



# Climate change: Australia vs the World

## Australia's pollution profile & how to turn it around



### KEY FACTS

CLIMATE ANALYTICS



Australia is far behind similar economies in terms of pollution per person and emission intensity of our economy.



Australia is projected to fall even further behind because unlike other nations Australia has no effective national policy to drive down greenhouse gas emissions and improve energy efficiency.



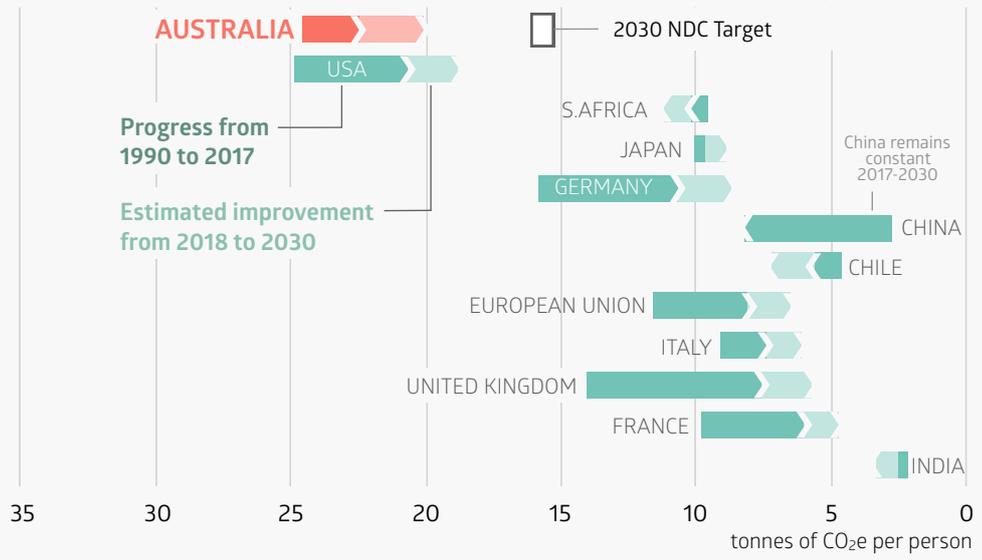
Australia is projected to increase its overall greenhouse gas emissions by 8.6% above 2005 levels by 2030, far away from the emission reductions Australia promised the world by 2030 (16-18% below 2005 levels after factoring out forests & land use change emissions).

### AUSTRALIANS' POLLUTION LEVELS ARE VERY HIGH BY WORLD STANDARDS

#### Australians are among the top 20 CO<sub>2</sub> emitters per person worldwide - a questionable honour.

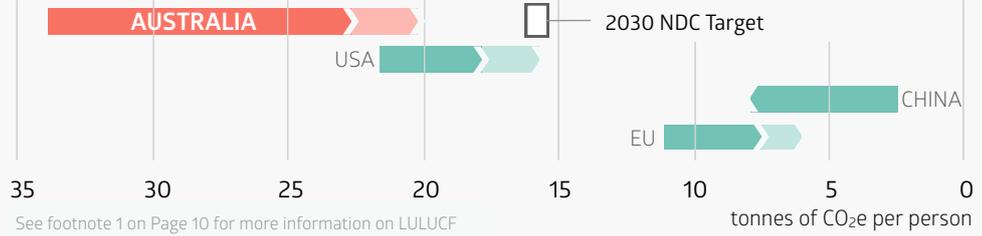
Australians emit more than twice as much per person as the average of the "Group of Twenty" (G20) in terms of greenhouse gas emissions. This includes burning fossil fuels and other processes in industry, agriculture and waste treatment. The Government argues that per capita emissions are at their lowest levels in 28 years, however the data shows that between 1990 and 2017, other developed countries such as Germany, France, the US, and even the EU as a whole, made greater improvements compared with relatively small progress in Australia. Even if Australia were to achieve its insufficient Paris Agreement target put forward in its Nationally Determined Contribution (NDC), it would remain far behind other major developed economies in 2030.

Greenhouse Gas Emissions per Person 1990 - 2030 (excluding LULUCF)



To measure progress towards decarbonisation, it is important to disentangle emissions reduction in energy, industry, agriculture and waste from very uncertain and often fluctuating data from the land use, land-use change and forestry sector (LULUCF). Forests or other ecosystems can change from storing carbon to releasing it. Rules for accounting progress in this sector remain contentious and are still unclear for the Paris Agreement. For Australia, very high deforestation levels in the past, explain the large improvement since 1990 when LULUCF emissions are included.

