also through this investment, facilitate the continued growth of renewable energy generation in the state.

We are currently facing similar issues in the energy grid with the continued growth in solar generation leading to challenges where we approach having more energy being generated in South Australia than the demand from industry and other energy users. The Marshall government's response has been to force every South Australian who installs solar panels to allow energy providers to switch off their solar at any point in time.

Government can and should turn that challenge into an opportunity.

A Malinauskas Labor government will build 250MWe of hydrogen electrolyzers, one of the world's largest hydrogen electrolyser facilities.

These electrolyzers will create hydrogen from water using green power.

They will soak up a large portion of the excess solar that is generated in the middle of the day and minimise the need for household solar panels to be turned off remotely.

We will also build one of the world's largest hydrogen power stations.

Acknowledgment of country.

We acknowledge and respect the Traditional Custodians whose ancestral lands we live and work upon and we pay our respects to their Elders past and present. We acknowledge and respect their deep spiritual connection and the relationship that Aboriginal and Torres Strait Islander people have to Country. We also pay our respects to the cultural authority of Aboriginal and Torres Strait Islander people and their nations in South Australia, as well as those across Australia.

This 200MW power station will be fuelled by hydrogen produced by the electrolyzers and the electricity it produces will be used to partner with renewable energy to supply cheaper and more secure power to South Australian based factories, manufacturing businesses and mining companies. This cheaper firm renewable electricity will mean that we can grow the jobs in businesses that are operating in South Australia and attract new businesses to operate and grow jobs in South Australia.

We will establish Hydrogen Power SA to own and operate the hydrogen production and power plant as a government enterprise. Its mandate will be to rejuvenate manufacturing in South Australia by utilising hydrogen and the associated electricity generated to grow job creating industries in South Australia, while also establishing a world leading hydrogen industry, including hydrogen export.

The hydrogen export strategy will take advantage of emerging export markets including Japan, South Korea and south-east Asia. ARENA forecasts the hydrogen export industry will be worth \$1.7bn and 2800 jobs by 2030, to the Australian economy and Labor's strategy will aim to deliver one third of those jobs to South Australia.

Labor's Hydrogen Plan, is all about new secure jobs, including:

- ▶ Up to 300 jobs in construction of the plant¹
- ▶ At least 10,000 jobs unlocked from the \$20bn pipeline of renewable energy projects in South Australia²
- ▶ More than 900 jobs will be created through developing a hydrogen export industry³

The extra clean energy produced from South Australia's hydrogen generator will provide more competition in the electricity market amongst industrial users and significant savings in their electricity costs.

Independent analysis by Frontier Economics has forecast South Australia's hydrogen plant will reduce the wholesale cost of electricity to industry by 8%.

This saving will aid the sustainment and rejuvenation of manufacturing in South Australia, especially in energy intensive industries.


Local hydrogen production will also open the door to opportunities for the heavy industry sector in South Australia to use hydrogen as part of that sector's transition to decarbonise and be more competitive against imports.

South Australia is unique in the world for our rare co-incident wind and solar resources, which place our state at the centre of the global hydrogen opportunity. In clean energy, South Australia has what the rest of the world wants and needs and this plan is all about government leadership paving the way for private industry and business to flourish in the low carbon economy. This plan is all about secure, well paid South Australian jobs.



Peter Malinauskas MP
SA Labor Leader





“An Australian hydrogen industry could generate thousands of jobs, many of them in regional areas. It could add billions of dollars to GDP over coming decades. Managed well, it could help us to reliably integrate extensive renewable generation into the electricity grid. Using hydrogen, we can reduce dependence on imported fuels. And we can reduce carbon emissions, in Australia and around the world.

The Australian National
Hydrogen Strategy 2019

This Plan will deliver:

Lower electricity prices for business and industry in South Australia

Unlock the development of \$20 billion pipeline of renewable energy projects in South Australia

Minimise the need for household solar panels to be switched off by energy providers during periods of excess renewable energy production

Deliver thousands of new jobs for South Australians

Continue South Australia's world leadership in clean energy transition by incentivising the next generation of innovative energy storage and grid reliability solutions through the use of green hydrogen

Labor's Hydrogen Jobs Plan



LABOR WILL build 250MWe capacity of hydrogen electrolyzers operated to assist in demand balance at times of high solar production and low demand. The operation of the electrolyzers during the middle of the day as a “solar soaker” will provide additional grid stability needed to enable the continued growth of household and business solar installations in South Australia which will:

