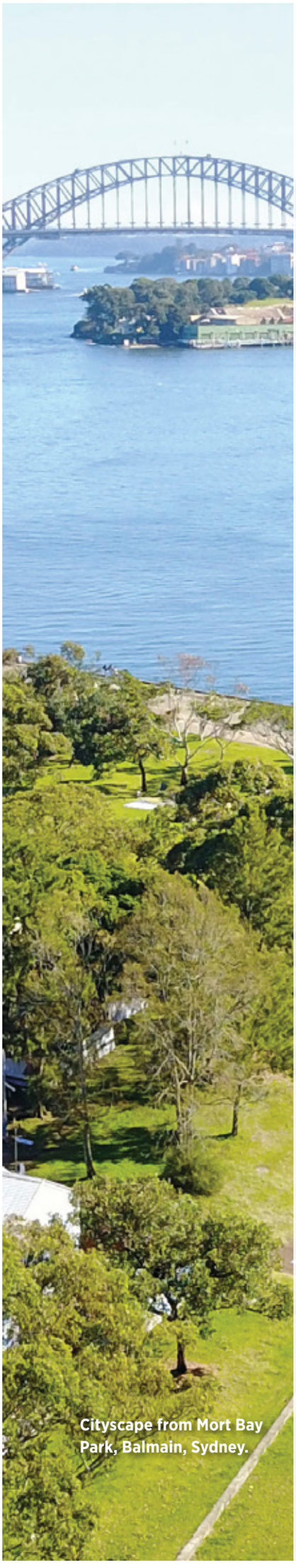
NSW GOVERNMENT

Department of Planning, Industry and Environment

Net Zero Plan Stage 1: 2020–2030

environment.nsw.gov.au



Cityscape from Mort Bay Park, Balmain, Sydney.

Minister's message

The NSW Government is committed to taking decisive and responsible action on climate change. That's why we've already set a goal of net zero emissions by 2050 and today, we're releasing this Net Zero Plan Stage 1: 2020–2030 to fast-track emissions reduction over the next decade and prepare the State to take further action in the decades to follow.

Getting to net zero will not be easy. I firmly believe that action on climate change must be grounded in science and economics – not ideology. Just as it is unacceptable to ignore the challenge posed by climate change, it is also unacceptable to call for an end to the modern way of life. Emissions reduction must enhance, not undermine, the prosperity and quality of life enjoyed by the people of New South Wales.

This Plan recognises that, in parts of our economy, low emissions technologies are becoming a commercially viable alternative to the traditional ways of doing things. Scaling up those technologies will play a critical role in getting to net zero. But it also recognises that more work needs to be done to get us to our 2050 goal.

That's why this Plan will invest in our scientists, entrepreneurs and businesses to deliver the next wave of technologies, goods and services for our consumers, workforce and the environment. It will also empower consumers with more information to drive sustainable choices for the environment and the household budget.

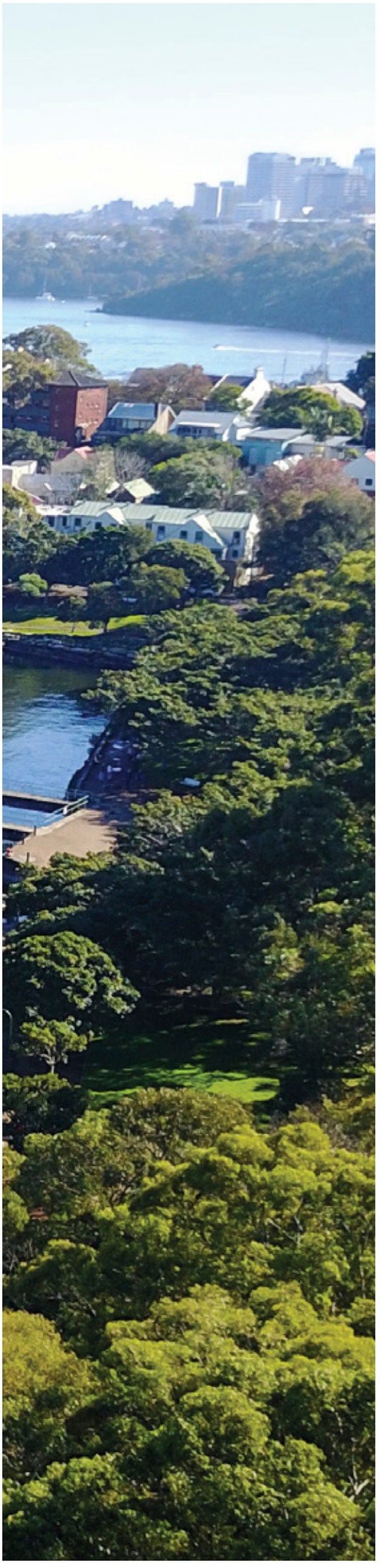
Under this Plan, energy consumers will see lower electricity prices, motorists will have more information and choice when buying their next car, farmers will have access to new markets and technologies, and businesses will be supported to modernise their plant and increase productivity.

The Plan is forecast to deliver a 35% emissions reduction in New South Wales by 2030 compared to where we were in 2005, and that is our objective over the next decade. The NSW and Commonwealth Governments will invest almost $2 billion over 10 years to reduce emissions in NSW - making this the most comprehensive, fully-funded plan in Australia. The Plan also paves the way to achieving a net zero future by accelerating the next wave of innovative technologies.

Governments are not alone in acting on climate change. Businesses, families and individuals are already taking action and there is every reason to think that action will grow. New opportunities, inconceivable today, will emerge over the next decade. For these reasons, this Plan should not be seen as the final word on emissions reduction between 2020 and 2030, but a foundation on which we will build.

The Hon. Matt Kean, MP

Minister for Energy and Environment



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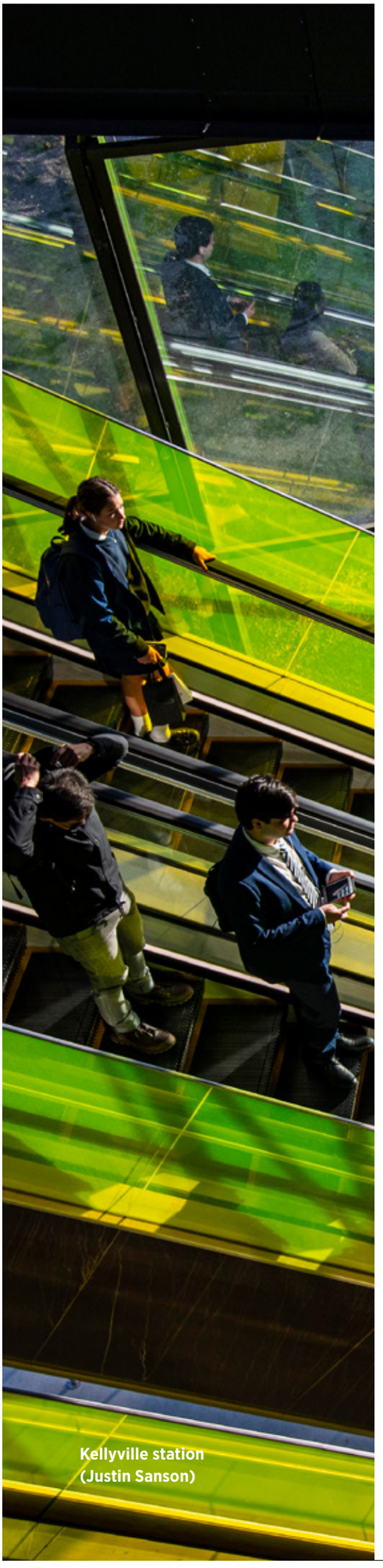


Kellyville station
(Justin Sanson)

Introduction

The NSW Government is committed to maintaining a strong economy, improving the quality of life for the people of NSW and protecting the environment.

That's why the NSW Government's objective is to achieve net zero emissions by 2050 by creating new jobs, cutting household costs and attracting investment.

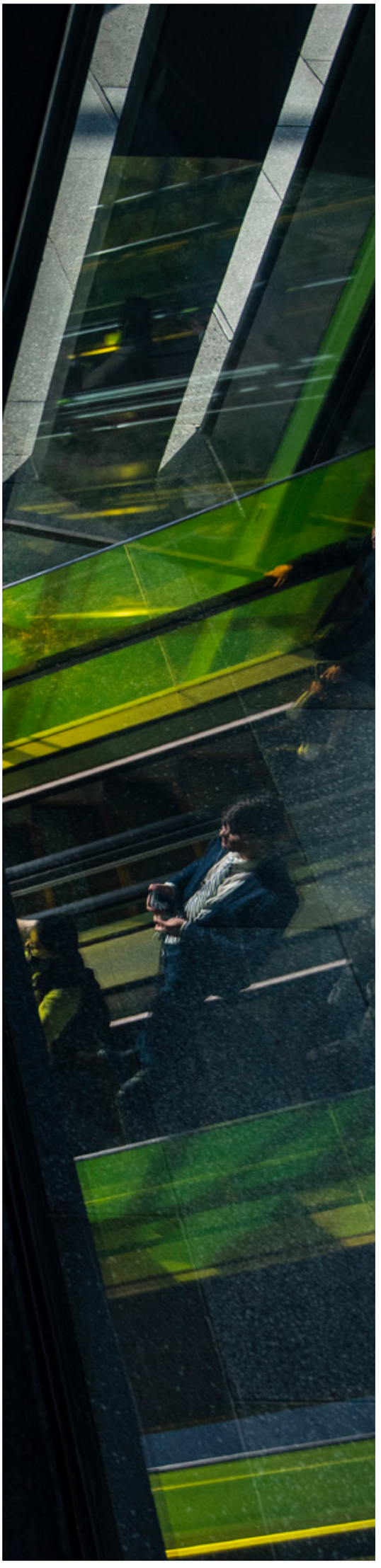
This Net Zero Plan Stage 1: 2020–2030 (**Plan**) sets out how the NSW Government will deliver on these objectives over the next decade. The Plan is focused on the next decade because rapid changes in technology make identifying the lowest cost path to net zero difficult. Plans for the second and third decades of the net zero path will be developed in the lead-up to the 2030s and 2040s respectively.

The purpose of the Plan is to give NSW families and communities confidence that the challenges posed by climate change can be solved by improving – not eroding – their prosperity. It will also send a clear message to local and international investors that New South Wales is open for business when it comes to delivering on our economic, social and environmental ambitions.

The Plan is financially supported by a Bilateral Memorandum of Understanding on Energy and Emissions Reduction Policy between the Commonwealth and NSW Governments (**Bilateral**).

The Plan is set out in four parts:

1. **A global challenge with local opportunities** – the trends and opportunities arising from global climate change action
2. **Progress and projections** – progress within New South Wales to date to reduce emissions and future projections
3. **The net zero priorities** – the NSW Government's net zero priorities
4. **Keeping track** – the Government's approach to keeping track of its progress.



