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OUR ENERGY FUTURE:

A plan to transition Australia to clean energy

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A NOTE FROM THE AUTHORS

Cover. ***Power lines***
Photo. Andreas Klein

Left. ***Moondarra State Park, VIC***
Photo. Bette Devine

The members of the Energy Transition Leadership Forum and authors of this blueprint are 17 prominent figures in Australia. We are CEOs of energy companies, presidents of conservation organisations, scientists, economists, leaders of professions, bankers, lawyers, broadcasters and a former Governor General of Australia. We are also sons and daughters, parents and grandparents who want to look back on the actions we take now and know we did the right thing.

We care deeply about Australia's future. We are bound by our concern for the significant dangers and disruptions we are already experiencing and that will worsen as our world continues to warm. The pollution from producing and using energy in Australia is fuelling global warming and this can and must change.

Change is inevitable. Clean energy is here to stay. Our country's choice is to plan for this inevitability and make sure the clean energy transition is controlled, innovative and fair, or resist and delay and deal with the consequences of a chaotic transition that disrupts our energy security, harms communities and our economy and fails to lower climate pollution.

To us the decision is clear. A nation powered by clean energy is not only possible, it is necessary to protect our beautiful and fragile island continent from dangerous climate change and provide reliable, secure and affordable energy for all.

We call on our federal government to lead a national energy transition plan to shift Australia to clean energy, through engaging across parliament and with all levels of government, communities, workers and businesses. The plan should drive a transition to clean energy by 2050, or sooner, to meet our international obligations under the 2015 Paris Climate Agreement.

This blueprint outlines eight actions under three themes that should form the basis of Australia's national plan to drive a clean energy transition. Transforming our country's energy mix is complex. This blueprint does not have all the answers but it provides clear direction.

The future outlined in this document is bright, not bleak. The changes we must make can bring us healthier lives and economic certainty; they can unleash billions in increased investment and create innovative jobs. In this future, Australia will be known as a progressive world leader in clean energy, not one of the world's biggest per capita polluters.

Let's make the right choice for Australia and plan a fair energy transition for all.

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Photo. Andreas Klein

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"Energy cannot be created or destroyed, it can only be changed from one form to another."

— **Albert Einstein,** *First Law of Thermodynamics.*

A silhouette of a child running with a kite
Photo. Tatiana Bobkova/ Shutterstock.com

THE STORY OF ENERGY
— Past, Present and Future

By Geraldine Brooks AO:
Journalist and Pulitzer Prize winning author

In the beginning there was wind, water, fire. Canvas snatched the wind and carried us around the globe. Massive millstones turned under the force of rushing streams. A world lit by wood and wax flared brighter with the discovery of whale oil, and coastal cities grew up on that trade.

Change came, as it always does. In 1850, the whaling port New Bedford, Massachusetts, known as "the city that lit the world" was the richest town in America.[1] Nine years later, petroleum was discovered in Pennsylvania and in an eyeblink, New Bedford dwindled into blight and poverty.[2]

Oil, coal and gas powered a new age of industry. Sail gave way to steam and ships to planes, rail and superhighways. All this happened in the span of a single lifetime: less than a century from the Wright brothers to the Concorde, a few decades from the horse and cart to interstate highways.

Now, once again, change is coming. Our use of carbon fuels has seared our planet. Already we face melting glaciers, corrosive oceans, storm-strafed coastlines, bleaching reefs, lightning-scorched forests, bushfires of infernal ferocity and increasing frequency.

We are smashing temperature records globally, month after month and year after year. This year is on track to be the hottest on record, as was the last, and the one before that.[3]

Massive climate disruption is not a problem for the future. It is a problem now. We cannot ignore physics and keep powering our lives with energy sources that ravage our only home.

We have no choice but to face the urgent need for change. The only choice we have is how we manage it.

We can be left behind, like the decayed whaling cities of the 19th century, or we can lead the way to a new prosperity: an innovative, controlled transition to a clean energy future.

The change we must make can lead to healthier lives and economic certainty; it can unleash billions in increased investment and create innovative jobs. It is a future in which Australia becomes known as a progressive world leader in clean energy, rather than as the world's biggest per capita polluter.

We've already made a start. At the Paris climate talks in December 2015, Australia joined with 195 other nations to finally recognise that we must urgently work together to address climate change. The result: the world's first universal, legally binding global climate agreement. Our government promised to take action to limit global warming to well below 2°C and committed to aim for 1.5°C above pre-industrial levels.[4] This means we must progressively reduce pollution to net zero by mid-century for a seventy-five per cent chance to stay below 2°C or much sooner for any chance of limiting warming to 1.5 °C.[5]

In Australia, since over two thirds of the climate pollution we generate comes from how we produce and use energy, we must transition our energy system away from polluting fuels to clean energy.

We are facing the greatest threat – and the greatest opportunity – for humanity and our living world. This is not a matter of 'we should do this' or 'we'd be wise to.' It's simpler. We must.

And we can.

We are already in the midst of an energy revolution. We are returning to the original clean sources of power – wind and water. We are harnessing the sun, the waves and the earth's geothermal energy.

Clean energy technologies are expanding rapidly.[6] Innovations in battery storage, electric vehicles and solar cells are as revolutionary as the light bulb and airplane. Solar panels today cost 150 times less than they did in the 1970s.[7] CSIRO has invented lightweight, low-cost and flexible printable solar cells it can print onto anything from rooftops to windows and packaging and smartphones.[8]

Global investment in clean energy has soared in both developed and developing countries. For 75 days in a row last year, Costa Rica generated 100 per cent of its energy from hydro and geothermal power. In May this year, Portugal ran on renewable energy alone for four days straight, just days after Germany used clean energy to meet nearly all of its electricity needs. Scotland is currently building the world's largest floating wind farm and last year, wind power produced the equivalent of 97 per cent of the country's household electricity needs. In the Netherlands, wind energy currently powers more than half the country's rail network; it will be 100 per cent wind powered by 2018.[9]

As countries embrace clean energy, they are transitioning away from energy fuels that produce pollution such as coal, oil and gas. In July 2016, the Chinese government banned the construction of new coal-fired power stations and has announced it will close 1,254 coal mines in 2016. The United Kingdom, too, plans to phase out all of its coal power plants within a decade; it currently has a target to reduce climate pollution by 57 per cent by 2032 on 1990 levels. In the United States, 200 coal-burning power facilities have closed or are closing, with more to follow. Scotland and Belgium have already burnt their last lumps of coal for electricity.[10]

In Australia, the transition has already begun.

In 2012 coal-fired plants generated 66 per cent of Australia's domestic electricity, down from 75 per cent a decade earlier. And by 2015, clean energy sources accounted for almost 15 per cent, more than doubling the decade-earlier figure.[11]

Today, over fifteen percent of Australian households capture the sun on their rooftops.[12] Some 23 million solar panels are harvesting sunshine, right across our wide brown land. That's a panel for every single person in the country.[13]

Governments and business are driving clean technology, offering feed-in tariffs for solar systems and tax incentives for clean energy investment; streamlining planning processes; setting state-based

We can be left behind, like the decayed whaling cities of the 19th century, or we can lead the way to a new prosperity: an innovative, controlled transition to a clean energy future.

renewable energy targets, setting reverse auctions for the purchase of renewable energy and bulk community clean power purchase schemes; and providing financial assistance for community institutions such as hospitals, universities, schools and sporting clubs to embrace clean energy technology and energy efficiency. In Western Australia, the state government has directed the state-owned electricity utility to shut down excess coal and gas capacity over the next two years.[14] The Victorian government has a renewable energy target of 40 per cent by 2025.[15] Queensland has a 50 per cent target by 2030.[16] By 2020, the ACT aims to have 100 per cent renewable energy. South Australia and Victoria have committed to reach zero net emissions by 2050.[17]

Visionaries in academia, business and civil society have taken the lead, laying out the next steps in our energy transition. Groups such as 'We Mean Business' gives the world's most influential businesses and investors a common platform to embrace the opportunities while the Australian Climate Roundtable brings together business, community groups and unions to work through the challenges and logistics.[18]

We are progressing and the transition is unstoppable. Yet it can be slowed, stalled, and bungled. There is all the difference in the world between seizing this opportunity to lead, and stumbling behind, tripped up by muddled plans and lukewarm, contradictory policies.