- ▶ Unlock the development of \$20bn pipeline of renewable energy projects in South Australia
- ▶ Deliver thousands of new jobs for South Australians



LABOR WILL build a new 200MW Combined Cycle Turbine powered by the hydrogen produced by the electrolyzers. The 200MW hydrogen fuelled power station will:

- ▶ Lower electricity prices for all businesses in South Australia
- ▶ Minimise the threat of household solar being switched off by energy providers during times of excess renewable energy production
- ▶ Continue South Australia's world leadership in clean energy transition by incentivising the next generation of innovative energy storage and grid reliability solutions through the use of green hydrogen



LABOR WILL build hydrogen storage capacity capable of holding 3600 tonnes of hydrogen or the equivalent of two months of hydrogen power generation.



LABOR WILL establish Hydrogen Power SA, a government owned enterprise, to offer a firming service to renewable generation facilities located in South Australia using a contract structure that will ensure the reduced firming costs are passed onto South Australian based factories, manufacturing businesses and other large energy users which employ South Australians. Hydrogen Power SA will also be charged with developing a strategy for the export of this renewable energy for those seeking a zero-carbon alternative to the use of coal, oil and gas.



LABOR WILL ensure all projects will be subject to a full competitive procurement process and be operational by the end of 2025.

Cost

The total capital cost of the hydrogen-fired CCT and its associated hydrogen supply chain is \$593 million, consisting of:

- ▶ \$220 million for a 250MWe electrolyser
- ▶ \$31 million for 3,600 tonnes of liquefied hydrogen storage
- ▶ \$342 million for a 200 MW CCT power station

The National challenge

... and South Australia's opportunity

After the Federal government abandoned any comprehensive, coherent, integrated plan for managing Australia's commitment to the Paris Agreement – which requires Australia to achieve net zero emissions by 2050 – the states have responded in the only way they can, by sponsoring the development of renewables.

One of the challenges of introducing large quantities of renewables to a system is that, unless planned carefully, it can cause significant security and reliability problems.

The clearest example of this is the large quantity of solar output that hits the grid in the middle of the day. In South Australia and soon in other states like Queensland, there is so much solar output that there is no demand for thermal generation (i.e. coal and gas).

While this reduces emissions, the nature of power systems and the intermittency of renewable generators mean that it is not safe to operate a power system on renewables alone. A power system requires access to generators that can continuously provide power.

A hydrogen power plant will ensure there is firming in the system.

Firming is the process of maintaining the electricity production from an intermittent power source, such as **wind** or **solar** for a guaranteed period of time.

Firming is usually achieved with traditional coal or natural gas fired power stations producing electricity when solar or wind sources cannot produce, therefore maintaining a consistent output of electricity to customers. This process however will produce carbon pollution. Firming renewables resources such as wind and solar using green hydrogen will produce no carbon pollution and allow solar and wind assets to contract electricity even when they are unable to produce electricity.