Supports over **2400** jobs

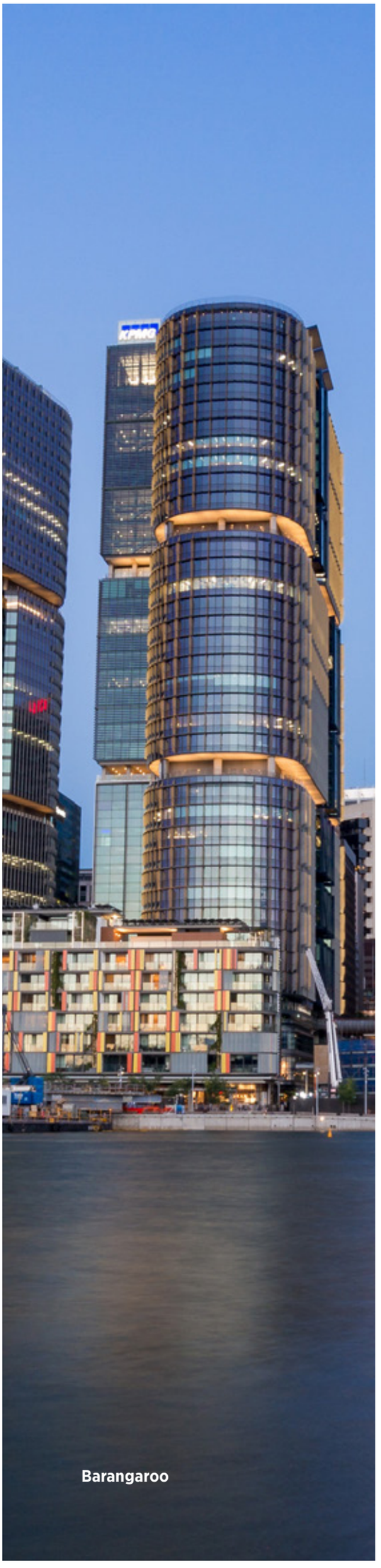
Attracts **$11.6 billion** in investment, **⅔** to regional Australia

By delivering the Plan, New South Wales is expected to create almost 2400 jobs and attract over $11.6 billion of investment over the next 10 years. Almost two-thirds of this investment will go to regional and rural New South Wales. The Plan is expected to save households $40 a year on their electricity bills.

Two additional points should be noted. **First**, there will be unexpected developments in technologies over the coming decade just as we've seen over the past decade with the falling cost of renewable energy. The NSW Government will look to take advantage of the benefits new technologies offer. Accordingly, while the actions set out in this plan constitute the NSW Government's primary policy to reduce emissions, the Government will also look at emerging opportunities to reduce emissions, as low emissions technologies fall in cost or offer other benefits.

Second, achieving net zero emissions by 2050 will require more than action from the State and Commonwealth Governments. It will require action from local government, business, communities and individuals. Many are taking action already and there is every indication that people will increase their efforts over time.

For these reasons, this Plan is intended to be a foundation for the State's action on climate change, to be built on into the future.



Barangaroo

A global challenge with local opportunities

New South Wales is not alone on the global journey to tackle climate change, but we are uniquely positioned to compete for the economic and social benefits it affords.

Community, business and government leaders across the world are embracing advances in technology that allow them to reduce emissions and adapt to a changing climate. The four primary trends driving climate change action, outlined below, show few signs of slowing. Together, they point to a significant opportunity for New South Wales to lead the nation when it comes to capturing the jobs and investment generated by the transition to a net zero economy.

1 Global demand for low emissions products and services is on the rise

Australia is one of 187 countries that have committed to keeping global temperature rises to well below 2°C under the Paris Agreement. Over 73 of these countries have set a goal of reaching net zero emissions by 2050. Countries may also start acting beyond the Paris Agreement: the French President, Emmanuel Macron, has proposed an EU border carbon tax, to ensure the competitiveness of businesses with low emissions intensities.

Action on climate change at the diplomatic and national levels is mirrored in many parts of the global community. More than 175 of the world's largest companies have committed to reducing their emissions to net zero by 2050, and local governments and community groups are increasingly looking for opportunities to invest in emissions reduction. Over the past decade, governments, businesses and households have invested at least US$2.5 trillion in renewable energy technologies. It is expected that approximately $US2.4 trillion will need to be invested globally in the energy system each year for the next 15 years in order to limit global temperature rises to 1.5°C.

Demand for low emissions goods and services is creating opportunities for businesses with expertise in developing and deploying the technologies needed to achieve the world's carbon reduction aspirations. New South Wales has a strong track record in developing low emissions technologies and services. For example, the University of NSW is a global research leader in silicon photovoltaic cells, launching the world's first undergraduate program in photovoltaic engineering in 2000 and holding the record for the most efficient silicon solar cell for over two decades.

The emissions intensity of goods and services will also become an increasingly important factor, with businesses already competing in capital and consumer markets on carbon emissions reduction. Some of Australia's largest companies such as Origin Energy advertise their commitment to climate action, while BHP, QANTAS, Rio Tinto, ANZ, AGL and Energy Australia, all have carbon reduction aspirations. It is important that NSW businesses are able to succeed in that environment.

2 Low emissions technologies are becoming cost competitive

As global demand for low emissions products and services continues to grow and mature, low emissions technologies are coming down the cost curve. Since 2010, the cost of solar generation has fallen by more than 73%. Electric vehicle battery prices have also fallen by more than 85% since 2010. As prices continue to fall, there will be opportunities to support economic growth, jobs, globally competitive businesses and exports.

These opportunities will arise in two forms:

First, there will be job opportunities in the deployment of these technologies. For example, solar panels and wind turbines are now capable of being manufactured and deployed at scale at significantly lower cost than traditional electricity generators. When combined with firming technologies, such as gas, batteries and pumped hydro, renewables are now the cheapest forms of new, reliable electricity generation.

These economics are driving their deployment around the world, creating construction and maintenance jobs. It is important New South Wales takes advantage of these opportunities and does not see renewables constructed in Queensland or Victoria at the expense of regional communities in New South Wales, because of the interventions of those governments.

While electric vehicles currently have higher purchase prices than petrol and diesel vehicles, they are expected to fall in price and have competitive strengths: they need less maintenance as they have fewer moving parts and have lower energy costs. As electric vehicle sales increase, opportunities will open for charging station businesses, the electricians required to install power points in shopping centres and other locations, and providers of the software and other services needed to integrate electric vehicles into the grid.

Second, there will be economic opportunities for businesses that make use of these technologies. Some businesses are already reducing their costs by installing rooftop solar. For example, Ikea has installed its largest Australian rooftop solar project at its Tempe store in Sydney, supplying over 1300 megawatt hours of electricity to the building and reducing emissions by 1500 tonnes. It is estimated this will save about $200,000 on their electricity bills per year.

Renewables are lowering wholesale electricity prices during the middle of the day, with some Australian states experiencing negative prices during this time. This creates opportunities for businesses that can shift their demand to times of low prices.

Taking advantage of these opportunities will also require new technologies, systems and processes, creating further opportunities for business. It is important that NSW businesses can take advantage of low carbon technologies to reduce their costs and create new commercial opportunities. By ensuring we adopt commercially viable emissions reduction technologies early, NSW businesses can lead in the development of ancillary goods and services and set themselves up for global success.

3 Innovation is needed and will create early-mover opportunities

While there are many success stories in developing markets for some technologies such as renewable energy and electric vehicle industries, this success has not yet been replicated across all parts of the economy. Innovation needs to be part of any plan to reach net zero emissions by 2050. Moving early on new technologies also increases opportunities for NSW businesses to develop goods and services and business processes that are globally competitive and create new market opportunities.

Hydrogen may be an example of such a technology. Hydrogen can be used as a fuel to generate electricity in gas turbines or to power vehicles and is a feedstock in industrial processes. It can be produced using electricity and water, and it can be stored and transported. Research into hydrogen use in vehicles indicates fuel costs for hydrogen fuel cell vehicles are likely to fall as supply scales up. Hydrogen has the potential to transform large sectors of the economy, such as transport and manufacturing, as it can be produced with low or no emissions. New South Wales is well placed to take advantage of this opportunity.

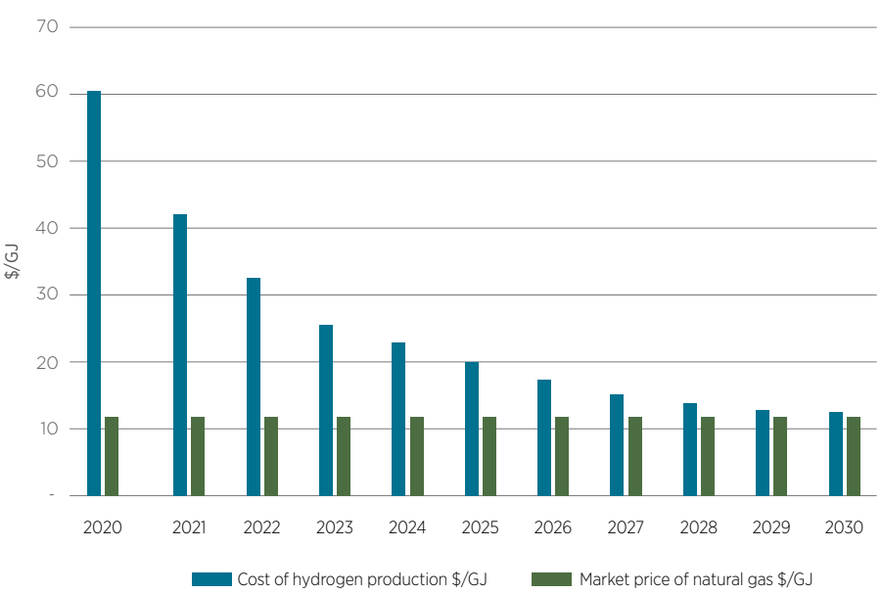


Figure 1 Projected hydrogen production costs

Source: Australian Gas Infrastructure Group. The natural gas 2020 market price is estimated using market data and held constant over time.