Australia remains one of the world's worst climate polluters per capita and our climate pollution is still rising.[19] In 2014-15, Australia's energy emissions increased by just over one per cent while global energy emissions remained flat.[20]

Australia has some of the best clean energy sources in the world. Our abundance of sun, wind and well established hydro systems means that we can move away from fuels like coal, gas and oil[21] which produce climate pollution that is extremely difficult and costly to abate.[22] We also have gifted scientists and farsighted entrepreneurs who can bring the innovation we urgently need.

Change will come. Australia's choice is to embrace the transition and the economic opportunities it brings. To plan for inevitable changes to our energy sectors and economy and make sure the transition is fair for all. Or we can resist and delay and deal with consequences of an unmanaged and chaotic transition that harms our communities and our economy and fails to rapidly lower our climate pollution. This transition won't always be easy, but by accepting necessity and acting with speed and clarity, we can buffer any negative impact and protect vulnerable businesses and populations.

The choice we make will set Australia on paths to two very different futures.

Future one:
a dynamic transition

Thirty years from now.

In 2016, we made a choice to work together for a clean energy Australia. All levels of government and members of parliament joined with the community and business to implement an ambitious national plan. With parliamentary support and widespread community and business enthusiasm, the transition was challenging but relatively smooth.

Some were skeptical. Some were daunted. Especially those in towns whose whole history and commerce were bound up in old fuels. But we embraced the fundamental Aussie ethos, that we're all in this together, and we shared the burdens fairly. In line with the science and Australia's international commitments, we engaged with affected communities and started to phase out coal-fired power stations. With careful planning and support, communities were able to prepare for the future and workers found the help they needed to transition to new jobs.

In place of sclerotic, climate polluting plants, clean technologies flourished thanks to the right policies and economic incentives. With careful planning, new sources came online as we shut down the capacity of older facilities. We improved the electricity grid to make sure it was interconnected and fit for the reliable, secure supply of the 21st century's clean energy. We updated our transport network to run entirely on clean energy and we became super-efficient with our energy use.

These days, we power houses, factories and skyscrapers with clean energy. We zip across vast distances on fast trains and drive pollution free vehicles on solar-paneled roads. Our houses and buildings are energy efficient and well-built. We don't waste things anymore – from the smallest households to the largest factories, we reuse what one process discards as input for another. Best of all: Australians work in good jobs that don't trade off their health or the health of our only home, this beautiful and fragile island-continent.

Some 30 years ago, economic modelling and research indicated we could dramatically reduce climate pollution and shift to clean energy before 2050, while continuing to grow our economy.[23] The modelling was right and a national plan provided clarity and certainty so people could invest money in the energy market for the long term with confidence. Money loves certainty and hates muddle. So this clear pathway unleashed billions in new investment in Australia and we more than kept pace with our trading partners. We encouraged other countries to reduce their pollution and worked together with people in developing countries to help them cope with the impacts of a damaged climate and make the transition to the new clean energy world.

Like vaccination and democracy, addressing our damaged climate and transforming our energy system have gone down in history as incredible achievements, where people came together to solve big challenges and create a better world. As Aussies, we're proud that once again, we took the lead.

Children playing on beach at sunset, Darwin, NT
Photo. Chris Ford

An older man saving his beloved dog during a flood, Brisbane
Photo. Shmelly50/ Shutterstock.com

Future two:
a chaotic, unplanned transition

Thirty years from now.

Nothing changed in 2016, or the next year, or the one after. Instead, we wasted time arguing. There were pockets of action – communities put solar panels on their roofs, some energy companies committed to clean power and some state governments decided not to wait for a national plan. But we were unprepared for the global momentum and the march of technology that shook up Australia's energy sector. Falling farther and farther behind, we had no choice in the end but to rush to catch up. But by then we could not manage the impact on communities or business. The shift was abrupt and the consequences severe. While everyone felt the effects of a flagging economy, the burdens fell unfairly. Low-income families suffered and many communities were devastated.

In 2030 we had to take dramatic action to close more than 80 per cent of Australia's coal-fired generators over just five years.[24] When these facilities shut without preparation, workers suddenly lost their jobs and had no support to transition to new industries. Alinta Energy closed its coal mine at Leigh Creek and its Port Augusta power stations in South Australia back in 2016 and 400 people lost their jobs. The Hazelwood coal plant closed soon after; it was a glimpse of what was to come. Years later, when whole clusters of coal-fired power stations in Victoria's Latrobe Valley and New South Wales' Hunter Valley shut at short notice, they left regional communities with little to show for decades of hard work. People had no chance to plan for the future. Once-thriving towns went the way of New Bedford two centuries earlier: blighted and left behind.

It was expensive and challenging to suddenly build enough clean energy capacity to fill the gap. Investors were skittish. Policy flip-flops over decades made them reluctant to commit to finance clean energy projects. As coal and gas facilities closed, Australia's energy supply became increasingly unstable and electricity prices sky-rocketed.

And above all: our slow transition away from coal, oil and gas meant we could not curb pollution to limit climate change. Our inaction encouraged other countries to ignore the scale of the problem until it was too late. Storms and fires left families homeless. A bleached reef attracted no tourists. Beaches vanished, along with our beloved surf culture. Insurers went bankrupt or stopped writing policies. No one could safeguard what they still had.

They warned us about tipping points, but everything changed much faster than we expected.

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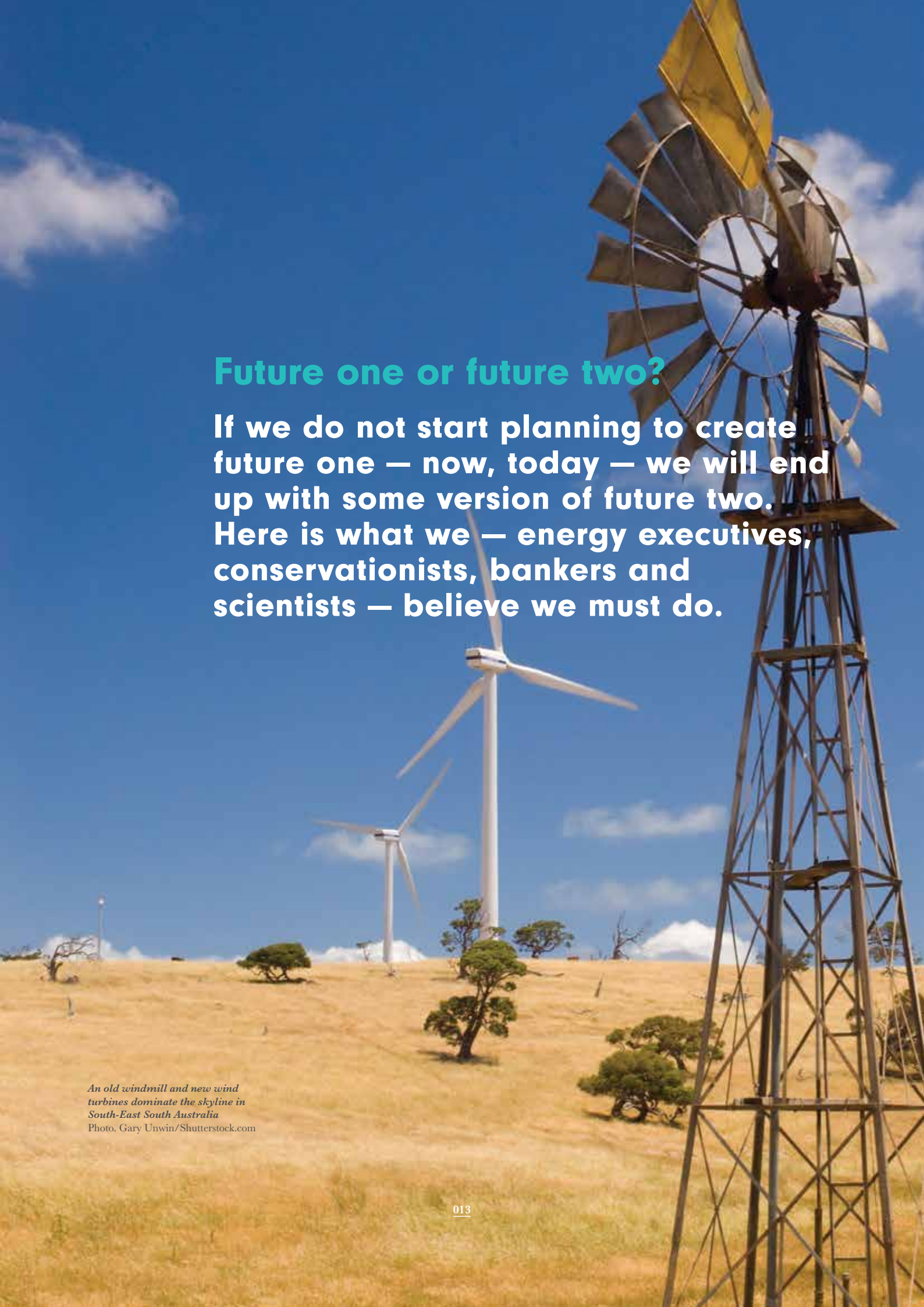


Future one or future two?