The South Australian Renewables Landscape

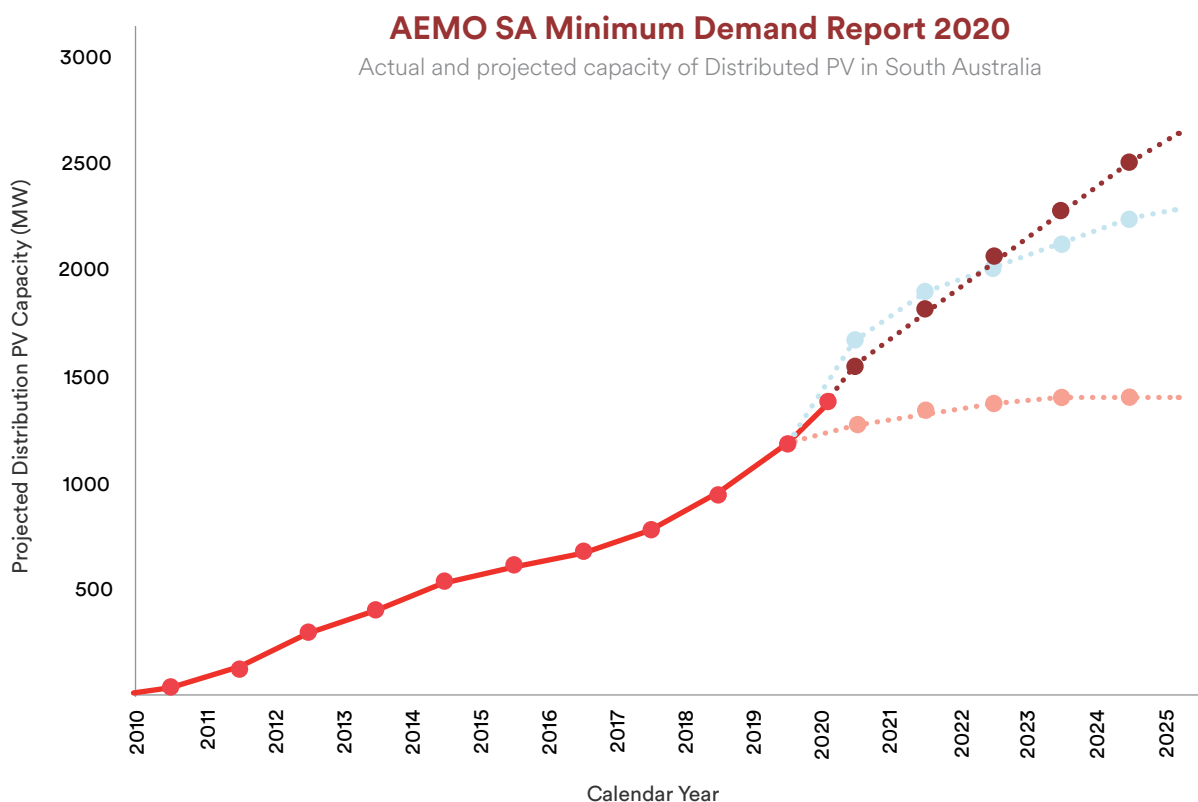
Through the term of the previous Labor government South Australia has established itself as a world leader in the transition to renewable energy, having gone from virtually no renewable energy in the supply mix in 2002 to more than 50% in 2020.

This growth has enabled South Australia to transition from an importer of energy from Victoria and NSW to its current position as net exporter of energy from South Australia to the larger eastern states.

In this period, the state has shifted from zero large-scale wind, solar and storage, to 2,675MW.

Rooftop solar has also grown from a negligible amount to more than 1.2GW over the same period.

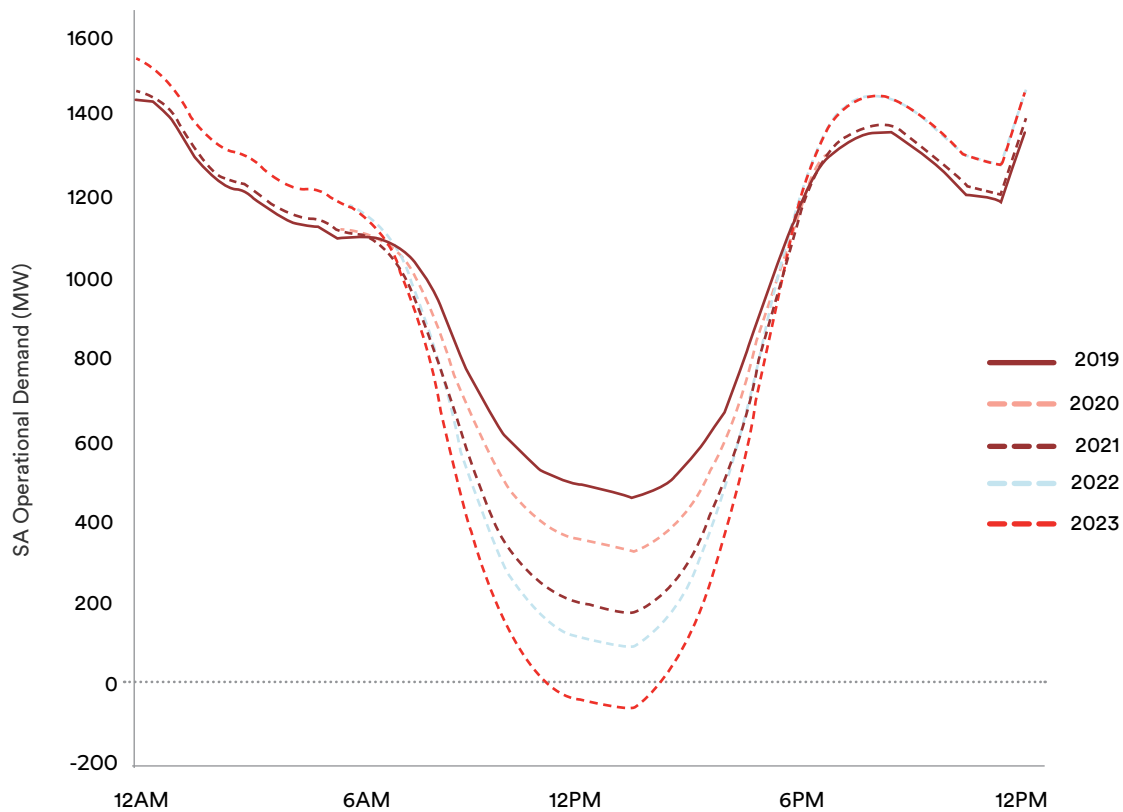
The uptake was initially driven by households but is increasingly driven by small and large businesses using rooftop solar to help reduce their power bills.