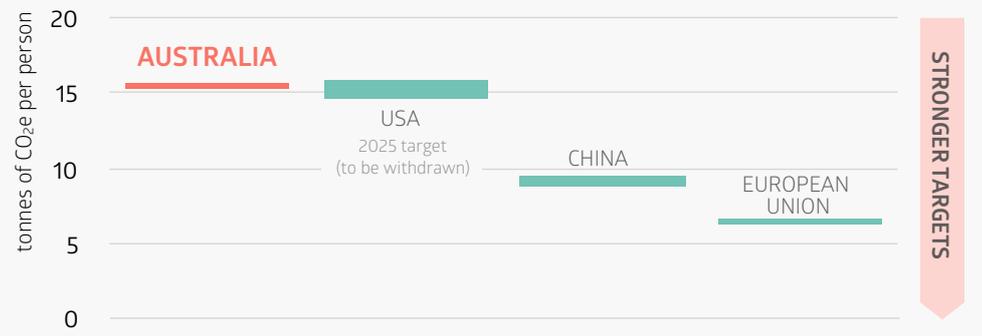
Greenhouse Gas Emissions per Person 1990 - 2030 (including LULUCF)



See footnote 1 on Page 10 for more information on LULUCF

Either with or without the land use sector, achieving its Paris Agreement NDC target would still put Australia behind other major economies like the USA, China, Japan, and the EU - in contrast to claims by the Australian government that on a per person basis, the Australian target is one of the strongest.

Paris Agreement 2030 NDC Targets on a per Person Basis (including LULUCF)



STRONGER TARGETS

# A GREENHOUSE GAS INTENSIVE ECONOMY

## Australia is falling further behind

Greenhouse gas emissions intensity for the overall economy is a measure of emissions per unit of economic activity, measured as Gross Domestic Product (GDP). Reducing emissions intensity means that less pollution is created per unit of GDP.

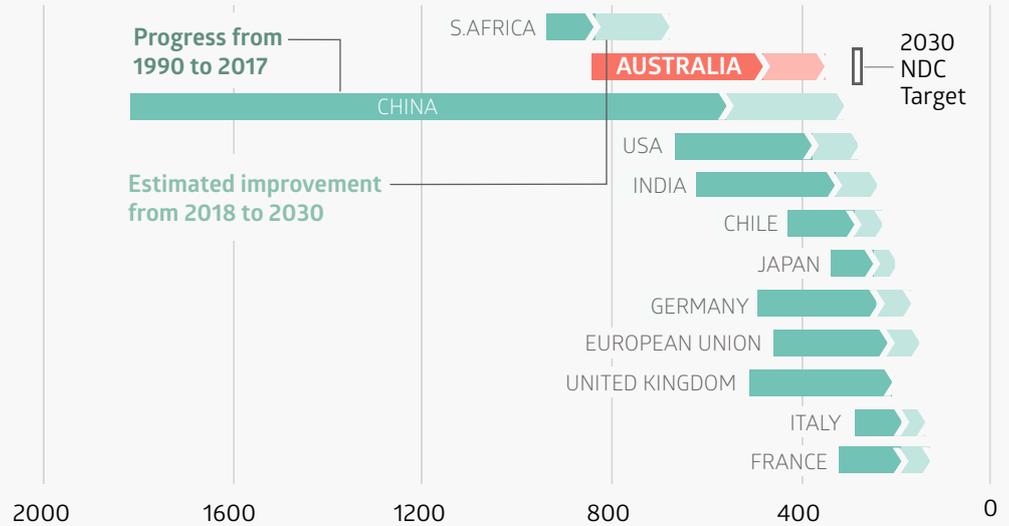
Whilst the Australian government argues that emissions intensity of the economy is the lowest since 1990 this also applies to most other countries. Australia's emissions intensity in 2015 was higher than that of the US and more than twice that of the European Union.

With current policies, Australia is not projected to catch up - indeed, it is projected to be overtaken by China by 2030 and stay far behind more efficient and less polluting economies such as Japan, the EU and its largest member states.

If emissions intensity is compared including the uncertain land use, land-use change, and forestry sector (LULUCF), the outlook to 2030 remains the same - Australia is overtaken by China or falls further behind other countries, like the USA and the EU. Very high deforestation levels in the past, which were largely reduced by 2010 explain the large relative improvement since 1990 - and also since 2005 - when LULUCF emissions are included.

The Australian government claims that its target is among the strongest of major economies on that basis, when in fact it would still be behind the USA and the EU if they achieve their targets.

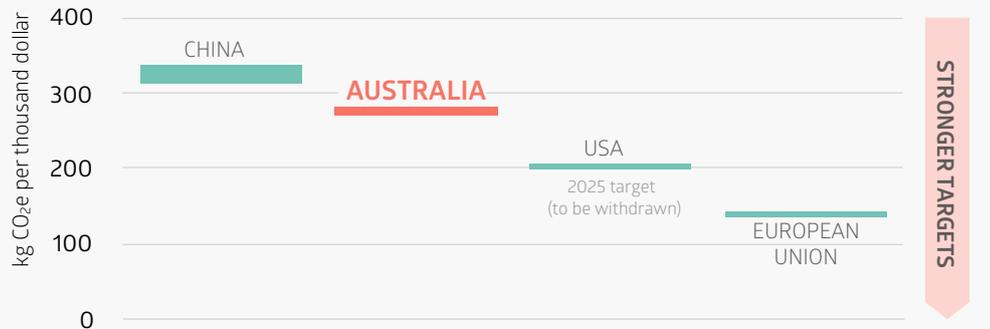
Greenhouse Gas Emissions Intensity of GDP 1990 - 2030 (excluding LULUCF)