>484,000
households and small businesses have installed rooftop solar

each saving around
$900 and
3 tonnes
of emissions a year

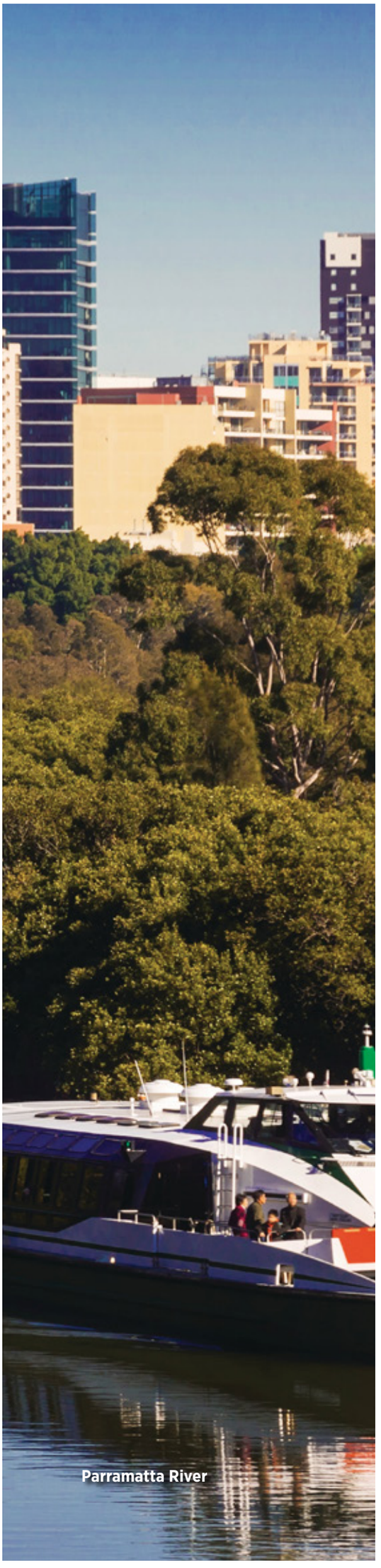
4 Households are already taking cost-effective climate action

The take-up of low emissions technologies is not limited to big business and industry. Households across New South Wales are increasingly adopting products and services that both reduce the cost of living and protect the environment.

For example, over 484,000 households and small businesses have installed rooftop solar, generally saving $900 per year and reducing annual emissions by three tonnes per family. Similarly, over 47,000 motorists have opted for an electric or hybrid vehicle, reducing their fuel costs by up to $1800 per year and decreasing annual emissions by up to three tonnes per car.

As the supply of cost-competitive, low emissions goods and services evolves, the purchasing power of consumers will continue to drive their uptake. We need to empower people with meaningful information to promote competition and to ensure all consumers benefit from the transition to a net zero emissions economy.

Eveleigh Street house with solar panels (DPIE)


Parramatta River

Progress and projections

NSW emissions have fallen but are projected to stabilise under current settings.

In 2016, the NSW Government released its Climate Change Policy Framework (**Framework**) with an objective to achieve net zero emissions by 2050.

Under the Framework, the NSW Government has:

- delivered energy savings through our $50 million Home Energy Action Program, reducing household energy bills by up to $300 per year and forecast to reduce emissions by 32,000 tonnes by 2030
- created a $75 million grant program for emerging, on-demand electricity generation projects, diversifying the State's sustainable energy supply mix and reducing emissions by up to 200,000 tonnes by 2030
- provided $35 million for energy intensive manufacturers to upgrade to more energy-efficient equipment, saving them about $80,000 in annual energy costs and reducing emissions by up to 108,000 tonnes by 2030.

Actions delivered under the Framework have helped New South Wales reduce its emissions by 29 megatonnes, or about 18%, on 2005 levels. This is more than the national average reduction of 12%.

Emissions are projected to stabilise out to 2030 if no further action is taken.

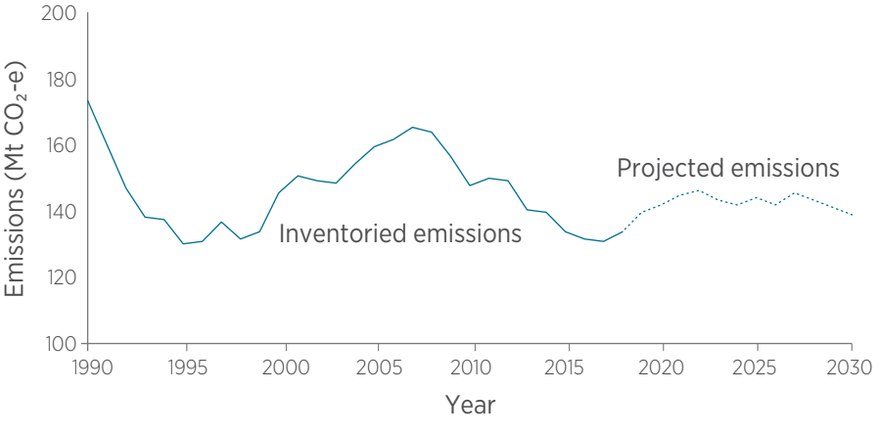


Figure 2 NSW total annual emissions to 2030
($MtCO_2$-e = Megatonnes of carbon dioxide equivalent)

The majority of emissions in New South Wales are derived from electricity generation (51 $MtCO_2$-e), followed by transport (28 $MtCO_2$-e).

Land-use is a net sink of emissions, reducing the State's total emissions by 12.7 $MtCO_2$-e.

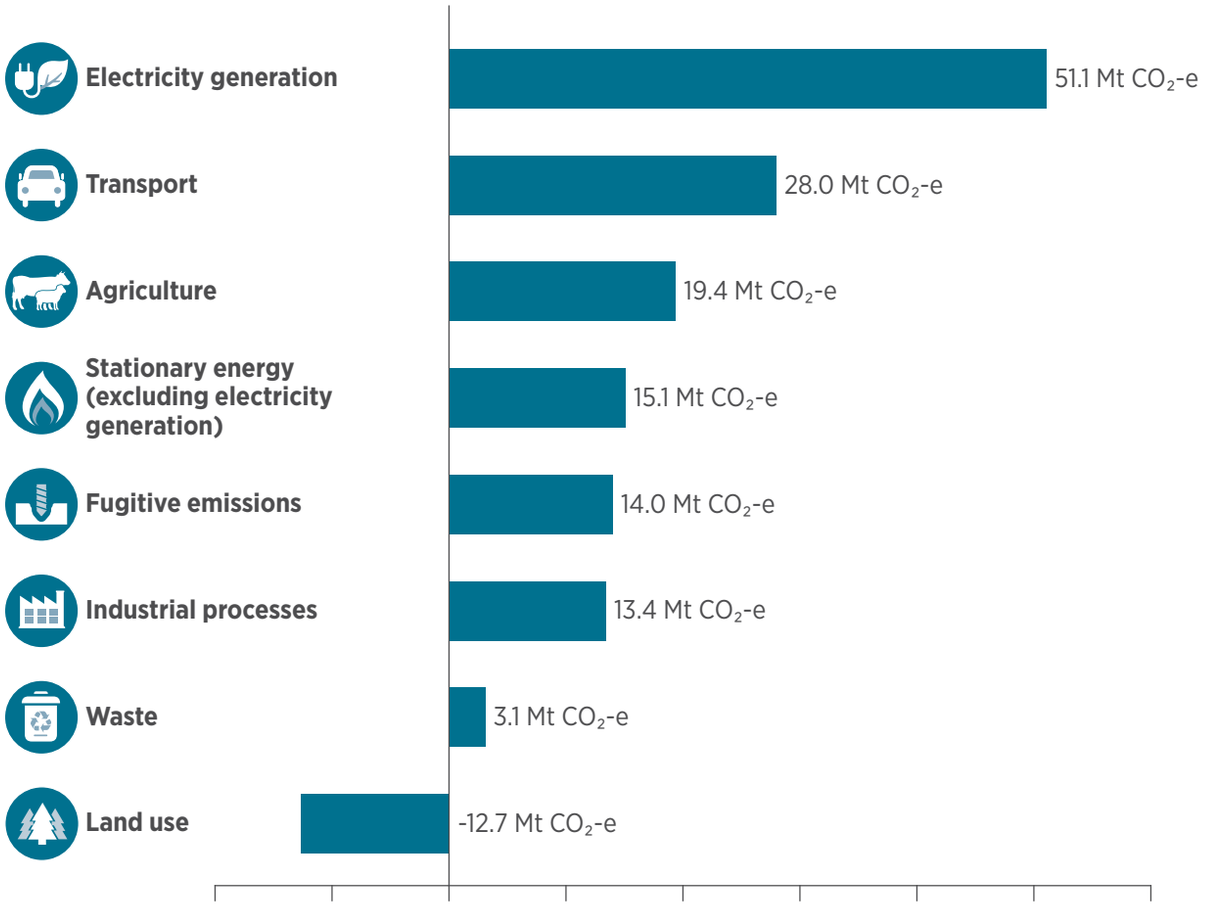


Figure 3 NSW emissions by sector in 2017

Rouse Hill station (Justin Sanson)

Darling Harbour rooftops and cityscape, showing solar panels on the rooftops. (Lisa Madden/DPIE)

The net zero priorities

The NSW Government will tackle the financial, social and environmental challenges posed by climate change using solutions based on science, innovation and economics.

This Plan sets out how the NSW Government will support those solutions over the next decade. There are four priority areas for action:

PRIORITY 1 Drive uptake of proven emissions reduction technologies that grow the economy, create new jobs or reduce the cost of living

Some low emissions technologies, such as firmed renewable generation and home energy efficiency products, are now the most cost-competitive new way to generate power and reduce electricity bills. Other technologies, such as electric vehicles and modern, electric manufacturing equipment, are coming down the cost curve and have the potential to save motorists, manufacturers and small businesses thousands of dollars in yearly fuel and energy costs.

The NSW Government's first priority is to provide a pathway to deploy those technologies at scale over the next decade. To do this, the NSW Government will remove unnecessary barriers to entry for those technologies and make co-investments to address the high upfront capital costs that may stand in the way of their take-up.

By embracing these technologies early, the NSW Government seeks to make them self-sustaining in the long term. Reaching and maintaining net zero emissions needs to strengthen the State's prosperity and reduce the cost of living. To this end, the NSW Government will target its support in deploying technologies that will deliver both for the economy and the environment.

PRIORITY 2 Empower consumers and businesses to make sustainable choices

Many consumers and businesses want to act on climate change. That action may take the form of buying a more fuel-efficient car, installing rooftop solar, planting trees or buying products where carbon emissions are offset. Whatever action individuals decide to take is a matter for them. However, people should be empowered to make meaningful choices and contribute as much as they want to and in the way that suits them and their families. For this reason, the NSW Government's second priority is to empower people with information about the carbon impact of key goods and services and give them opportunities to offset that impact.

Additionally, some goods and services with low emissions intensities also have cost benefits. For example, fuel-efficient cars often have lower emissions intensities, therefore reducing both the cost of fuel and the emissions generated. Accordingly, the NSW Government will require key information about the financial and environmental impact of certain goods and services to be provided at the point of sale, to help consumers make informed decisions. The NSW Government will provide consumers with opportunities to easily offset the carbon emissions associated with the goods and services they use and reinvest this money in NSW-based projects such as revegetating our national parks or supporting remote communities to install solar.

These actions will help increase transparency on the price, quality and sustainability of goods and services and motivate businesses to compete for consumer business.