Source: Clean Energy Regulator, SAPN, AEMO forecast



AEMO SA Minimum Demand Report 2020



Data from the Australian Energy Market Operator (AEMO) predicts that 90 per cent of the state’s electricity could be generated from renewable sources by 2025.

The pipeline of future renewable energy projects is estimated to equate to \$20bn of investment in South Australia and it continues to grow.

However, South Australia has a “peaky” load that averages around 1,500MW, reaching more than 3,000MW in the summer heat, and down to as low as 300MW in mild and sunny spring days.

The question is, how can we unlock this investment and the associated jobs that come with it?

Apart from stabilising and growing the state’s energy network, driving down energy costs for industrial users and unlocking billions of dollars’ worth of renewable projects currently in the pipeline, hydrogen is also a very versatile zero-carbon fuel that can be used in a range of applications.

- ▶ It can be burnt creating heat and therefore replace the use of coal, oil and gas in manufacturing processes
- ▶ It can be combined with catalysts, acting as a reductant in chemical processes such as the manufacture of ‘green steel’, alumina or cement
- ▶ It can be used to replace petrol, diesel and LNG in heavy and public transport
- ▶ Because it is an existing chemical feedstock, renewable hydrogen can replace feedstocks made through burning coal, oil and gas
- ▶ Creating a new export industry for South Australia by exporting hydrogen and ammonia to markets in Japan, South Korea and south-east Asia. The global demand for hydrogen has been forecast to increase to about 650 Mt by 2050, creating a global export market of A\$300bn per year.

Explaining Labor's Hydrogen Policy



Building a 200MW hydrogen fuelled power station to provide firming capacity in the South Australian Electricity Market.

The most reliable way to reduce energy prices for all South Australian customers is to increase competition in the supply of firm generation. This enables electricity retailers to contract this generation and compete in the market with the current large incumbent generators who own a vast majority of the firming generation assets.

This will in turn unlock more of the estimated \$20bn pipeline of renewable energy projects in South Australia.

This will continue South Australia's world leadership in the clean energy transition by incentivising the next generation of innovative energy storage and grid reliability solutions.

By building a new hydrogen fuelled power station to supply these services directly, demonstrating this technology can be delivered at scale and accelerating its use across Australia and the globe.

Hydrogen electrolyzers are able to be used as a form of energy storage through the regulation of their production which means they are an extremely valuable asset in the management of the electricity grid.

The ability for these hydrogen production projects to have an additional revenue stream for the firming services that they can provide will assist with the project economics and fast track their delivery in a very similar way that the grid services contract did for the establishment of the Hornsdale Power Reserve in 2017.

Fast tracking the development of the new hydrogen export industry in South Australia by investing in hydrogen electrolysis and power generation.