If we do not start planning to create future one — now, today — we will end up with some version of future two. Here is what we — energy executives, conservationists, bankers and scientists — believe we must do.

An old windmill and new wind turbines dominate the skyline in South-East South Australia
Photo. Gary Unwin/Shutterstock.com

The eight foundational actions are:

Integrate climate and energy policy	**ACTION 1:** Update the electricity market to speed a clean energy transition
An orderly and just transition	**ACTION 2:** Facilitate and accelerate the inevitable closure of coal-fired power plants
	ACTION 3: Accelerate the uptake of clean energy technologies and support the development of new technology
	ACTION 4: Create an attractive sustainable investment environment for clean energy
	ACTION 5: Ensure a just transition for communities and workers
	ACTION 6: Support vulnerable people to use energy efficiently and adjust to the energy transition
Pursue complementary reform	**ACTION 7:** Increase Australia's energy efficiency
	ACTION 8: Dramatically reduce climate pollution from transport

A national plan to drive the energy transition

We are calling on our federal government to lead a national energy transition plan to shift Australia to clean energy, through engaging across parliament and with all levels of government, communities, workers and businesses. The plan should drive a transition to clean energy by 2050, or sooner, to meet our international obligations under the 2015 Paris Climate Agreement.

The national plan needs to establish rules, policies, regulations, markets and a basis for investment that will power the transition. These principles, and the structures that flow from them, must be enduring if they are to be effective and they must be founded upon the notion of a just, fair transition for workers, businesses and communities. They must set up Australia to prosper from the innovation and services that come with the clean energy transition.

This blueprint outlines eight actions under three themes that should form the basis of the national plan to drive a clean energy transition. Transitioning to clean energy is complex. This blueprint does not have all the answers but it provides clear direction. Each action includes a foundational reform and a range of related recommendations. Implementing these eight actions will put us on a pathway towards the future we all want, one that secures affordable and reliable energy supplies, cares for workers, communities and our environment and encourages investment by providing greater certainty for business.

Government leadership is essential

Governments have a unique ability to transform Australia. Only government can align the efforts of multiple sectors with complementary goals. It can drive planning and decision making, and ensure we embrace the opportunities of transforming our energy system.

Now more than ever, Australians need leadership.

Integrate Climate and Energy Policy

Solar farm in the Czech Republic
Photo. Castka/ Shutterstock.com

ACTION 1: Update the electricity market to speed a clean energy transition

THE PROBLEM

The current electricity market was designed for the past, when only a small number of large-scale operators generated electricity and fed it into a centralised grid for distribution to people and businesses who consumed it. But that's all changing. A different model is emerging. Around 1.5 million households have solar panels. Decentralised large and small scale clean energy facilities powered by wind and solar are proliferating.[1] The result: a growing mismatch between the existing market and regulatory frameworks and the technology people actually use and wish to use. This misalignment is slowing Australia's energy transition.

THE SOLUTION

We need to update our electricity market framework. We need reformed governance structures – including an updated National Electricity Objective – alongside electricity tariff reforms that better reflect the real costs of providing electricity and manage the prices people pay for electricity.

The Australian government should update our National Electricity Objective to include a clear goal to accelerate Australia's energy transition towards net zero emissions before 2050, to fulfil our domestic policy objectives and international commitments. The objective should also properly incentivise investment in clean energy and the infrastructure required for the transition.

THE BARRIERS

Outdated electricity market objective

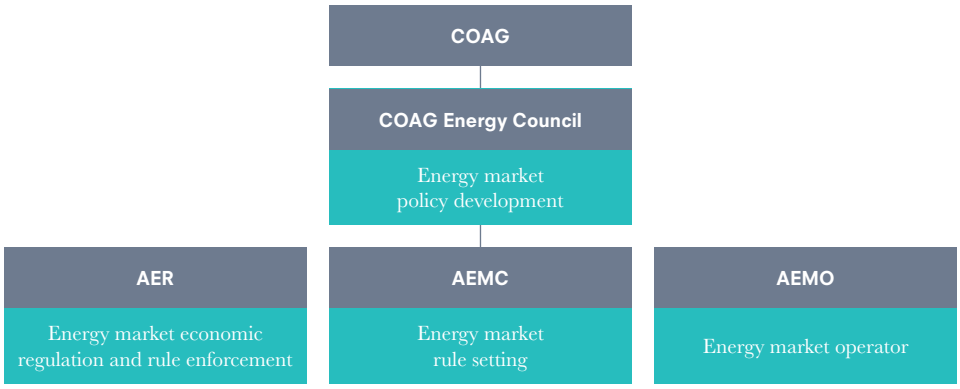
Australia's energy markets were designed around 20 years ago. Our energy needs have changed significantly since then. The design, governance and regulation of our energy market are outdated. A report commissioned by the Council of Australian Governments' Energy Council, *Review of Governance Arrangements for Australian Energy Markets*, describes the challenges of this new world:

The pace of change in the energy sector has accelerated to a level that is arguably unprecedented. The principal underlying drivers that were most frequently identified were continuing, innovative developments in digital and renewable technologies and their applications, and in policy responses to the assessed risks of harmful climate change. Either driver would pose major challenges for the energy sector; when taken together, they have created a policy environment that is more onerous and complex than it has ever been.[2]

The National Electricity Market is guided by the National Electricity Objective. This objective does not take into account Australia's need to reduce climate pollution and shift to clean energy, even though these objectives are outlined in government policy and in our commitments under the Paris Agreement.[3]

Outdated electricity governance system

A number of bodies drive Australia's electricity market, policy design and regulation. Among these bodies are the Australian Energy Market Operator (AEMO), the Australian Energy Regulator (AER), the Australian Energy Market Commission (AEMC) and the COAG Energy Council, which is made up of relevant federal and state ministers.[4]



The governance system for the National Electricity Market needs to be updated to encourage innovation in strategic decision making regarding Australia's future energy mix and the rules and structures to achieve an orderly transition to a clean electricity system.

The role of the AEMC in strategic policy advice should be substantially expanded to facilitate better energy market policy development at the COAG Energy Council. The number of AEMC commissioners should also be increased to include representations from consumers and the clean energy sector.[5]

Inflexible electricity tariffs

Australia's electricity tariffs need reform.[6] The cost of producing and delivering electricity is not constant – at peak demand times electricity is more expensive; at low demand times when there is plenty to go around, it costs less. Yet because of the tariff pricing structures, underlying costs are hidden from consumers so they have no financial incentive to use electricity wisely. For example:

Customers will tend to use their air-conditioners at peak times, even if that means the local network reaches or exceeds its limits. Customers will not have an incentive to reduce their consumption (or defer charging of their electric vehicle) or to use their local generation at such peak times.[7]

As people are not exposed to price signalling, some customers effectively subsidise other customers, depending on when they use electricity. We use our shared electricity network and generation assets inefficiently.

At the moment, generators and network owners make money by charging consumers for the amount of electricity they use. In recent years, as people have used less grid-sourced electricity, network businesses have increased prices to recover revenue. This has only encouraged customers to reduce their use even more. This process is known as a 'death spiral.'[8]

Our government should reform these tariffs to properly reflect underlying cost/price signals and give people and businesses incentives to adopt clean and smart technologies, while ensuring the transition is as smooth as possible, especially for vulnerable people.

FOUNDATIONAL ACTION

Before the 2017 Climate Policy Review, we call on the Federal Government to convene a group of experts best able to research and recommend essential revisions in governance and markets and necessary infrastructure to ensure a smooth energy transition.