Invest in the next wave of emissions reduction innovation to ensure economic prosperity from decarbonisation beyond 2030

While many low emissions technologies show strong prospects of success, other technologies that could contribute to decarbonising the economy are still in the early stages of development. Where commercial technologies do not exist, targeted investment is needed to fast-track their research, development and commercialisation to bring them to market.

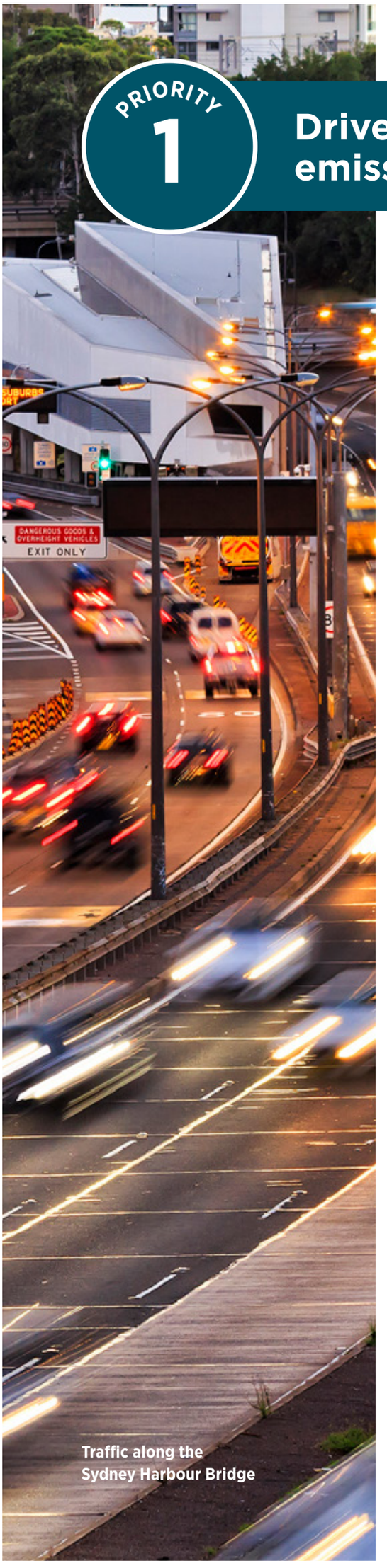
The NSW Government's third priority is to accelerate the research, development and demonstration of low emissions technologies that show potential for becoming scalable, replicable and cost-effective. Investment in this area will be focused on linking research with industry, including through grants, low-interest loans and a new clean technology innovation hub.

Ensure the NSW Government leads by example

The NSW Government purchases around $20 billion of goods and services each year, employs 10% of the State's workforce and manages approximately 15% of all NSW land, including schools, hospitals, conservation areas and national parks.

The NSW Government's fourth priority is to play a leading role itself, by bringing sustainable goods, services and practices into the market and maximising the environmental value of the assets it oversees.

Based on the new initiatives set out under this Plan, emissions in New South Wales are expected to reduce by 35.8 megatonnes by 2030. This means the State's annual emissions are forecast to reduce by 35% on 2005 levels, and it is the NSW Government's objective to achieve this. The Government will continue to monitor and report against its progress to ensure we meet that reduction by 2030.



Traffic along the Sydney Harbour Bridge

PRIORITY 1

Drive uptake of proven emissions reduction technologies

Emissions intensity reduction

Many small and large businesses in New South Wales rely on emissions intensive plant and processes to produce high quality, affordable goods and materials for their customers. This extends from cement, steel and aluminium manufacturing processes to factories and farms that use fuel to power onsite plant and equipment.

Manufacturers are increasingly developing electric versions of previously fuel-dependent plant and equipment. Electric models are typically highly efficient and have a substantially lower emissions intensity than existing equipment, especially when they draw on renewable electricity sources. Their high upfront costs can, however, prohibit businesses from easily adopting them.

The NSW Government will establish a **$450 million Emissions Intensity Reduction Program** to support businesses to transition their plant, equipment and processes to low emissions alternatives. Program funds will be allocated on a strategic basis over 10 years to businesses that show the strongest prospects of reducing their emissions without compromising their contribution to the NSW economy and workforce.

Climate Solutions Fund

The Emissions Intensity Reduction Program will be complemented by the Commonwealth's **$450 million commitment to New South Wales from the Climate Solutions Fund (Fund)** in addition to the other commitments under the Bilateral. The Climate Solutions Fund supports Australian businesses, farms and land managers to take practical, low-cost actions to reduce emissions. This commitment from the Commonwealth will allow New South Wales to take full advantage of the Fund over the next decade and will provide important environmental, economic and social benefits to local businesses and communities.

In addition to the Emissions Intensity Reduction Program and the NSW allocation of the Climate Solutions Fund, the NSW and Commonwealth Governments will commit a further $1.07 billion over 10 years under the Bilateral to the Energy Efficiency, Electric Vehicle Infrastructure and Model Availability, Primary Industries Productivity and Abatement, Coal Innovation, Clean Technology and Hydrogen programs described throughout this Plan.

$450 million from the **Emissions Intensity Reduction Program** together with **$450 million** from the **Climate Solutions Fund**

Case study: Capturing carbon from cement

Over half the carbon emissions from making cement come from the use of limestone. An Australian company, Calix, is piloting a breakthrough technology to capture the carbon emissions from making cement at Heidelberg Cement's Lixhe plant in Belgium. With €12 million of funding from the European Union's Horizon 2020 Research and Innovation program, they have been able to show that the technology works and are now looking to scale-up its use across the sector.

Because the technology involves minimal changes to the conventional process for cement manufacture and no significant additional energy or capital costs, it has tremendous potential for deployment in cement, lime and similar mineral processing applications in New South Wales and around the world.

Case study: Switching from diesel to solar-diesel irrigation systems

For many years a family-run cotton business in Moree NSW relied heavily on a diesel powered irrigation pump when rainfall was low during spring and summer.

With NSW Government support, the business upgraded their system to an off-grid solar-diesel hybrid power plant, allowing the pump to use solar power during the day and diesel at night. This reduced their diesel consumption by more than 60%, saving them over $45,000 a year. The system is also more water efficient, allowing the farm to reduce its water use during peak periods.

Electricity and energy efficiency

The national electricity system is undergoing an extended period of change as existing power stations retire and new forms of generation come online. The NSW Government is committed to ensuring consumers are provided with reliable and affordable electricity during this time, while also protecting the environment.

To do this, the NSW and Commonwealth Governments will fast-track the delivery of NSW's first **Renewable Energy Zone**. The Zones will connect investors with communities that are looking to diversify their local industries into renewable energy. This will involve expanding transmission infrastructure into those regions to open new parts of the grid for renewable energy projects, like wind and solar farms.

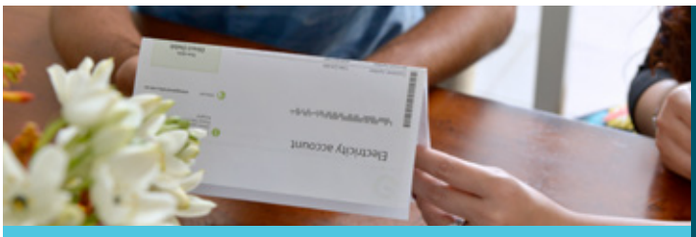
The three Zones in the Central-West, New England and South-West will play a critical role in replacing retiring generators in New South Wales over the next two decades and bringing up to 17,700 megawatts of cheaper, renewable power into the grid. Once fully established, the Zones could drive up to $23 billion of private sector investment and create about 2000 construction jobs each year in regional New South Wales.

The NSW Government will also establish an **Energy Security Safeguard** (**Safeguard**) to ensure New South Wales has access to cheaper, more reliable electricity supplies. This will extend and expand the Energy Savings Scheme under the new Safeguard name. The Safeguard will support the uptake of:

- energy savings activities that reduce the demand of businesses and households on the electricity and gas network, such as energy-efficient lighting upgrades or replacing the use of grid gas with onsite biomass
- demand shifting and peak reduction technologies, like smart pool pumps and household batteries, that ensure people are using electricity at the cheapest times of the day when it is available in abundance.

The NSW Government will also support the development of a regulatory framework that promotes new generation in New South Wales. The framework will be focused on bringing new, lower cost generation into New South Wales in order to reduce electricity prices, ensure the reliability of the electricity system and protect the environment.

The NSW Government will continue to deliver targeted energy efficiency actions by establishing an expanded **Energy Efficiency Program**. The Program will focus on initiatives that reduce electricity



Case study:
The Energy Savings Scheme

The Energy Savings Scheme has been in operation in New South Wales for a decade and has supported the growth of a robust energy efficiency market.

In the five years to 2018, the Energy Savings Scheme has delivered $2.2 billion in energy bill savings for homes and businesses and avoided 9.8 megatonnes of emissions.

bills, ease pressure on the electricity grid and reduce emissions and will include support for vulnerable households and small businesses.

The NSW Government will consider extending initiatives such as the Solar for Low Income Households or LED street lighting replacement through the Energy Efficiency Program, where those initiatives have demonstrated strong results for both consumers and the environment. The Energy Efficiency Program is identified as a priority program for Bilateral funding.

Together, the Renewable Energy Zones, the Safeguard, and the Energy Efficiency Program will ensure the NSW electricity system delivers for consumers by promoting more resilient and sustainable energy supplies. These measures are expected to reduce household bills by $40 per year.

Electric vehicle infrastructure and model availability

The global electric vehicle market is growing rapidly, with about 2.1 million electric vehicles sold around the world in 2018. In Australia, electric vehicles are forecast to reach upfront price parity with traditional combustion engine vehicles from 2024.

Switching to an electric vehicle can save **$1300** on fuel and **$300** on maintenance a year

Electric vehicles present a significant opportunity for motorists to reduce their yearly car operating costs. Already today, the average driver can save about $1300 per year on fuel costs by switching to an electric vehicle, as well as saving about $300 on annual maintenance costs. Despite the falling prices and lower costs, there are two primary barriers to widespread electric vehicle adoption in New South Wales: the lack of convenient, fast charging infrastructure and the limited range of affordable electric vehicle models in the market.

In January 2019, the NSW Government released its Electric and Hybrid Vehicle Plan to help overcome these barriers in New South Wales.

The NSW Government will expand that Plan by developing an **Electric Vehicle Infrastructure and Model Availability Program** to fast-track the growth of the electric vehicle market in New South Wales. The program is identified as a priority program for Bilateral funding.

Case study:
The Empowering Homes program

The NSW Government is conducting a pilot for the Empowering Homes program in the Hunter region before rolling out a broader program that will support 300,000 NSW households to install solar-battery systems by providing interest-free loans. For households that use more than 6,000kWh of electricity a year, the Empowering Homes program could help reduce electricity bills by more than $250 a year. The program will help NSW avoid up to 23 million tonnes of emissions over the next 20 years while creating jobs, increasing system security and reliability, and placing downward pressure on energy costs for everyone.