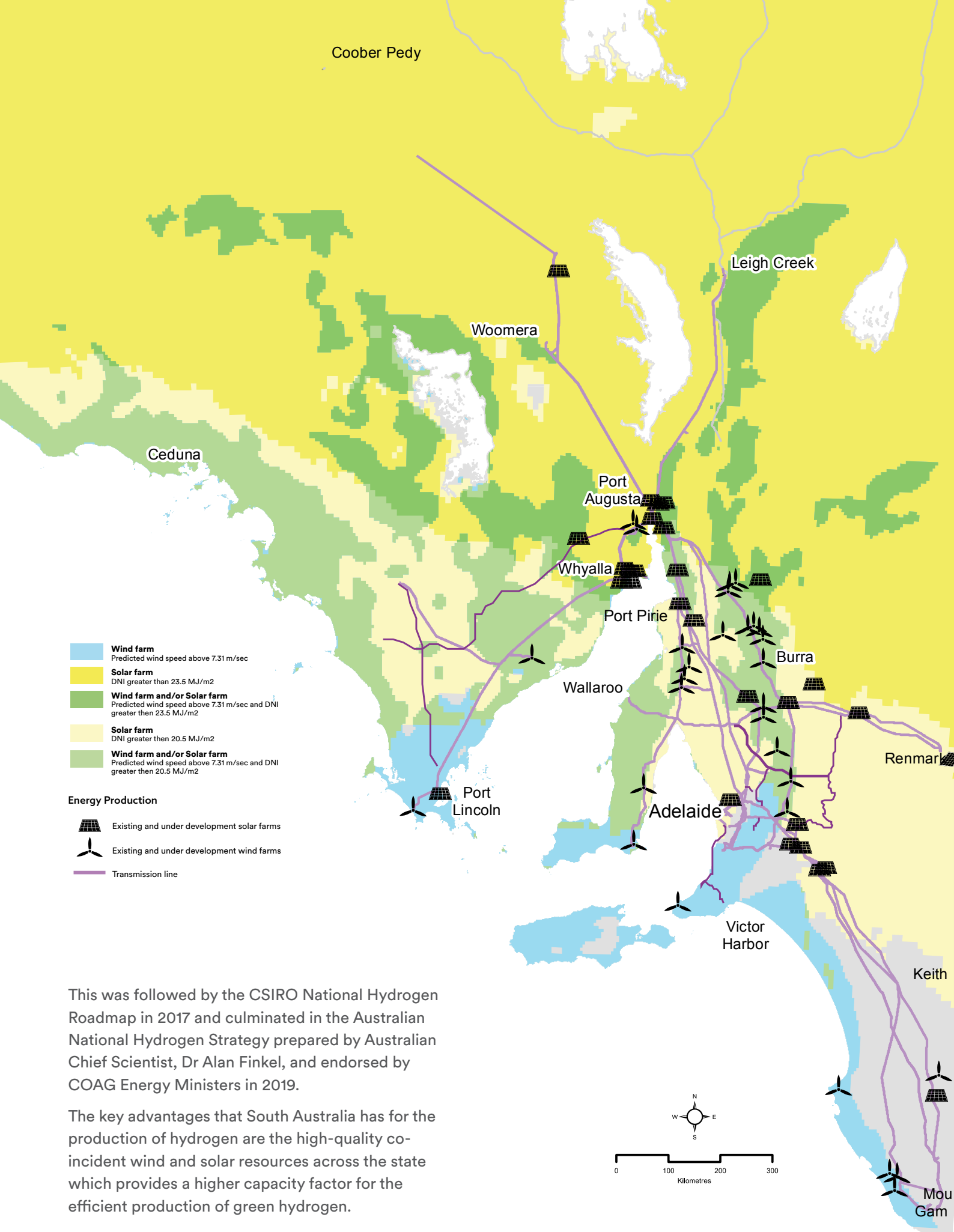
There is currently a global race to develop hydrogen production facilities that are able to produce and export clean hydrogen.

Within Australia there is a significant first mover advantage for the state that is able to get the first Australian project moving as it will see the establishment of the hub for the Australian hydrogen industry with a significant number of international contractors and suppliers establishing a presence in the state and also hiring and developing the local workforce.

The orderly and economic transition of the power system is at the heart of Labor's energy policy and we will ensure that all communities in South Australia share in the gains through the reinvigoration of existing industries by the creation of new industries.