The group should provide recommendations on how best to:

- Revisit the National Electricity Objective to incorporate a clear goal to accelerate Australia's energy transition towards net zero emissions before 2050, consistent with government policy and international commitments.
- Reform the governance structures for the National Electricity Market (NEM), to:
  - Expand the role of the AEMC in strategic policy development, increasing the number of AEMC commissioners and broadening the sectors represented by commissioners;
  - Reform electricity tariffs to better reflect the true costs of providing electricity and to provide people and businesses with appropriate signals for using electricity;
  - Create market rules that enable the development of new systems to support the development of infrastructure for the transmission of clean energy;
  - Facilitate a market structure that gives households and small scale producers an incentive to sell the electricity they produce back into the grid for fair returns;
  - Provide for infrastructure investment that enables a fit for purpose transmission system and consistency with the changing generation mix.

The review announced by the COAG Energy Council (the Finkel Review) should include the environmental sustainability of the NEM alongside other identified goals of security, reliability and governance of the NEM.

Complementary action

We also call on state and territory governments to support these recommendations and ensure the COAG Energy Council implements them as efficiently as possible.

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Australia's most polluting and least efficient power stations (2014-15 t CO_2-e)[19]

Power Station	Emissions Intensity (Tonnes CO2-e/MWh)	Emissions (MT CO2-e)	Fuel Source	Year Commissioned
Hazelwood	1.4	15.5	Brown Coal	1964-71
Yallourn	1.27	14.6	Brown Coal	1973/4-81/2
Loy Yang A	1.14	18.8	Brown Coal	1984-87
Loy Yang B	1.13	9.8	Brown Coal	1993-96
Gladstone	0.97	6.4	Black Coal	1976
Liddell	0.94	6.6	Black Coal	1971-73
Bayswater	0.88	12.3	Black Coal	1985-86
Tarong	0.88	6.7	Black Coal	1984-86
Vales Point	0.87	6.1	Black Coal	1978
Eraring	0.86	12.3	Black Coal	1982-84

An orderly and just transition

Smokestacks
Photo. Rich, Flickr

ACTION 2: Facilitate and accelerate the inevitable closure of coal-fired power plants

THE PROBLEM

Over many decades, Australia has taken advantage of coal as a cheap source of electricity. But by generating so much electricity from coal, we are pumping some 187.5 million tonnes of climate pollution into our skies each year.[9] Electricity generation alone causes around a third of Australia's climate pollution and the dominance of coal makes Australia much more emissions intensive than the United States and the European Union.[10] As well as damaging our climate, burning coal generates pollution which damages our air and harms people's health.[11]

Australia's coal-fired stations are some of the most polluting and least efficient in the world. Our aging fleet uses old, inefficient technology that is well past its use-by date; five of our generators are more than 35 years old and one was commissioned way back in 1964.[12] By 2030 nearly half of Australia's existing coal-fired power stations will be 50 years old and the average age of the fleet will be over 40.[13] They will be difficult and expensive to update[14] and there is currently no cost-effective way of sequestering pollution – also known as carbon capture and storage – from even the most efficient plants,[15] which is an important factor in planning their transition. If technology was to advance in this area it could play a role amongst a range of future options in Australia's energy mix.

Hazelwood Power Station, for example, was built in the 1960s and has an emissions intensity of 1.4 tonnes of CO_2 per megawatt hour. This is 35 per cent more polluting than the world's average for 'sub-critical generators' – the least efficient and most polluting power stations that use considerably more coal and water to generate the same amount of power.[16] [17] Even Australia's newer coal-fired generators produce significant volumes of climate pollution.[18]

THE SOLUTION

To address the problem of Australia's aging electricity plants, reduce Australia's climate pollution and meet the 2°C commitment under the Paris Agreement, it is inevitable that our existing coal-fired operations must close. As a nation, we have an opportunity to decide how and when to close the power stations that have served us for generations.

A considered and orderly plan to retire coal-fired power stations is required, with clear timelines and a smooth and steady process. The Climate Change Authority has calculated the carbon budget that Australia must stay within to remain aligned to the 2°C goal.[20] Using this budget as a framework in its proposed path to net zero emissions by mid-century, the Climate Institute calls for Australia to retire coal generation by 2035 and reduce generation by 1,500 MW each year on the way.[21]

With leadership and planning, we can ensure Australia's transition away from coal-fired generation is as efficient and smooth as possible. We can attract investment to overhaul every part of the electricity generation and supply chain, which will foster emerging innovation and new technology breakthroughs. We can help coal plant operators phase out their existing assets and invest in assets designed to replace them. This will give communities and companies certainty so they can plan for the future and manage the cost of electricity over the long term.

THE BARRIERS

Australia's current trajectory is not ambitious enough

Under Australia's current modest pollution reduction targets, the Australian Energy Market Operator (AEMO) projects we need to withdraw coal-fired generation from the National Electricity Market by 2030, by around:[22]

- 40 per cent in Victoria (about 2,700 MW of generation capacity);
- 30 per cent in New South Wales (about 3,300 MW of generation capacity); and
- 30 per cent in Queensland (about 2,700 MW of generation capacity).

AEMO also assumes coal-fired generation capacity of 7,700 MW will be phased out in the 2030s and 2040s (Bayswater, Loy Yang A and Eraring) in line with announcements by their owners, AGL and Origin.

However, these closures will need to be significantly accelerated as Australia raises its emissions reduction targets to respond to our damaged climate and do our fair part in meeting the 2°C commitment under the Paris Agreement.

There is no market or regulatory incentive to reduce pollution

At the moment, the government does not require electricity generators to pay for the pollution they generate and the damage this causes our climate. This leaves operators with no financial incentive to manage the emissions intensity of their power stations. There are also currently no regulatory standards to limit the emissions intensity or age of power stations. Because coal pollution is damaging our climate and harming the broader community, its true cost is not properly reflected. This increases its apparent cost advantage over clean energy sources. (See action 3 for further discussion.)

There is little incentive to close

Australia has an excess of electricity generation capacity. Right now, the National Electricity Market has the capacity to generate around 7,000 MW more electricity than it requires, due to a range of factors including falling demand and households and businesses generating their own clean energy.[23] This oversupply reduces the wholesale price of electricity. However, if a power station closes, reducing or eliminating the oversupply, wholesale electricity prices will go up – benefiting the energy companies that are still operating. It therefore makes economic sense to coal-fired generators to wait for other companies to close their plants first which ultimately leaves companies waiting and 'sweating' their assets (waiting until the low costs of maintaining old facilities become higher than the money they can make running at a reduced rate).[24]

This increases the potential for a disorderly or relatively sudden closure – as was the case for Alinta Energy which closed its coal-fired power station in South Australia in 2016 and Energy Australia which shut its Wallerawang operation in 2014.[25] The Hazelwood Power Station in Victoria's Latrobe Valley will close in March 2017.[26]

The cost of closure is significant

Decommissioning power stations and rehabilitating their associated mines is expensive. Estimates put the rehabilitation costs of shutting down Alcoa's Anglesea brown coal power station and coal mine at approximately $400,000 per megawatt of capacity.[27] Environment Victoria predicts that rehabilitating the coal mines that service power stations in Victoria's Latrobe Valley will cost between $243 million and $600 million.[28] It is economically beneficial for plant owners to delay the realisation of this liability, which further incentivises 'mothballing' over permanent closure. 'Mothballing' reduces certainty for new investors who look to enter the market with clean energy solutions, since mothballed plants could reopen again and change the expected price dynamics.

FOUNDATIONAL ACTION

We call on the federal government to lead the development of a plan to facilitate the phased and controlled closure of coal-fired electricity production that is in line with Australia's commitment to the Paris Agreement.

Options the federal government could consider as part of the plan to ensure the reliability, affordability and sustainability of Australia's energy supply and address the barriers above, include:

- A market mechanism for regulated closure of highly emissions intensive power stations;
- An emissions intensity standard for power stations that tightens over time, ensuring the dirtiest coal-fired power stations are closed first; or
- An age-based regulation that tightens over time, ensuring the oldest coal-fired power stations are closed first.

The federal government should convene an expert panel to investigate and report on potential options to facilitate a gradual and systematic phase out of coal fired generation.

Complementary action

We also call on state and territory governments to work with the federal government to develop a national plan to phase out coal-fired electricity generation and implement policies that require owners of coal-fired electricity generators and associated mines to post bonds that ensure they can fully fund decommissioning costs and associated mine rehabilitation costs.