Case study:
Electric vehicles in NSW vs Norway

New South Wales has just under 400 existing public charging points and almost 30% of households do not have access to off-street parking where they could charge an electric vehicle. Meanwhile in 2019, New South Wales had only 22 electric vehicle models available for public sale. The cheapest model available is the Hyundai IONIQ Plug-in Hybrid, which costs over $45,000. As a result, there were only 47,389 plug-in hybrid and electric vehicles on NSW roads in 2019.

In comparison, Norway has more than 13,000 public charging points and most garages are powered to prevent vehicles from freezing during winter. There are 39 electric vehicle models in the Norwegian market, with the cheapest costing about AU$24,500 equivalent. It is estimated there are over 300,000 plug-in hybrid and electric vehicles in Norway.

The investment will be targeted by running competitive funding processes that co-fund:

1. the deployment of fast electric vehicle charging infrastructure
2. vehicle fleet owners, such as car rental companies, car share companies and local councils, to procure electric vehicles.

The NSW Government will support amendments to the National Construction Code and NSW Building Sustainability Index (BASIX) to ensure new buildings are electric vehicle-ready. This could involve requiring new buildings to provide electrical conduits and wiring to make it easy to install electric vehicle charging equipment. This builds on recent simplifications to NSW planning policies to support the rollout of electric vehicles. Licensing and parking regulations will also be amended to support the uptake of electric vehicles and the efficient rollout of charging infrastructure.

By rolling out fast and conveniently located charging infrastructure across the State and making new buildings electric vehicle ready, more NSW motorists will be encouraged to purchase an electric vehicle regardless of whether they live in their own home, a tenanted property or an apartment with or without a private car space.

By encouraging vehicle fleet procurers to buy electric vehicles, their bulk purchasing power will incentivise importers to sell a greater range of electric vehicle models. This means the NSW electric vehicle market will become increasingly competitive and lower cost. Co-funding fleets with the private or local government sector will bring a substantial number of new electric vehicles into New South Wales. These vehicles are typically resold to the second-hand market after three to five years, giving NSW drivers more electric vehicle options at a lower cost.

Primary industries productivity and abatement

The primary industry sector contributes more than $13 billion to the NSW economy every year and is the main driver of economic prosperity in regional New South Wales. Primary producers and landowners will play an important role in reaching net zero emissions in New South Wales through cost-effective mitigation.

The NSW Government has invested over $29 million in the Primary Industries Climate Change Research Strategy to help ensure the sector's continued growth and resilience as the climate changes.

This Research Strategy identified opportunities for the primary industries sector to reduce emissions and secure new income streams from carbon sequestration. These opportunities include reducing livestock methane through selective breeding and feed additive technologies, limiting nitrous oxide emissions from soils and enhancing sequestration through revegetation.

Case study: Meat and Livestock Australia

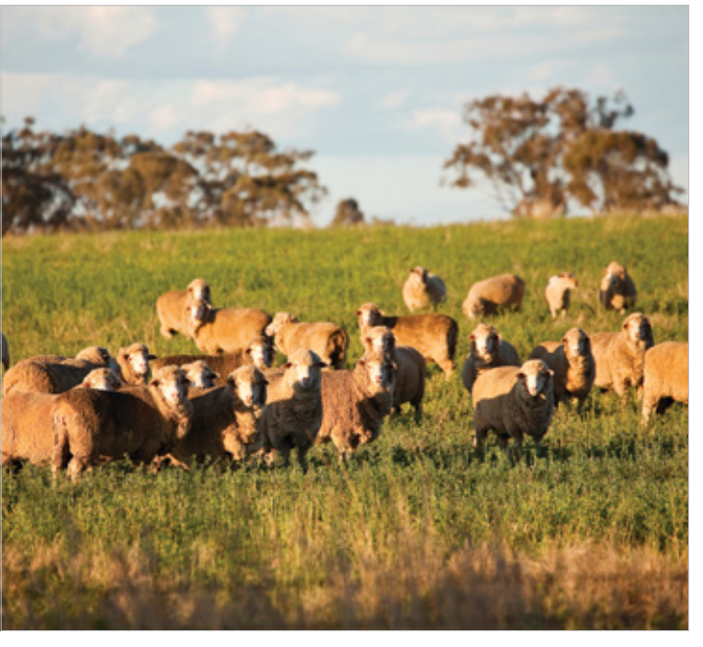
In a program known as CN30, Meat & Livestock Australia (MLA), on behalf of the red meat and livestock industry, has set a target of reaching net zero emissions from red meat production by 2030. MLA has noted that the emissions from livestock are an 'issue for customers who are also increasingly interested in the provenance of their food.'

As a result, MLA is working to make Australia a world leader as the first red meat exporting nation to have carbon neutral red meat and has teamed up with CSIRO and other partners to carry out related research and development into options for producers such as feed supplements, genetic selection and carbon capture.

Case study: The carbon neutral cow and sheep farm

Regional businesses across Australia are looking to generate new opportunities and revenue streams through carbon neutral farming.

For example, a Victorian farm with 550 cows and 25,000 sheep achieved carbon neutrality in 2010 through extensive tree planting. The owner observed significant biodiversity gains on the land.



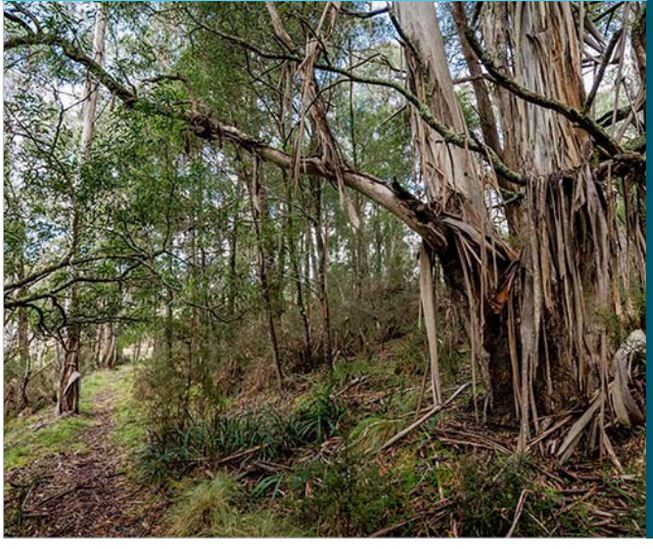
The NSW Government will develop a **Primary Industries Productivity and Abatement Program** that supports primary producers and landowners to commercialise low emissions technologies and maximise their revenue from carbon offset programs. The program is identified as a priority program for Bilateral funding.

In its early years, the Primary Industries Productivity and Abatement Program will prioritise:

- commercialising low emissions technology in the dairy, wool and red meat industries, such as those technologies identified through the CSIRO-MLA partnership
- connecting small landholders, including Aboriginal landowners, to carbon markets
- underwriting project risks from trialling new approaches to carbon sequestration
- developing premium land-based carbon markets that deliver stronger environmental and social outcomes compared to traditional low-cost abatement programs.

Currently farmed livestock in Australia is worth more than $30 billion per year and global demand for meat, dairy and eggs out to 2050 is projected to grow by 50–70%, according to the Food and Agriculture Organisation. According to the CSIRO, meeting the increasing demand for sustainable products will be critical to future growth of the agricultural sector. The Primary Industries Productivity and Abatement Program will help NSW farmers meet this growing demand and ensure the productivity of the State's primary industries is not tied to emissions intensity in the global transition to a net zero economy.

Case study: Biodiversity Conservation Trust



More than 70% of NSW biodiversity – including trees and other vegetation that capture and store carbon - is located on private land. The NSW Biodiversity Conservation Trust supports biodiversity conservation and habitat protection by providing private landholders who enter into biodiversity stewardship agreements, conservation agreements or wildlife refuge agreements with annual conservation payments for taking conservation actions.

The NSW Government has committed more than $350 million to the Trust over the next five years. It has already invested more than $100 million, resulting in 155 new conservation agreements covering more than 35,000 hectares across New South Wales.

Case study:
The promise of premium carbon projects

Premium carbon projects are those with attractive environmental and social co-benefits, such as biodiversity outcomes, coastal and wetland regeneration and Aboriginal community development.

There is rapidly growing domestic and international private sector demand for premium projects. For example, QANTAS funds high social impact Aboriginal projects in Northern Australia that may not otherwise be viable under the Emissions Reduction Fund.

There is a role for the NSW Government to build investor confidence in these projects by supporting demonstration projects, setting standards to ensure premium carbon projects are subject to robust certification and auditing processes and by making available appropriate NSW Government land, such as National Parks, and expertise to support the roll out of these projects.

Coal innovation

New South Wales' $36 billion mining sector is one of our biggest economic contributors, supplying both domestic and export markets with high quality, competitive resources. Mining will continue to be an important part of the economy into the future and it is important that the State's action on climate change does not undermine those businesses and the jobs and communities they support.

Limiting the fugitive emissions that come from coal mining is important to reduce the State's emissions. Capturing and combusting these emissions will also provide new revenue streams to the mining sector and ensure that NSW mining companies can take advantage of global action on climate change.

The NSW Government will invest in a **Coal Innovation Program** to reduce emissions from the mining and use of coal. The program is identified as a priority program for Bilateral funding.

The Coal Innovation Program will focus on providing:

- coal operators with direct, strategic incentives to capture and reuse methane released during mining
- research and industry partnerships with funding to commercialise emerging technologies to reduce emissions at hard to mitigate mine sites.

Emissions reductions from the resources sector could provide a new revenue stream for mines, increase productivity, improve mine safety and improve air quality.

Case study: Capturing methane from mines

Methane released during coal mining is a potential energy source equal to the entire residential gas use in New South Wales each year. Capturing some of the methane from underground mines and using it on-site or via the gas system could help offset emissions from gas used in homes and businesses across New South Wales.

Waste methane from the Appin and Tower coal mines in the Illawarra already feeds two power stations with a combined annual generation capacity of 654 gigawatt hours – enough to power approximately 60,000 homes.

Net zero emissions from organic waste

Organic waste, such as food scraps and garden trimmings, makes up about 40% of red-lidded kerbside bins. When sent to landfill, the decomposing material releases methane that may not be captured. However, when this waste is managed effectively, through proper composting and recycling processes, methane emissions can be substantially reduced, soils can be regenerated to store carbon and biogas can be created to generate electricity.

The NSW Government will set a target of **net zero emissions from organic waste by 2030**. To deliver on this goal, the NSW Government will establish world-leading landfill diversion policies to apply to the waste industry. In particular, it will:

- support local councils to provide communities with best-practice food and garden waste management infrastructure
- ensure composts or other organic soils are of the highest quality for land application
- facilitate the development of 'waste to energy' facilities in locations that have strong community support, provided those facilities meet strict environmental standards
- update regulatory settings to ensure residual emissions from the organic waste industry are offset.