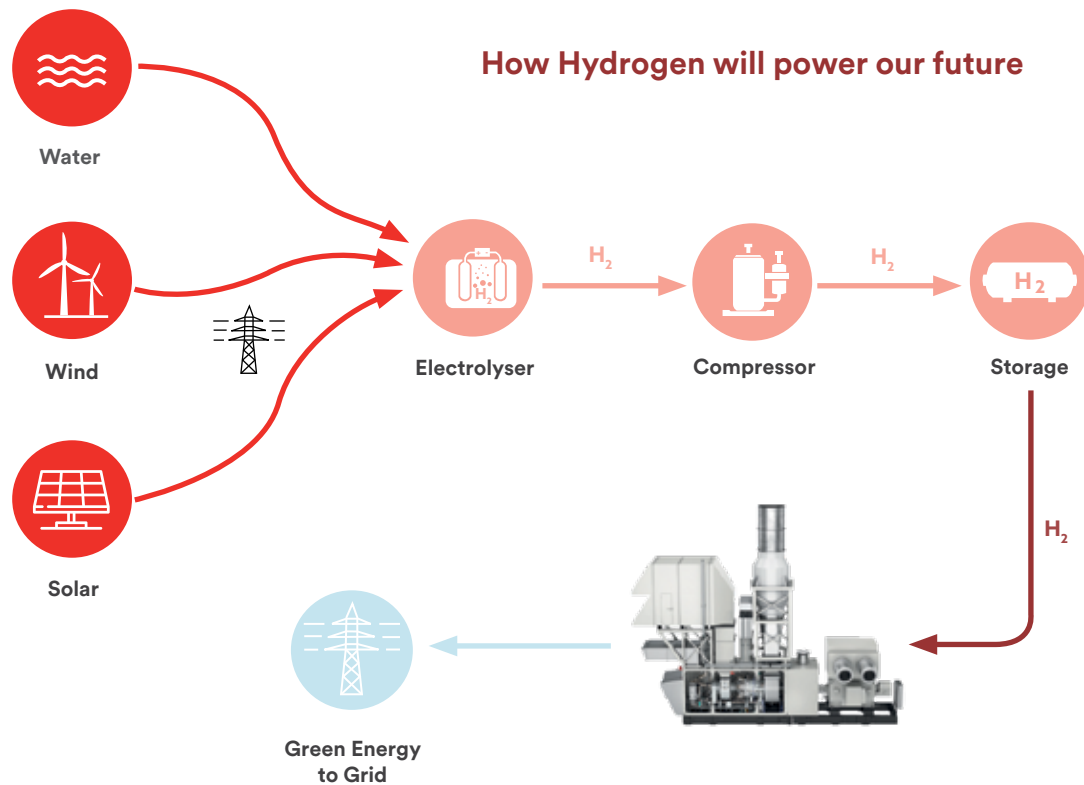
Why hydrogen in South Australia?

In 2016, the Weatherill government was the first to develop and publish a Hydrogen Roadmap, the development of hydrogen was a common-sense next step solution to storage and firming to develop or close the cycle on dispatchable renewable energy.



This was followed by the CSIRO National Hydrogen Roadmap in 2017 and culminated in the Australian National Hydrogen Strategy prepared by Australian Chief Scientist, Dr Alan Finkel, and endorsed by COAG Energy Ministers in 2019.

The key advantages that South Australia has for the production of hydrogen are the high-quality co-incident wind and solar resources across the state which provides a higher capacity factor for the efficient production of green hydrogen.



Source: Adapted from original Siemens graphic

“Electrolysis is the process of using electricity to split water into hydrogen and oxygen. This reaction takes place in a unit called an electrolyser. Electrolysers can range in size from small, appliance-size equipment that is well-suited for small-scale distributed hydrogen production to large-scale, central production facilities that could be tied directly to renewable or other non-greenhouse-gas-emitting forms of electricity production.”

Office of Energy Efficiency & Renewable Energy, US Energy Department

What are hydrogen electrolyzers?

Hydrogen electrolyzers are able to be used as a form of energy storage through the regulation of their production which means they are an extremely valuable asset in the management of the electricity grid.

This will in turn unlock more of the \$20bn pipeline of renewable energy projects in South Australia and the thousands of jobs they will create.

What will we do with excess hydrogen?

Hydrogen has many applications in industry and can be used as a substitute for natural gas in existing South Australia's pipe networks to a maximum capacity.

This could generate substantial revenues to offset costs associated with the project's operational costs or capital costs.