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An orderly and just transition

Solar panels on the roof of Sydney Theatre Company
Photo. Sue Murray

ACTION 3: Accelerate the uptake of clean energy technologies and support the development of new technology

THE PROBLEM

Our grid is outdated. Storage technology is inadequate. Our National Innovation and Science Agenda does not identify Australia's climate challenges or the need to transition Australia's energy systems as priorities. Meanwhile science and research budgets have been slashed.

THE SOLUTION

To transition our energy systems and take advantage of the worldwide opportunities in clean energy, we need modernised grid infrastructure and better storage technologies. We must accelerate the uptake of existing clean energy technology and support the development of new clean tech. This is recognised by the Australian Renewable Energy Agency which is funding a number of micro grid and storage development projects.[29] The government's National Innovation and Science Agenda should focus on accelerating the energy transition as a priority.

Governments play an important role in accelerating investment and uptake of new technology.[30] They can help overcome technical and logistical challenges by enabling Australia's renewable energy agencies and premier research agencies to push the transition, along with world leading research and targeted investments. This requires dependable funding for research and development and funding assistance through grants, concessional financing, or equity investment for demonstration projects and emerging technologies. The government can also provide policy support for innovation and lead the implementation of clean energy in its properties and operations.

THE BARRIERS

Clean energy is not yet a national R&D priority
Despite the transition to clean energy driving investment and innovation across the world and in Australia, the National Innovation and Science Agenda does not mention climate change, the energy sector or the innovation already occurring, such as clean energy production and storage.

The government should recalibrate the National Innovation and Science agenda to address the challenges of transitioning our energy system. The agenda will only achieve its aim of "Placing innovation and science at the heart of policy making"[31] if our damaged climate and clean energy innovation are genuine government priorities.

This should build on Australia's membership of "mission innovation," which is an international pledge to double funding for clean energy research by 2020.[32]

This kind of research also drives innovation beyond the energy sphere. Clean energy is an emerging area with wide technical applications. It spills over into other fields and creates opportunities for highly skilled work.[33]

Uncertain research budgets

Over the past few decades, successive governments have reduced funding to federal research agencies. In 2014, federal government funding for science, research and innovation was at its lowest level (as a proportion of GDP) since data was first published in the 1970s.[34] However, without research and development in clean energy technology, there will be no breakthroughs to overcome technological challenges and speed up the transition. The recently resolved debate about funding the Australian Renewable Energy Agency was another example of funding insecurity for clean energy research in Australia. Providing long term certainty is critical to ensure gains from innovation and harnessing of non-government investment.[35]

Government is not walking the talk

Governments use a great deal of electricity. When the federal government last reported on its energy use in 2011-12, it was responsible for 1738 gigawatt hours of electricity, equivalent to around 300,000 households.[36] The Council of Australian Governments recognises that governments have a role to play in its National Energy Productivity Plan:

Governments should lead by example. Action undertaken by governments on their own energy productivity can have flow on benefits to the economy, not only through energy and cost savings and emissions reductions, but through leadership and driving market development in related services and technologies. Governments have undertaken a range of commitments, for example the Commonwealth commits to review and revise its own policy by the end of 2016.[37]

Governments are in a unique position to trial technologies in their properties and operations, including – as a starting point – demand management technology, battery storage and electric vehicles.

FOUNDATIONAL ACTION

We call on the federal government to make energy transition a central priority in the National Innovation and Science Agenda.

The federal government should do so by:

- Increasing support and funding certainty for research agencies such as the CSIRO, Bureau of Meteorology, Geoscience Australia, Australian Renewable Energy Agency and the Australian Research Council;
- Providing targeted policy support to develop new clean energy generation technologies and storage;
- Introducing incentives for investment and uptake of new technologies;
- Trialling clean energy technologies in its properties and operations;
- Convening an expert panel to investigate and advise on support for clean energy post 2020 and integration with existing legislation.

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Solar panels on homes in Australian suburb
Photo. zstock/
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An orderly and just transition

Night from NASA International Space Station
Photo. NASA Creative Commons

ACTION 4: Create an attractive sustainable investment environment for clean energy

THE PROBLEM

Transitioning Australia's energy sector requires large scale investment to finance the construction of new infrastructure and projects and the decommissioning of old infrastructure. Attracting new types of finance and investment is an important part of accelerating the transition. The International Energy Agency estimates that cumulative investment of $53 trillion is required in the energy sector by 2035 to finance the worldwide energy transition to reach the Paris Agreement's 2°C goal.[38]

But Australia's unstable policy environment on climate and energy erodes confidence and causes capital to flow to countries with more attractive policies. Investors are looking for stable policy, regulation and underlying targets so they can make rational assessments on the revenue they will receive over the life of an asset. They want to know whether the revenue they receive will cover the cost of their investment and provide appropriate returns to shareholders and financiers. Government leadership has the potential to provide this stability for lumpy and large investment capital, ensuring a steady transition in an efficient manner.

THE SOLUTION

A combination of policies will help deliver attractive, stable investment conditions for Australia's transition. An orderly phase out of Australia's coal-fired power stations will help to address the oversupply of electricity which suppresses wholesale prices and makes investment in electricity generation less attractive. An efficient market based carbon pricing mechanism would also be an important and effective incentive. The government should also increase other incentives to drive investment in clean energy and storage to speed up the transition and attract capital to Australia.

THE BARRIERS

Australia has an excess supply of electricity
Australia's electricity grid has more electricity generation capacity than we need,[39] which leaves little incentive for companies to deploy new clean energy generation infrastructure. Closing existing, polluting plants is required as a first step.

The Renewable Energy Target will end in 2020
Australia's current Renewable Energy Target (RET) is designed to make sure at least 33,000 Gigawatt-hours (GWh) of Australia's electricity comes from clean energy sources by 2020.

Since the government introduced it in 2001, the RET has successfully encouraged investment in clean energy. Clean Energy Council modelling of the revised RET in 2015 estimated that by 2020 the target will generate $40.4 billion worth of investment and 15,200 additional jobs.[40]

The current growth trajectory for the large scale RET scheme only runs until 2020, although the scheme will remain in operation until 2030.[41] This puts pressure on companies to quickly deliver new projects to maximise their time under the RET umbrella, but only gives a limited investment horizon beyond this point. While phasing out coal-fired power stations would go some way to encouraging new investment, extending support for clean energy sources would provide stability for large scale infrastructure renewal. Incentives need to remain while the excess capacity is being withdrawn to ensure ongoing investment.[42]

An extension and expansion of the large-scale element of the renewable energy target scheme, which has been proven effective in encouraging the transition to clean power generation, should become an urgent policy priority.

Other policies that help establish a stable market for clean energy investment include reverse auctions – which the Australian Capital Territory is already doing – and contracts for difference arrangements in government procured Power Purchase Agreements. Power purchase agreements for clean energy help guarantee revenue from the sale of the energy and provide certainty to investors. The government could consider these mechanisms to complement an extended and expanded large scale clean energy target.

Subsidies artificially lower the price of fossil fuels
Emissions intensive energy sources like coal and diesel receive government subsidies through tax incentives for fossil fuel exploration and the Fuel Tax Credits Scheme, which gives certain industries refunds on fuel excise. These subsidies make the cost of these energy sources artificially lower, encouraging companies to keep using them, rather than create an incentive to shift to clean energy. Government presently subsidises fossil fuels to the tune of up to $12 billion a year.[43]

No financial cost on pollution
Without laws to make companies pay for their pollution, these companies effectively receive a further subsidy, as they are not responsible for the cost of damaging our climate. This makes investment in emissions intensive energy like coal and gas appear more competitive than clean energy.[44] However with a carbon pricing mechanism to expose the true total cost of power generation from various energy sources, clean energy investment is shown to be cost competitive.

Institutions such as the World Bank and International Monetary Fund continue to promote carbon pricing and emissions trading as effective ways to mitigate damage to our climate:

"These [carbon price or emissions trading schemes] are potentially the most effective mitigation instruments, are straightforward to administer (for example, building off fuel excises already commonplace in most countries), raise (especially timely) revenues for lowering debt or other taxes, and establish the price signals that are central for redirecting technological change towards low-emission investments." [45]

"The World Bank Group, business groups, and investors have called on governments and corporations around the world to support carbon pricing to bring down emissions and drive investment into cleaner options." [46]

On their own, structures to make companies pay for their pollution are unlikely to drive investment to transition our energy system. However, requiring companies to pay for their climate pollution, either through a pricing mechanism, emissions trading scheme, safeguard mechanism or a baseline and credit scheme, can, if properly designed, be an important part of creating stability to give people confidence to invest in clean energy.