These policies will ensure opportunities for local processing are fully utilised and disposal costs for local councils and ratepayers are minimised.

Case study: Diverting organics from landfill

About one million tonnes of NSW food and garden waste and 570,000 tonnes of textile waste across Australia are sent to landfill every year.

Landfill space has been saved, soil quality has been improved and local farmers have been supported to grow sustainable food thanks to Byron Shire Council introducing a food organics and garden organics household collection service.

About 5000 tonnes of organic waste or one-third of kerbside waste is diverted from Byron Shire's landfill, saving ratepayers $180,000 a year. The valuable resource is instead converted into rich compost to help the region's growers and farmers produce sustainable food.

Finance

Regulators, investors, shareholders and consumers are increasingly expecting businesses to take responsibility for the social and environmental impacts of their activities. Businesses without demonstrable sustainability outcomes can incur higher borrowing rates, higher operating costs, and can face risk as global trends change around them. For example, major institutions including the Australian Prudential Regulation Authority, Reserve Bank of Australia and Moody's have recently raised worsening capital situations for assets at risk of 'stranding' or rapid devaluation. These risks include increased physical risks, such as from the changing climate, keystone species loss or ecosystem collapse, as well as poor alignment with international investor trends.

The G20, Canada, the European Union, France, China and the United Kingdom recently delivered green investment strategies with specific regulatory and non-regulatory action. As of June 2019, 800 organisations declared support for the G20 Financial Stability Board's Taskforce on Climate-related Financial Disclosures. This included global financial firms responsible for over US$118 trillion in assets. The EU requires 6000 of its biggest banks, insurance corporations and listed companies to report on environmental and social impacts of investments. The EU is also considering further regulation to require large companies and credit rating agencies to report on climate-related impacts as well.

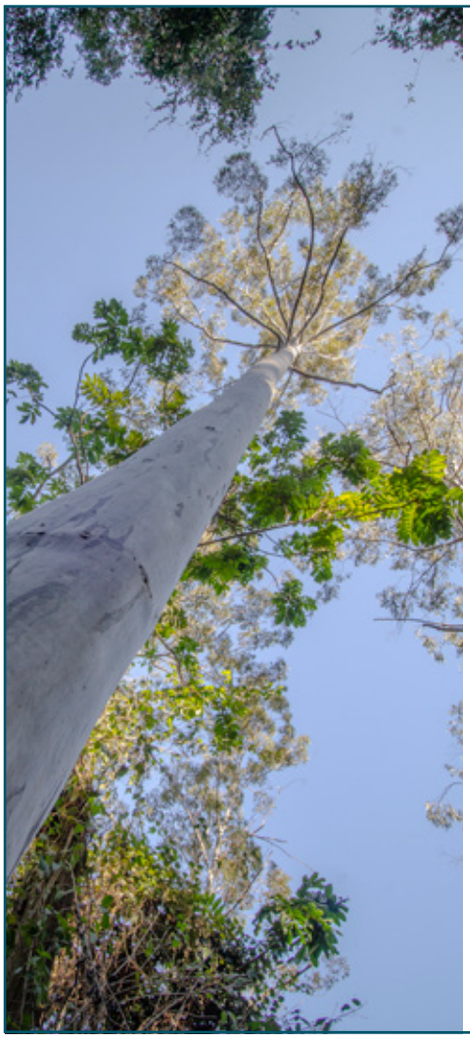
In Australia, representatives from academia, the finance sector, industry bodies and regulators have formed the Australian Sustainable Finance Initiative to set a policy agenda for the finance sector. New South Wales has the most representatives of any Australian government. These policies are already shaping decisions about how investors operate in New South Wales.

Early action will help New South Wales manage these risks and seize opportunities so that NSW businesses can build a competitive edge. To support NSW businesses to do this, the NSW Government will develop a **Green Investment Strategy** – a first for any Australian government.

The Green Investment Strategy will ensure New South Wales can:

- diversify revenue and funding to support public environmental outcomes
- build and steward markets to grow our environmental goods and services sector
- mobilise new partnerships to fund and deliver shared environmental values
- attract new investors and help our economy align with global trends.

Sydney is the nation's financial capital and a regionally significant financial hub with the presence of important financial organisations. Financial services in New South Wales contribute 45% of the national financial services output. In order to maximise green investment in New South Wales, the NSW Government will also look to establish Sydney as a **world leading carbon services hub by 2030**.



Green Investment

Green investment is an umbrella term referring to activities that support external funding or financing of projects or programs that deliver net environmental benefits. This includes:

- financing mechanisms like green bonds, green loans, impact bonds and other sustainable finance instruments
- market mechanisms like carbon offset markets, the Energy Savings Scheme, and the Biodiversity Offset Scheme
- partnerships and sponsorships like philanthropic funding or research partnerships
- standards, metrics and data including tools to help monetise environmental benefits, standard measurement and reporting methods and public data resources.

International demand to lend to green investments is in the hundreds of billions of dollars and growing. The scale of demand for green bonds provides a useful indicator for the capital opportunity. The Climate Bond Institute has forecast that cumulative green bond issuances will climb to US$350 billion in 2020. In Australia, green bond issuances doubled between 2017 and 2018 to AU$6 billion, including AU$1.8 billion through TCorp's NSW Sustainability Bond program released in November 2018. Green bonds have typically been focused on financing renewable energy and climate change mitigation assets, although new asset classes are emerging.

Household solar
(Peter Sherratt/DPIE)

PRIORITY 2

Empower consumers and businesses to make sustainable choices

NSW consumers and businesses are increasingly looking to take advantage of sustainable options to lower their emissions footprint. Low emissions goods and services are steadily becoming cost-effective alternatives to their emissions intensive substitutes.

The NSW Government will empower people with more information that allows them to compare products and services, not only in terms of price and quality, but also in terms of their impact on the environment. We will do this by enhancing the information that must be provided at the point of sale for various goods and services and creating opportunities for consumers to offset their carbon footprint.

Transport

Under existing national rules, new light vehicles sold in Australia must display a sticker that tells consumers about their typical fuel consumption. The sticker also includes the average number of grams of carbon dioxide emitted per kilometre driven by that vehicle. However, this information can be difficult to assess meaningfully.

The NSW Government will work to extend this scheme by requiring additional information to be provided on the typical yearly fuel costs of each vehicle and an easy to understand fuel economy star rating. By providing this additional information, consumers looking to purchase their next car will benefit from clear information about the everyday costs and environmental impact of each model. This information will also be provided as part of the annual vehicle registration process, and motorists will be provided with an option to offset their vehicle's carbon emissions when they register their car each year. These offsets will be invested in NSW-based projects, such as revegetating the State's national parks or providing solar to remote communities.

Electricity

A range of electricity retailers in New South Wales offer different priced products and plans. The NSW Government's EnergySwitch service allows consumers to compare retailers to find the lowest cost plan to suit their electricity and gas needs.

The Government will enhance the EnergySwitch service by allowing consumers to compare the emissions performance of energy retailers. We will work with retailers to provide information on their emissions profile, and this information will be provided in an easy to understand format for electricity consumers looking to change plans. This will improve transparency in the electricity retail sector and empower consumers who want to consider environmental factors when selecting an energy provider.

Buildings

Medium and large-scale infrastructure projects in New South Wales offer a significant opportunity to drive uptake of sustainable building materials and energy efficiency technologies. The State is well placed to facilitate low emissions and energy efficiency outcomes for the building sector, predominately through the National Australian Built Environment Rating System (NABERS). NABERS allows commercial office users to compare energy efficiency, water usage and waste management services when looking to buy or lease building space.

The NSW Government will advocate in national forums to provide similar information to other building users by:

- expanding the NABERS rating scheme to other major building types including schools, retirement living, industrial warehouses, retail tenancies, and supermarkets
- improving the National Construction Code and Building Sustainability Index (BASIX) to provide a pathway to deliver cost-effective, low emissions outcomes for residential, commercial and public buildings.

This information will help the market to drive strong environmental and financial outcomes in the building sector and improve the quality and amenity of homes and workspaces across New South Wales.

Case study:
Certified carbon-neutral bricks

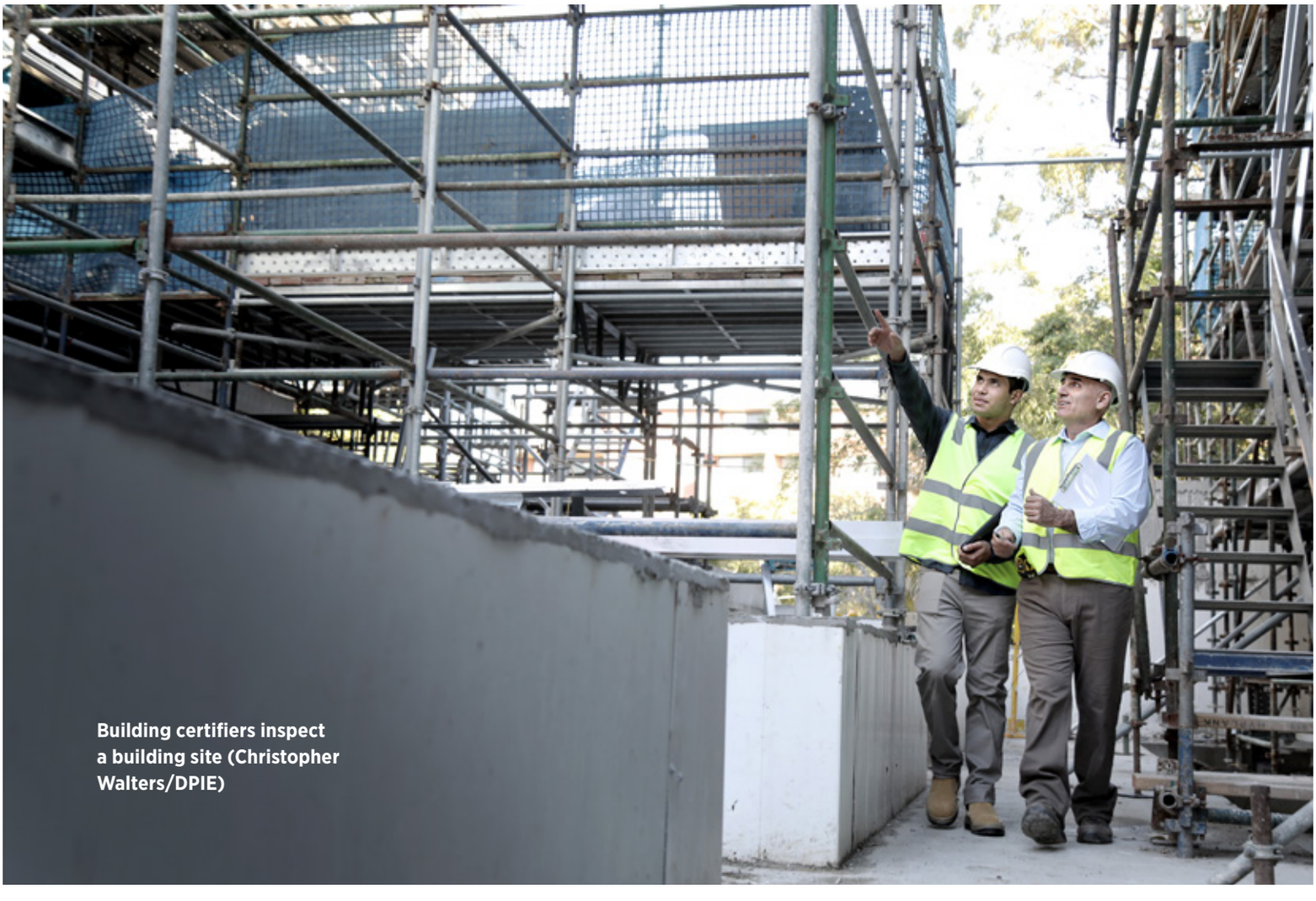
There is growing local and global demand for low emissions building materials such as cement, steel and aluminium. Architects, builders and consumers can now request bricks that result in net zero emissions during the manufacturing process.