- ▶ Sold as fuel to other generators
- ▶ Exported as "green hydrogen" to other jurisdictions focusing on hydrogen as a fuel substitute to lower emissions
- ▶ Used in energy intensive manufacturing and smelting industries as a low-cost alternative to natural gas and a low emission option to decarbonise, giving industry the opportunity to invest and grow, thus also making South Australia an attractive destination for businesses to establish.



Supporting Hydrogen



A global transformation of the energy sector is underway. To support a future where all our energy comes from clean sources, the world needs clean, flexible, storable and safe fuels. Hydrogen has all of these characteristics. When used as a fuel, it produces no carbon emissions, only water. It can be safely used in a broad range of applications.”

The Australian National Hydrogen Strategy 2019



Australian Government
Department of Industry, Science,
Energy and Resources

“Hydrogen can enable renewables to provide an even greater contribution. It has the potential to help with variable output from renewables, like solar photovoltaics (PV) and wind, whose availability is not always well matched with demand. Hydrogen is one of the leading options for storing energy from renewables and looks promising to be a lowest-cost option for storing electricity over days, weeks or even months.”

International Energy Agency – The Future of
Hydrogen - June 2019



Alan Finkel

Australia's former Chief Scientist



Australia's former Chief Scientist, Alan Finkel in his "Hydrogen for Australia's Future" white paper Appendix C, stated the following regarding South Australia's ideal location for a Hydrogen industry and applications for the use of Hydrogen in the domestic economy.

South Australia, now a global test bed for various new energy technologies... Its high proportion of solar and wind electricity makes it an attractive location to invest in hydrogen production and associated

The key benefit of using hydrogen is that it is a clean fuel, emitting only water vapour and heat when combusted. Replacing current fossil fuel use with hydrogen could substantially reduce CO2 emissions to the atmosphere."



Australian Government
Geoscience Australia

Labor's Renewable Legacy

Between 2002 and 2018 Labor boosted our renewables industry



The **world's largest lithium-ion battery** near Jamestown.



A **state-owned power plant**, to have stand-by power available in South Australia for emergencies.



A **\$150 million Renewable Technology Fund**, which is supporting 21 significant renewable energy projects in South Australia.



Strong Ministerial powers to **bring control of the market back into South Australia's hands**.



Delivered a **\$31 million Energy Productivity Program** to help large South Australian businesses improve efficiency and manage their electricity costs.

Created a positive policy and regulatory environment, which has encouraged the construction of 24 large-scale renewable energy projects across the state since 2002.

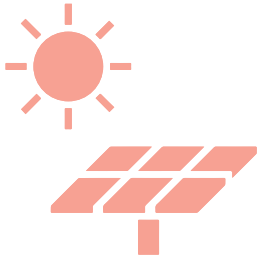
SAVING
\$531
ANNUALLY

Established a discount energy offer for low-income earners, saving more than 25,000 households up to \$531 on their annual electricity bills.

Legislated a specific target to reduce greenhouse gas emissions in 2007.



Partnered with the Adelaide City Council in our commitment to make Adelaide the world's first Carbon Neutral City.



Installed solar panels on 400 Housing Trust homes and in 40 schools, and replaced inefficient lighting and installed sensors and timers in 200 schools.

South Australian
Labor

Partnered with Tesla on the world's largest Virtual Power Plant. Following a successful trial, solar and batteries will be installed on at least 50,000 South Australian homes.



Provided energy audits to South Australian households since 2009 through the Retailer Energy Efficiency Scheme (REES), which is currently saving enough energy to power almost 100,000 homes each year.



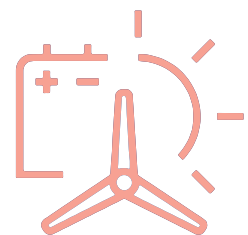
Shifted South Australia from 99 per cent fossil fuelled energy in 2003-04 to almost 50 per cent renewable energy in 2016-17.



Released a Hydrogen Roadmap that will accelerate investment in hydrogen infrastructure and technologies in 2016.

Partnered with Sundrop Farms, which has embarked on a 20-hectare expansion of their horticulture business in Port Augusta. Sundrop Farms uses world-leading technology to support solar electricity, heat and desalinated water.

Established a Low-Carbon Investment Plan and Climate Change Strategy and set a target for \$10bn of investment in low-carbon energy by 2025. So far we have achieved investment of more than \$7bn.





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