Lack of incentives to invest in Australian energy transition
Like all investment, the decisive factor that increases investment in clean energy is return from the investment balanced against the risk.[47] To incentivise private investment in Australia's energy transition, the federal government can make investment in clean energy more attractive than the alternatives. It can do this directly through the tax system or through other actions, such as issuing green bonds to help finance clean energy projects. For example, on 18 July 2016, the Victorian government launched a five-year green bond through the Treasury Corporation of Victoria.[48]

Globally it is estimated that $500 billion of investment in clean energy is required by 2020 to ensure the world is on track to meet the 1.5°C target as part of the Paris Agreement.[49] The need for investment coincides with low borrowing rates and, for some countries, even negative borrowing rates.[50]

The global green bond market continues to grow rapidly. Around $37.2 billion in green bonds was issued in the first half of 2016, an 89 per cent increase from $19.7 billion in the first half of 2015.[51] China has become a major global issuer of green bonds, issuing over $15 billion in green bonds already this year to transform its energy infrastructure.[52] If our government provides the right investment environment Australia will be able to be a part of this growing investment movement.

Accelerating the process requires a global effort. At the recent G20 meeting in China the B20 outlined in its policy recommendations to the G20 that the "transition of funds from assets that deplete natural resources to those in the green sector is slow for a number of reasons, including misplacement of incentives and a lack of institutional capacity, understanding, and standards on green finance."[53]

The government can play a role in accelerating the global movement of funds to the green sector through its participation in the international financial system, the Financial Stability Board (FSB) and the G20. The FSB is currently working on climate risk disclosure to provide investors with climate risk information and reveal the true risk in some investments. The G20's current focus on mobilising and incentivising green finance is also critical. The recent meeting highlighted green financing needed to be scaled up by overcoming a range of challenges that the Green Finance study group is working through.[54] The Australian government should strongly support this work as a priority and implement recommendations at a national level to ensure green investment can help fund Australia's energy transition.

FOUNDATIONAL ACTION

We call on the federal government to remove barriers and encourage companies to invest in clean energy.

This should include actions to:

- Boost support for clean energy by expanding and extending the Renewable Energy Target to buttress other market and emission reform rules;
- Introduce economy-wide complementary laws (such as a price on pollution) to make companies pay for their pollution to assist across the breadth of transition activity;
- Address the supply and demand imbalance and plant obsolescence in the National Electricity Market through planned coal closure;
- Revise market structures and rules to appropriately value a safe, reliable, affordable and carbon constrained electricity market;
- Support the uptake and advances in clean energy technology, including storage technologies;
- Incentivise investment in the energy transition by making investment in clean infrastructure and technology more attractive than the alternatives;
- Establish an expert panel to investigate and report on barriers to investment in clean energy infrastructure and technology.

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An orderly and just transition

People's Climate March 2015
Photo. James Thomas

ACTION 5: Ensure a just transition for communities and workers

THE PROBLEM

Coal-fired power production is concentrated in several regional and rural areas in Australia – in the Hunter Valley in New South Wales; Victoria's Latrobe Valley; Central and South East Queensland; and two large coal-fired power stations inland from Bunbury in Western Australia.

The Federal Department of Employment puts the number of people employed in electricity supply (the supply, generation, transmission, distribution and on-selling of electricity) at 54,700 in November 2015.[55] As coal-fired power stations are clustered together in specific regions, unplanned closures will have a significant impact on local communities.

People are already experiencing the consequences of coal closure. In May this year, Alinta permanently closed its Playford B and Northern Power Stations in South Australia, while Alcoa shut its Anglesea operations in Victoria in 2015. In New South Wales Redbank, Wallerawang and Munmorah closed in 2014, and Collinsville in Queensland ceased operating in 2013. The Hazelwood plant in Victoria's Latrobe Valley will close in March 2017.

There is widespread recognition that affected communities will need help to negotiate this transition. Recent experiences of the closures in South Australia and Anglesea in Victoria highlight the impact that sudden, market-driven closures have on people who work in coal operations and their communities. In both cases, the operators and governments failed to give people support, regional investment and employment alternatives through a well-planned phased closure process with a well-funded transition package. Such transition support is reasonable when public policy goals that benefit all of us (addressing climate change) have a disproportionate effect on some of us (communities around coal-fired power stations).

THE SOLUTION

Coal-fired power stations and associated mines make an important contribution to local economies, so helping people who work in these industries and their communities to adjust to the transition is both crucial and fair. A successful and just transition must ensure communities are given the time and resources to determine their economic future, in consultation with governments. This should include a genuine and honest conversation as early as possible between communities, companies that operate generators and all levels of government. Together, these groups should make regional plans to help communities and people who lose their jobs in the transition with appropriate financial resourcing. The plan should be specific for each region and its needs, not 'one size fits all.'

Case study: GERMANY

Germany's Ruhr Valley was once synonymous with coal-driven industrial might. At its peak production in the 1950s West Germany produced around 145 million tonnes of coal per annum and employed almost 600,000 miners.[56] The coal industry was largely concentrated in the Ruhr Valley in the north west of the country, where 70 per cent of people were employed in coal mining and steel production.[57]

The industry's transition began in the 1950s when demand for coal began to fall as domestic coal was replaced by cheaper coal from other countries and oil became an increasingly popular source of energy.[58] Environmental pressures in the region were also a factor. In 1961, then-German opposition leader and future Chancellor Willy Brandt declared, "the sky above the Ruhr must turn blue again."[59]

Since then, the region has radically shifted its economy; in 2014, only 10,000 people still worked in the coal industry.[60] The transition plan focused on enabling people to stay in their communities rather than encouraging migration to other areas. From the 1960s to the mid-1980s, the German government largely centralised transition policies and programs, with support from relevant state governments for implementation. The government invested in road and public transport infrastructure and programs to clean up pollution and manage waste. It established new universities and technical institutions in the region, as there were none before. At the same time, it publicly funded early retirement programs and pension funds for coal miners.

From the mid-1980s, the region adopted a 'bottom up' approach, designed and implemented by local groups, including the Regional Association Ruhr, and guided by the state government.[61] By bundling money from public and private sources, they rejuvenated the local environment, such as the heavily polluted waterway, the Emscher River. New technology and innovation centres grew with a strong focus on environmental management.

In 2007, the federal government decided to close the last eight underground thermal coal mines and eliminate subsidies by 2018. The German government, the relevant state governments and RAG – the company that once owned and operated all the Ruhr valley's coal mines – made a national agreement.[62] The miner's trade union supported the national agreement; the majority of workers will reach retirement age by 2018. A trust, established through legislation, will enable RAG to manage environmental and other legacies that will be left from coal mining.

The transition has been not easy; the region's economic growth over the period was below the national average (but still positive) and unemployment is higher than the national average.[63] Yet careful planning and implementation over time made it possible to vastly lessen the impact of transitioning two industries (coal mining and steel production) that employed 70 per cent of people in the region.

THE BARRIERS

The jobs in clean energy are not always in affected communities

While there are significant employment opportunities in clean energy, these opportunities are not necessarily located in coal regions and do not always neatly fit with the skills of people who currently work in coal-fired power stations and mines. Similarly, regions that rely on coal may not have obvious and immediate opportunities for alternative economic and industry growth.

When Victoria's electricity sector started being privatised in the early 1990s, people in the Latrobe Valley lost their jobs, the area's population declined and property prices fell.[64] Unemployment hit a high of 12.8 per cent.[65] Many residents and workers are understandably worried about this happening again.

> Economic modelling commissioned by the Australian Conservation Foundation and the Australian Council of Trade Unions found that investment in infrastructure that helps the economy transition creates jobs across the economy. This includes investment in clean energy, energy efficiency and public transport to help speed the energy transition.[66]

FOUNDATIONAL ACTION

We call on the federal government to engage with local communities and workers, other levels of government and coal-fired power station operators early and genuinely to establish and fund regionally-based transition plans.

Regionally based transition plans should include:

- **Transition assistance:** The government should provide financial resources to help people retrain and, if necessary, relocate. These resources should be used to leverage extra financial resources from other levels of government and from industry.
- **Economic diversification:** The government should accelerate new industry enabling investments for regions affected by coal closure years before coal-fired power stations are scheduled to close; this will also support the expansion and consolidation of existing industries in communities. This provides alternative employment and gives people the opportunity to re-imagine the identity of their community when it has been entwined with coal.
- **Community collaboration:** Industry restructuring and transition is a complex problem requiring input from all stakeholders including workers, community representatives, unions, industry and government. The government should also maintain ongoing support for community services and functions.