Australian brick manufacturers, Austral Bricks and Daniel Robertson, of the Brickworks Building Products group, have achieved carbon neutrality for their bricks products made in Longford, Tasmania. The entire range of Tasmanian made bricks are certified carbon neutral under the Australian Government's Climate Active Carbon Neutral Standard. They achieved carbon neutrality by using sawdust, a by-product of the timber industry, as a low emissions fuel source for the kiln. They also increased their operational efficiency through equipment and lighting upgrades. All remaining carbon emissions are offset by purchasing carbon credits that support international and local projects such as the Redd Forests Tasmanian native forest protection program.

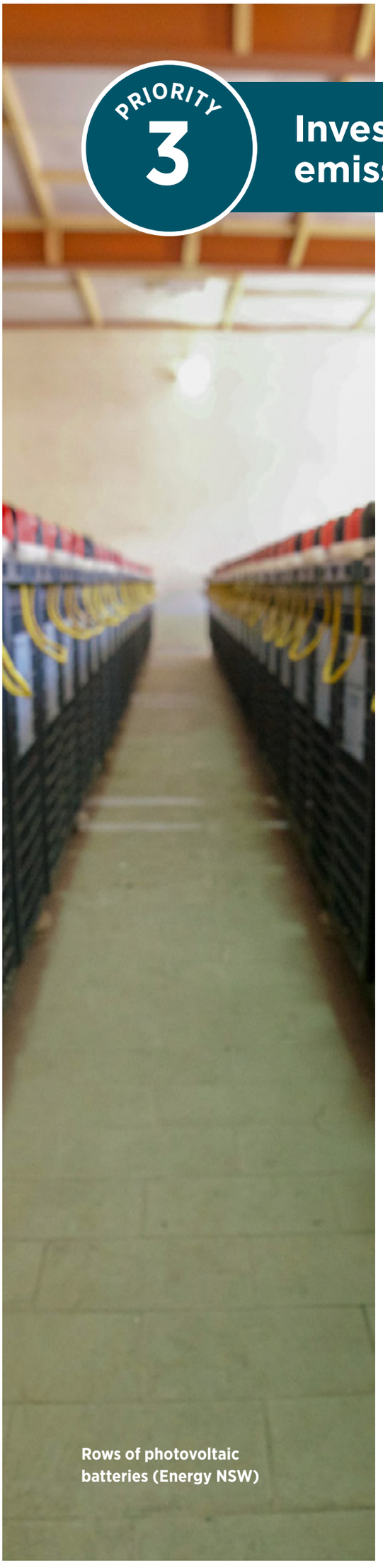
The NSW Government will also work to improve transparency in the construction supply chain and grow the market for sustainable building materials by:

- supporting industry led targets and certification schemes for low emissions building materials, such as concrete and aluminium
- embedding sustainable building material standards and targets into the design and construction of major NSW Government infrastructure projects
- leading a national strategy to achieve net zero embodied carbon in building materials, through mechanisms such as the National Construction Code and the Green Star Rating System
- working with large developers and infrastructure providers to drive their use of low emissions materials in procurement processes.

These measures will allow the building materials industry to meet increasing demand for low emissions products and allow NSW building suppliers to maintain a competitive advantage against overseas imports.



Building certifiers inspect a building site (Christopher Walters/DPIE)



Rows of photovoltaic batteries (Energy NSW)

PRIORITY 3

Invest in the next wave of emissions reduction innovation

Developing and commercialising low emissions technology

While a number of low emissions technologies are competitive today, new technologies are needed to achieve net zero in ways that improve the State's prosperity, not undermine it. Accordingly, the NSW Government will establish a substantial **Clean Technology Program** to develop and commercialise emissions reducing technologies that have the potential to commercially out-compete existing emissions-intense goods, services and processes. The program is identified as a priority program for Bilateral funding.

Some of these technologies are well developed, if not fully commercialised. There is significant potential to cut emissions from onsite fuel use through electrification using renewable energy, commercialising hydrogen production, improving fuel efficiency and making the existing natural gas supply 'greener' through the injection of hydrogen and biogas.

The Clean Technology Program will support research, development and commercialisation of these new technologies. It will do this by providing competitive-based funding for research and commercialisation projects, research and commercialisation equipment, PhD scholarships and investment for large-scale infrastructure, for example a clean technology innovation hub. Grant funding from the Clean Technology Program will require co-investment from the private sector.

The Clean Technology Program will be supported by a review currently underway by the NSW Chief Scientist and Engineer into the commercial opportunities in New South Wales of low emissions technologies, which is expected to report back by mid-2020.

Case study:
Aviation Biofuels

Over 95% of QANTAS's greenhouse gas emissions come directly from jet fuel. QANTAS is partnering with bio-energy and agricultural-technology companies in North America and is working on a program with Australian farmers to commercialise biofuel alternatives to jet fuel. A promising alternative is a sustainably-grown, non-food mustard seed called carinata which is 80% less emissions-intensive than conventional fuel.

In January 2018, QANTAS operated the world's first dedicated biofuel flight (from Los Angeles to Melbourne). QANTAS will invest a further $50 million between 2020 and 2030 in biofuel research and development, to support its goal of net zero emissions by 2050.

Hydrogen

The technology to produce low-emissions hydrogen has been successfully piloted on a small scale but is yet to be proven to be economically viable. By 2030, the hydrogen market could be worth up to $1 billion, increasing fuel and electricity system security while attracting green investment.

To boost the commercialisation of low-emissions hydrogen production and applications, the NSW Government will establish a **Hydrogen Program** that will help the scale-up of hydrogen as an energy source and feedstock. The NSW Government will set an aspirational **target of up to 10% hydrogen in the gas network by 2030**. This could have benefits for the transport, energy storage, ammonia, glass, metal and electronics production industries. This will also develop NSW's potential as a competitive hydrogen exporter to a growing international market.

The Hydrogen Program will offer competitively-based grants for demonstration, research and development and commercialisation projects. The program will require co-investment from the private sector and is identified as a priority program for Bilateral funding.

Developing the hydrogen industry has other benefits for New South Wales. A hydrogen market could improve energy reliability as there is potential to use hydrogen in the gas network as a renewable energy storage solution, essentially using it like a large battery to help firm-up renewable energy generation. An active market would also help reduce energy costs for other sectors, such as the long-haul transport industry. It would also improve fuel security, reducing Australia's reliance on energy imports.

PRIORITY 4

Ensure the NSW Government leads by example

Moree solar farm

The NSW Government seeks to drive continuous resource efficiency from government operations and limit its impact on the environment. The NSW Government spends about $400 million each year on electricity, operates 13,000 passenger vehicles for public sector staff and manages approximately 15% of the State's landmass on behalf of the people of New South Wales.

The NSW Government's purchasing power can help provide the market with confidence and contracts to supply more affordable, low emissions products and services to the market. Under the NSW Government Resource Efficiency Policy (GREP), public sector agencies are required to use resource-efficient technologies and services to reduce costs and lead by example.

The NSW Government will build on its ambitions and commitments under the GREP by:

- more than doubling our solar target from 55,000 to 126,000 megawatt hours by 2024
- offering our rooftops and other spaces for third parties to install solar PV systems
- expanding NABERS ratings to other buildings managed by the NSW Government (such as schools and hospitals) once those ratings systems are available
- purchasing our electricity from low emissions sources of generation
- increasing our target for electric or hybrid passenger vehicles to 30% by 2023, with at least 10% to be fully electric
- replacing Sydney's bus fleet with electric buses
- rolling out a new fleet of hybrid diesel-electric passenger trains from 2023 for regional lines.

Case study: Sydney Metro

Sydney Metro has committed to offsetting 100% of its operational electricity. Sydney Metro Northwest has a power purchase agreement with the Beryl Solar Farm, which boasts 355,000 solar modules on a 145-hectare site outside Gulgong.

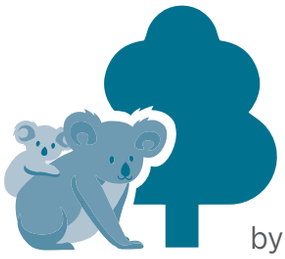
The NSW Government has also committed to expanding the national parks estate by at least 200,000 hectares by June 2021. These new parks will boost tourism and job opportunities in regional economies.

Increasing the State's national park footprint will protect land in New South Wales that is currently a carbon sink and create opportunities for additional carbon sequestration activities. The NSW Government will update national parks legislation to ensure additions to the estate can better access carbon funding to help revegetate and improve our carbon sinks.

Any revenue generated by offsetting emissions in national parks will be reinvested in the National Parks and Wildlife Fund to continuously improve our national parks estate.

Expanding the
national parks estate by

200,000 hectares



by June 2021

Case study: Solar schools

School Infrastructure NSW is installing rooftop solar PV systems at all new public schools and many existing schools as part of the Cooler Classrooms program. The NSW Department of Education is planning to install at least 18 MW of solar PV at hundreds of schools over the next 5 years. With rooftop solar, schools can save thousands of dollars on their annual energy bills which can be invested back into delivering core education outcomes.

Sydney Metro (Justin Sanson)

Keeping track

Carbon accounting

The Commonwealth Department of the Environment and Energy maintains the National Greenhouse Accounts. These accounts are used to meet Australia's reporting requirements under the United Nations Framework Convention on Climate Change (UNFCCC), to track progress against Australia's target under the Kyoto Protocol, and to inform policy-makers and the public.

Multiple greenhouse gases contribute to climate change. Carbon dioxide is the most abundant contributor, followed by methane, nitrous oxide and fluorinated gases. We measure greenhouse gas emissions in terms of millions of tonnes (Mt) of carbon dioxide equivalent (CO_2e).