Complementary action

We call on the federal government to establish an independent body to represent the interests of consumers, communities and workers in the discussion and development of transition plans.

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An orderly and just transition

Portrait of granddaughter and grandmother
Photo. Bojan Milinkov/ Shutterstock.com

ACTION 6: Support vulnerable people to use energy efficiently & adjust to the energy transition

THE PROBLEM

Regardless of which energy sources Australia chooses in the future, we will need to build and maintain new power facilities to replace our ageing coal-fired infrastructure. These new facilities – whether clean or polluting – will cost money and probably increase power prices, at least in the short term.[67]

Once we have built the new infrastructure we need, it will be considerably less expensive to produce electricity from clean energy, as most renewable sources have no ongoing fuel costs after construction. Over the long term, people will pay less money for clean energy.[68]

Short term costs will add to the already significant prices people pay for electricity in Australia. Between 2009-2013, retail electricity prices rose by more than 59 per cent[69] and Australians now pay some of the highest power prices in the developed world.[70] Any further short term price rises will take a large chunk from the disposable incomes of poorer Australians. It is imperative the energy transition not make life more difficult for vulnerable people.

THE SOLUTION

We need to limit the impact of further price rises by helping people use energy more efficiently. This includes introducing efficiency programs for people on low incomes, including requiring minimum energy efficiency standards for rental properties, to make sure renters can manage their energy use more efficiently. Existing social housing stock should be retrofitted to ensure it is energy efficient. The government should also make sure people with low incomes are appropriately protected and benefit from electricity tariff reform. Higher per unit prices for wholesale electricity do not have to equal higher total power bills.

St George Community Housing Development

The Clean Energy Finance Corporation (CEFC) has partnered with the St George Community Housing and provided a loan of up to $60 million to upgrade existing and build new energy efficiency properties. More than 200 new houses will be built alongside upgrades to some of the 4,300 houses managed by St George Community Housing. Upgrades include improved insulation window glazing, lighting, appliance upgrades smart meters and solar systems.

The 10-year finance being offered by the CEFC will enable St George Community Housing to build the new homes at an appreciably better energy rating that would have otherwise been possible.[69]

THE BARRIERS

Vulnerable people have less access to energy efficiency improvements and clean technology

Using energy more efficiently is a key way people can adjust to rising electricity prices. However, it is difficult for low income households to pay the upfront investment to upgrade their appliances, install or purchase clean energy and make their housing more efficient. People who rent must rely on their landlords for any improvements, yet as tenants pay the electricity bills, there is little incentive for landlords to make their properties more energy efficient. While tenants can ask for upgrades, landlords in most jurisdictions are not obliged to make them.

Low income families are disproportionately affected by pricing structures

As discussed in action five, the price people pay for electricity does not appropriately reflect the cost of delivering that electricity. All users subsidise the higher cost of supplying energy during peak times. This burden falls on all consumers, but people with low incomes are disproportionately affected, as they must pay a higher proportion of their income to cover these increased costs.[71]

FOUNDATIONAL ACTION

We call on federal and state governments to help people with low incomes adjust to the energy transition and specifically to:

- Set regulated minimum energy efficiency standards for social and private rental housing;
- Increase funding for household energy efficiency schemes that give low income residents and landlords access to grants or discount finance to invest in energy efficiency improvement and clean technology;
- Help people with low incomes to adjust to the energy transition by providing additional financial assistance where necessary.

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Sandridge Outstation, Rumburriya Country, NT
Photo. Karl Goodsell

Pursue complementary policies

ACTION 7: Increase Australia's Energy Efficiency

THE PROBLEM

Australia's energy standards lag behind those of global leaders. Our record on energy efficiency and energy productivity is poor compared with much of the rest of the world.[72] Improving energy efficiency will help buffer households and businesses as electricity prices increase over time and help people use less electricity from polluting sources across the transition period.

We also need to electrify Australia's transport and industrial sectors to accelerate the energy transition.[73] This will involve a large increase in electricity demand. Improving energy efficiency will make this more manageable.

THE SOLUTION

We must commit to an ambitious but achievable energy productivity target. By improving energy productivity, we can grow Australia's GDP and increase international competitiveness.

To achieve this, our government should raise Australia's minimum energy standards for appliances, equipment and buildings to global standards. This must include the introduction of associated measurement tools, as well as tightened vehicle emissions standards. According to the Australian Alliance to Save Energy, if we double Australia's energy productivity by 2030, we will save $30 billion on energy spending.[74]

How we develop and build our cities over the longer term is an important factor in our energy transition. We must bring Australian cities into line with the leading international cities and introduce mechanisms that require new and existing buildings to meet high standards of energy efficiency. Our cities must be better equipped to manage energy demand and support low carbon technologies in urban renewal areas. These objectives could be pursued through the City Deals concept promoted by Prime Minister Turnbull in April 2016.[75]

THE BARRIERS

Australia's low energy productivity ambition
In December 2015, Australia's Energy Ministers released a National Energy Productivity Plan, aiming to improve energy productivity in Australia by 40 per cent between 2015 and 2030.[76] The document identifies a range of energy efficiency activities, yet it recommends Australia implement just over half of them to meet our current 40 per cent goal.[77]

This ambition falls short of Australia's potential; modelling demonstrates we can double Australia's energy productivity by 2030 through investment in the modernisation of the electricity system.[78] By increasing Australia's target to double energy productivity, we can provide certainty and guide government and investor decisions.

Low energy efficiency standards & accountability
Enhanced standards for appliances, equipment and buildings drive efficiency. For example, better standards mean houses built after 2010 use around 30 per cent less electricity than houses built before 2007.[79] A review of the Equipment Energy Efficiency Program (known as E3), which covers household and industrial equipment and appliances, found since the year 2000, Australia has avoided generating 86.8 million tonnes of climate pollution through energy efficiency measures at an effective negative cost (i.e. the value of energy savings exceeds the program costs).[80] COAG agreed to deliver a new E3 priority plan but because of the long review

time it is unclear when new standards will actually be implemented.[81] Commercial building minimum energy efficiency standards under the National Construction are only set to be updated in 2019.[82]

Energy efficiency in Australia still has vast room for improvement, with a review of building energy efficiency published in November 2014 concluding there is "a pervasive culture of mediocre energy performance across the Australian building industry."[83] This was borne out in a study in the Lancet that found, as a percentage of mortality, there are more deaths from cold weather in Australia than in Sweden.[84] We can also improve existing measurement and rating schemes such as the National Australian Built Environment Rating System (NABERS), NSW's Building Sustainability Index (BASIX) and Green Star.

Lack of harmonisation of schemes and standards
New South Wales, Victoria, the Australian Capital Territory and South Australia have a range of 'retailer energy efficiency obligations'.[85] To improve their effectiveness we should harmonise, strengthen and expand these schemes across jurisdictions.

We also need to streamline the process for setting standards. A review into the Greenhouse and Energy Minimum Standards program commissioned by the COAG Energy Council recognised this was necessary, however it is unclear whether it has been implemented.[86]

Australia should use international metrics, such as the common carbon metric for buildings, to report our energy use to make international comparisons and reporting easier and accurate.[87]

Limited incentive for large energy users to save energy
At the end of June 2014, the government discontinued its Energy Efficiency Opportunities program. This program required companies who used large amounts of energy to participate and was voluntary for medium energy users.[88] Under the program, companies had to identify and report on potential energy efficiency improvements, but had no obligation to implement them. A revised program based on this scheme, alongside a program for small to medium enterprises, would help to drive energy efficiency across the economy.

As large users of energy, governments should ensure they invest in energy efficiency and productivity. They should trial new technology and set ambitious targets for their assets and operations.

FOUNDATIONAL ACTION

We call on the federal government to adopt a goal to double Australia's energy productivity by 2030 and develop an energy efficiency roadmap to achieve this goal.

This should include measures to:

- Improve energy efficiency minimum standards across appliances, industrial equipment and buildings, including updating the Building Code of Australia to set higher minimum standards for energy efficiency and set future paths for ongoing improvement aligned with the Paris goals;
- Harmonise and improve energy efficiency schemes across the country, in line with global standards, including proper disclosure of carbon intensity of buildings;
- Introduce a business and government energy management plan to help identify energy efficiency opportunities.