1 million
tonnes of CO_2e

=

120,000 homes
powered for a year

=

212,000 cars
driven for a year

Greenhouse gas emissions accounting is based on the methods set out by the Intergovernmental Panel on Climate Change (IPCC). The methods include data collected through company reporting legislated under the National Greenhouse and Energy Reporting (Measurement) Determination, introduced in 2007.

The National Greenhouse Accounts include databases and reports on estimated greenhouse gas emissions, both nationally and by state and territory. Updated national, state and territory emissions data are published annually by UNFCCC and economic sector for the latest reporting year.

The NSW Government publishes information from the National Greenhouse Accounts on the AdaptNSW website each year to track progress on meeting long-term emissions objectives. We also:

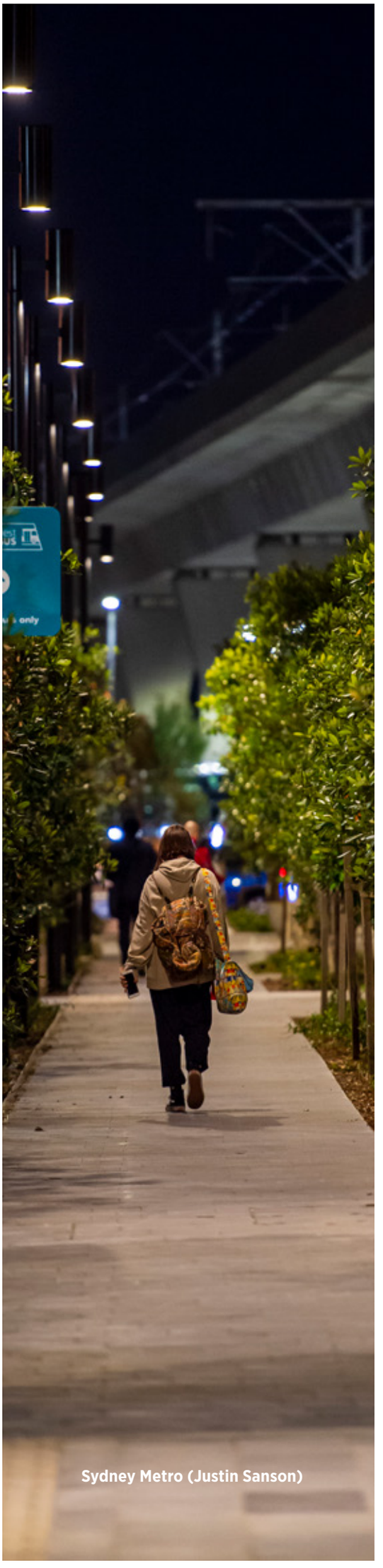
- track emissions from individual sectors within New South Wales
- track emissions from NSW funded emissions savings programs
- keep track of rooftop solar installations and their contribution to reducing emissions
- model greenhouse gas emissions in fine scale for the Greater Metropolitan Region as part of the air emissions inventory.

The NSW Government is also establishing a central repository and technical modelling capabilities for ongoing tracking of NSW greenhouse gas emissions for all sectors at fine resolution across the entire state.

Governance

The NSW Government will monitor and review its progress to net zero emissions and the implementation of this Plan. This will be supported by a four-level approach to governance:

1. State of the Environment Reports will be published between 2020 and 2030. These reports will include an assessment of the environmental impacts of this Plan, including its emissions reductions (actual and expected to 2030), emissions forecasts and an economic impact analysis.
2. The NSW Climate Change Council will be asked to provide annual recommendations on improvements to programs in this Plan and opportunities for NSW Government action that both reduces emissions and supports the State's economy or reduces the cost of living.
3. The NSW Chief Scientist and Engineer will be asked to report every second year on emerging technologies that reduce emissions and are commercially competitive.
4. The NSW and Commonwealth Governments have established a Bilateral Implementation Committee to design and oversee implementation of the jointly-funded programs.



Sydney Metro (Justin Sanson)

Next steps

This Plan shows the actions we will take over the next decade that will contribute to meeting the NSW Government's objective to achieve net zero emissions by 2050.

The NSW Government will develop detailed delivery plans for each program and will continue to refine the forecast emission reduction figures to reflect these more detailed plans. The detailed plans will be developed in consultation and partnership with industry.

Appendix 1 Emissions reductions forecasts

Table A.1 Forecast changes in annual carbon emissions from 2005 to 2030

Program	Carbon emissions reduced by 2030 (Mt/year)	Annual emissions (change on 2005 levels)
2005 emissions	160.7	-
2019 emissions	140.1	13%
2030 BAU emissions	139.5	13%

Table A.2 Expected reduction in carbon emissions by 2030

Priority and program	Carbon emissions reduced by 2030 by Program (Mt/year)
Priority 1 – Driving uptake of proven emissions reduction technologies	**27.7**
Emissions Intensity Reduction Program	3.0
Climate Solutions Fund	2.9
Bilateral Priority Programs	15.8
Energy Security Safeguard	6.0
Priority 2 – Empowering consumers and businesses to make sustainable choices	**1.6**
Priority 3 – Investing in the next wave of emissions reduction technology	**1.4**
Priority 4 – Government leading by example	**5.1**
Total forecast carbon emissions reduced by 2030	35.8

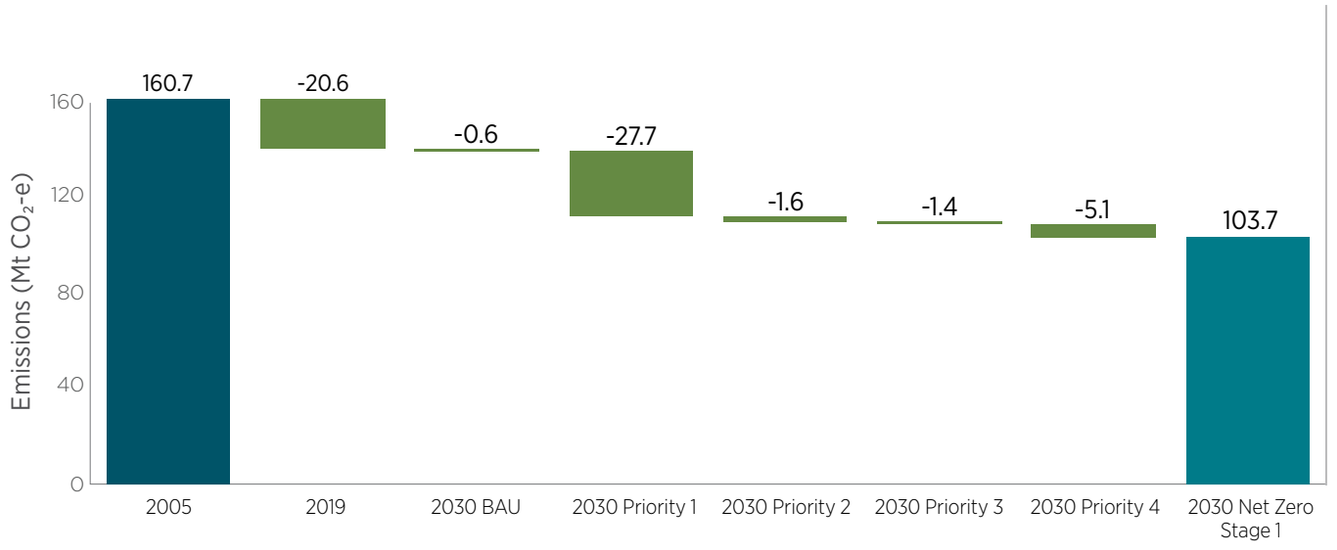


Figure A.1 Total emissions and expected reduction in emissions 2005 to 2030

Note on emissions modelling

Baseline emission projections and net zero emissions pathway modelling by the Department of Planning, Industry and Environment informed the Plan with all major sectors of the NSW economy addressed including electricity, transport, agriculture, on-site energy use, mining, industry, waste and forestry. The projection of future baseline emissions assumed no new emission abatement policies are implemented, with the reduction in carbon emissions resulting from proposed policies forecast against this baseline.

The actions in this Plan were forecast based on neutral (best estimate) assumptions to reduce annual NSW emissions by 35.8 megatonnes by 2030, with annual emissions reduced by 35% on 2005 levels. Actions driving the uptake of proven emission reduction technologies contribute much of the forecast emission reduction, with such actions generally providing greater certainty and enabling earlier delivery of emission savings (see Figure A.1). Despite modest early contribution, investments in commercialising new technologies help pave the way for emission reductions in the longer-term.

An independent peer review found the baseline and forecast assumptions, method and modelling approach to be appropriate and reasonable, targeting the greatest impact across sectors. The actions proposed were concluded by the peer reviewer to cover a good range of initiatives for each economic sector.

Photos

Cover: One central park Sydney building (Lisa Madden/DPIE); **Page 7:** Wind arm at Blayney, NSW (Steve Back/DPIE); **Page 8:** Solar panel roof in Glenfield, South West Sydney, NSW (DPIE); **Page 13:** Kellyville station (Justin Sanson); **Page 15:** Leilac Project funded by H2020 (Paul Poels); Agricultural case study (W Pratt/DPIE); **Page 16:** Worker installing rooftop solar panels, A family review their energy bill (DPIE); **Page 17:** Traffic (DPIE); A happy man with his arms crossed in front of his home with solar panels installed on the roof (Lisa Madden/DPIE); **Page 18:** Interior of Electric Hybrid vehicle (Ajith Weerantne/DPIE); **Page 19:** Farmland in Dubbo (Peter Robey/DPIE), Sheep on a field outside of Warialda, NSW (DPIE); **Page 20:** Large tree alongside a walking track through forest, close to Nunnock campground, near Bombala (John Spencer/DPIE); **Page 21:** Grey Teal, Murray River (John Spencer/DPIE); **Page 22:** Worker in a mine; **Page 23:** Girl placing food scraps into a worm farm (Lisa Madden/DPIE), Household food waste (Rosie Nicolai/DPIE); **Page 24:** Australian currency; **Page 25:** Gum tree, Copeland Tops State Conservation Area (John Spencer/DPIE); **Page 27:** Building certifier stands on scaffolding at a building site (Christopher Walters/DPIE), Person laying bricks; **Page 28:** Wetlands at Wangal Park, Croydon (Salty Dingo), **Page 30:** Airport workers prepare a plane for departure at Newcastle Airport. Newcastle, NSW (DPIE), Windfarm (Energy NSW); **Page 31:** Sydney Metro – Rouse Hill station (Justin Sanson); **Page 32:** Aerial photo of Mutawintji National Park (John Spencer/DPIE); Coutts Crossing, NSW (Lisa Madden, DPIE); **Page 34:** North Rd Eastwood (Salty Dingo); **Page 38:** Grazing land of North West of New South Wales (Simone Cottrell/DPIE)

Homestead Creek picnic area,
Mutawintji National Park (John Spencer/DPIE)

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