Complementary action
We call on state governments to work with the federal government to harmonise and improve energy efficiency measurement and rating schemes across the country.

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Pursue complementary policies

People's Climate March 2015
Photo. James Thomas

ACTION 8: Dramatically reduce climate pollution from transport

THE PROBLEM

Transport creates 17 per cent of Australia's climate pollution, second only to electricity generation.[89]

Australia's vehicle emission standards trail comparable countries and we do not have a carbon emissions standard, which risks Australia being a dumping ground for foreign-made vehicles that are too inefficient for other markets.

Our truck fleet is much older than comparable countries. According to the Truck Industry Council, our national truck fleet had 582,029 vehicles in January 2014 with an average age of 13.3 years.[90] In comparison, the UK average is 7.8 years and the USA's is 6.7 years.[91] Approximately 30 per cent of the trucks currently on Australia's roads were first registered before 1996. These old trucks are much more polluting than newer models, as emission standards that have scaled up over time weren't introduced until 1996.[92]

THE SOLUTION

Australia should increase the emissions standards of our vehicle fleet by bringing Australia's standards into line with the European Union's. This will increase the number of low emission vehicles on the road and accelerate the retirement of older parts of Australia's truck fleet.

Our government can achieve more ambitious emissions standards by regulating vehicle imports, as Australia will not be manufacturing vehicles from 2017. We should also improve Australia's public transport and freight networks and encourage more active transport such as walking and cycling in towns and cities.

THE BARRIERS

Poor vehicle emission standards

Australia's vehicle emissions standards currently lag most other developed countries. Our government adopted these standards in 1970s and they have improved somewhat over time, but they have not kept up with current technologies or standards in other parts of the world.[93]

Importantly, Australia does not have a carbon emissions standard, even though three-quarters of the light vehicles sold globally are subject to a carbon emissions standard.[94] Without a standard, we have allowed Australia to import foreign-made vehicles that are too inefficient for other markets.[95]

Each year in Australia, people buy around a million new cars and small commercial vehicles, such as vans (1.1 million in 2014), while around four per cent of our 16 million-strong vehicle fleet is retired each year.[96] This provides a significant opportunity to start converting our vehicles to a higher standard. Australia's vehicle manufacturing will end in 2017, so all new vehicles will be imported. There is therefore no need to protect domestic manufacturers or create adjustment periods.

Overall fuel efficiency in Australia (measured in grams of CO_2 emitted per kilometre) was 188 g/km in 2014 – an average of 177g/km for passenger vehicles and 235g/km for light commercial vehicles. The EU passenger vehicle fleet standard for 2015 is 130g/km.[97] By 2021, the EU passenger car standard (phased in from 2020) will be a fleet average of 95g/km for all new cars, while the light commercial vehicle standard for 2020 is 147 g/km of CO2.

Technologies and standards are continually improving, so to make sure Australia's standards keep up, we also need a review process and timeframe for periodical review.

FOUNDATIONAL ACTION

We call on the federal government to introduce vehicle emission standards to bring Australia into line with European Union standards; accelerate the retirement of the oldest parts of Australia's truck fleet; increase investment in public transport, rail freight and active transport infrastructure, and work with state and local governments to roll out national electric vehicle infrastructure.

Complementary action

We call on state and local governments to:

- Incentivise the uptake of low emission vehicles through mechanisms such as discounted registration to encourage uptake; and
- Increase investment in public transport and active transport infrastructure.

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Clean energy — reliable, affordable and necessary

The purpose of this blueprint's is to describe the necessary interventions to enable a smooth and fair transition to clean energy. While Australia has an abundance of clean energy resources we did not set out to identify the technologies that will form part of a clean energy future. This work has been done already.

Modelling from ClimateWorks Australia demonstrates that Australia can achieve net zero levels of emissions by 2050 and continue to grow the economy at a rate consistent with recent economic growth by switching to clean energy, embracing energy efficiency, electrifying the transport fleet and sequestering any remaining carbon emissions through our landscapes and technologies.[98]

Modelling from the University Technology of Sydney demonstrates a transition to 100 per cent clean energy within one generation is technically feasible and economically responsible. By 2030, Australia's homes and businesses can be powered by clean electricity and by 2050 the whole energy system can be completely decarbonised.[99]

The Australian Energy Market Operator, in its investigation into transitioning Australia to 100 per cent renewable energy by 2030, stated that "operational issues appear manageable but… several key considerations would require more detailed investigation." And that "there are no fundamental technical limitations to operating the given 100 per cent clean NEM power system generation portfolios that have been identified."[100]

Finally, modelling from the Australian Council of Trade Unions and the Australian Conservation Foundation identified that lowering emissions requires investment in infrastructure that creates economic activity and new jobs across the economy.[101]

A nation fuelled by clean energy is not only possible, it will decouple our economy from pollution and create jobs.

Clean energy is also crucial in providing reliable and affordable energy in to the future. Unabated fossil fuel based energy cannot be relied upon in a carbon constrained world. It is not a reliable option for our future. As Minister for Environment and Energy, Josh Frydenberg, has said:

"The Australian economy is in transition. We are moving away from coal and that is not a bad thing."[102]

But the transition must result in secure and affordable energy. Clean energy combined with storage provides a secure and reliable choice for our future.

Energy storage costs have fallen dramatically[103] and innovative storage projects are coming to Australia. In Adelaide, AGL with funding support from the Australian Renewable Energy Agency are implementing a 5MW shared storage project providing secure energy through 1000 connected batteries in homes and businesses.[104] In Port Augusta, the site of the now closed Alinta coal plant, a solar thermal plant is proposed that would generate and store electricity as well as provide jobs to local communities.[105] A recent report by the Melbourne Energy Institute found a solar thermal plant such as the one proposed at Port Augusta is an effective way of boosting the reliability of South Australia's electricity grid.[106]

Clean energy offers an affordable option. As outlined in Action 6, once the unavoidable capital investment to upgrade our aging energy infrastructure is delivered, it is less expensive to deliver electricity from clean energy sources. The federal government's 2015 review of the renewable energy target also showed that clean energy offers more affordable electricity into the future.[107]

Finally, a shift to clean energy is also necessary.

The unprecedented global agreement to curb carbon pollution to levels that limit global warming is forcing the transition to clean energy. Without this transition, global warming will fuel ever more dangerous weather, fires and droughts and place our future in grave danger.[108] Nations that are slow to act are likely to suffer economically through missed investment opportunities. It is possible they could be penalised by other nations that are acting as good global citizens.[109] The Montreal Protocol – a global agreement to reduce the use of CFC gases – enshrined trade sanctions against countries that didn't join or didn't comply.[110]

In every way we look at our energy future – reliability, affordability, safety – clean energy provides the answers. The transition will not be easy. Change never is. But it is unavoidable.

Sadly, in recent times, despite the support clean energy enjoys with the Australian community,[111] clean energy has become a political football with fierce debate based on ideologies not evidence. This is not in the best interests of the Australian people, business or economy.

Our bright, safe and secure future relies on a planned and fair transition to clean energy. The longer we take to accept this reality, the greater the disruption to Australian communities, workers and business.

Our future relies on governments and parliaments making the right choices today to set Australia on a pathway to a clean future.

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A FINAL WORD

"We are the first generation to feel the impact of climate change and the last generation that can do something about it".
— **Governor Jay Inslee** *of Washington State, USA*

The energy we use to power our lives is changing. We cannot pretend otherwise. We have no choice but to curb pollution and transition to energy sources that do not damage our world.

We must make decisions today to plan for this inevitability.

This is not a decision for future generations. Before a child born today even finishes high school, our energy systems will be vastly different. Change is happening now. Our only choice is how we manage this change. We can make our future fair or disruptive, predictable or chaotic. This is the choice we make today.

If we choose to lead, we will make possible an orderly and fair transition to clean energy. We will curb pollution and create healthier lives. We will unleash billions in investment, help communities and businesses plan for the future and create lasting, meaningful jobs for Australians.

If we choose to lead, in future years we will look back at the legacy we leave for the next generation and know we did the right thing.

We have come together now because this is the time for leadership. We call on our federal government to lead a national energy transition plan to shift Australia to clean energy before 2050, or sooner, and create a future where everyone can thrive.