Greenhouse Gas Emissions Intensity of GDP 1990 - 2030 (including LULUCF)



Paris Agreement 2030 NDC Targets on a per Unit of GDP Basis (including LULUCF)



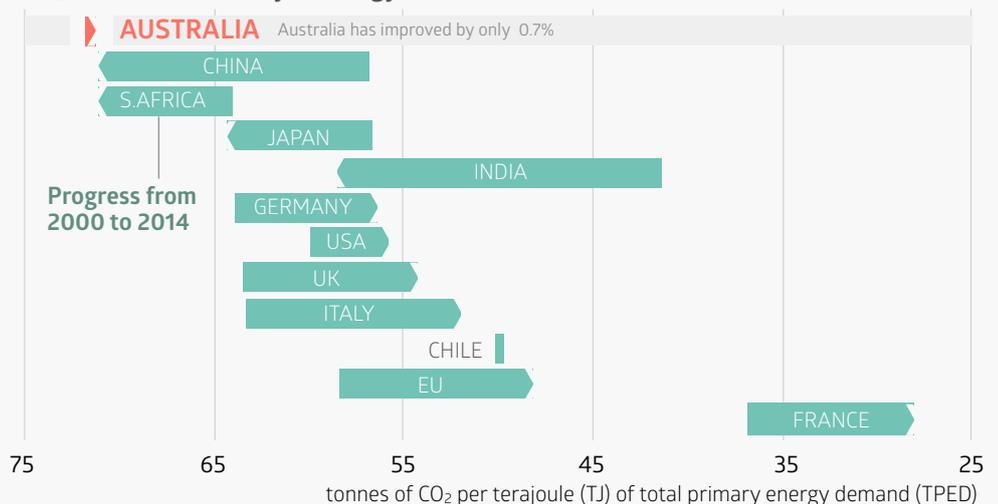
# AUSTRALIA'S ENERGY MIX IS HIGHLY POLLUTING

## Australia is one of the worst countries in terms of carbon pollution of its energy use.

Australia is far behind many countries - in particular developed countries - when it comes to decarbonising its energy mix. This is mainly due to the high share of coal in its electricity production, and the low share of renewable energy in its overall energy mix.

Australia has shown little improvement over recent decades - unlike other major developed economies such as the USA the European Union (EU), and the larger EU Member states.

CO<sub>2</sub> Emissions Intensity of Energy 1990 - 2014

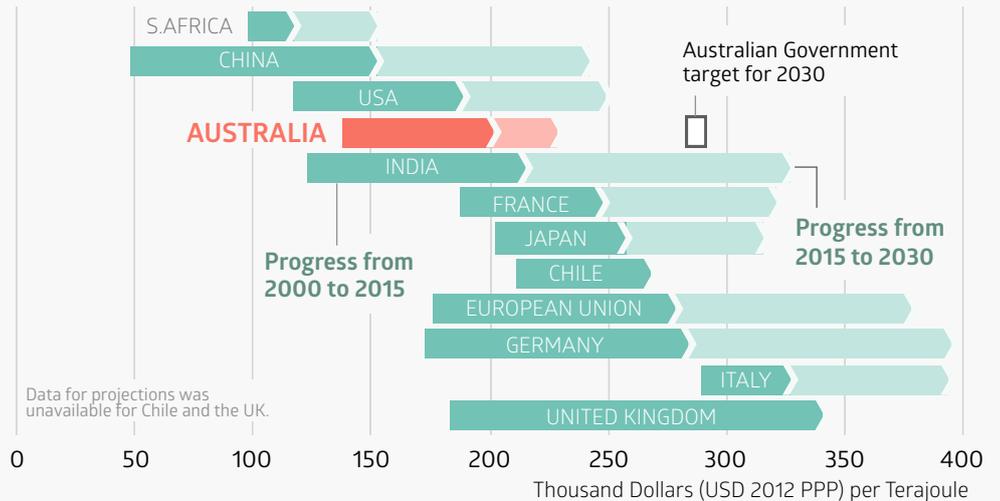


# AUSTRALIA IS WASTEFUL WITH THE ENERGY WE USE

## Australia's economy has low energy productivity.

Australia's economy is far from energy efficient and behind many other countries. This is partly a reflection of the structure of the economy, however the rate of improvement is also a reflection of how other countries are managing to make more efficient use of energy. Other countries are making more progress because they have more effective policies in place. Australia's energy productivity is expected to increase by 14% by 2030 compared to 2015 levels. But it is far from improving at the rate required to meet the government's 40% target for 2030.

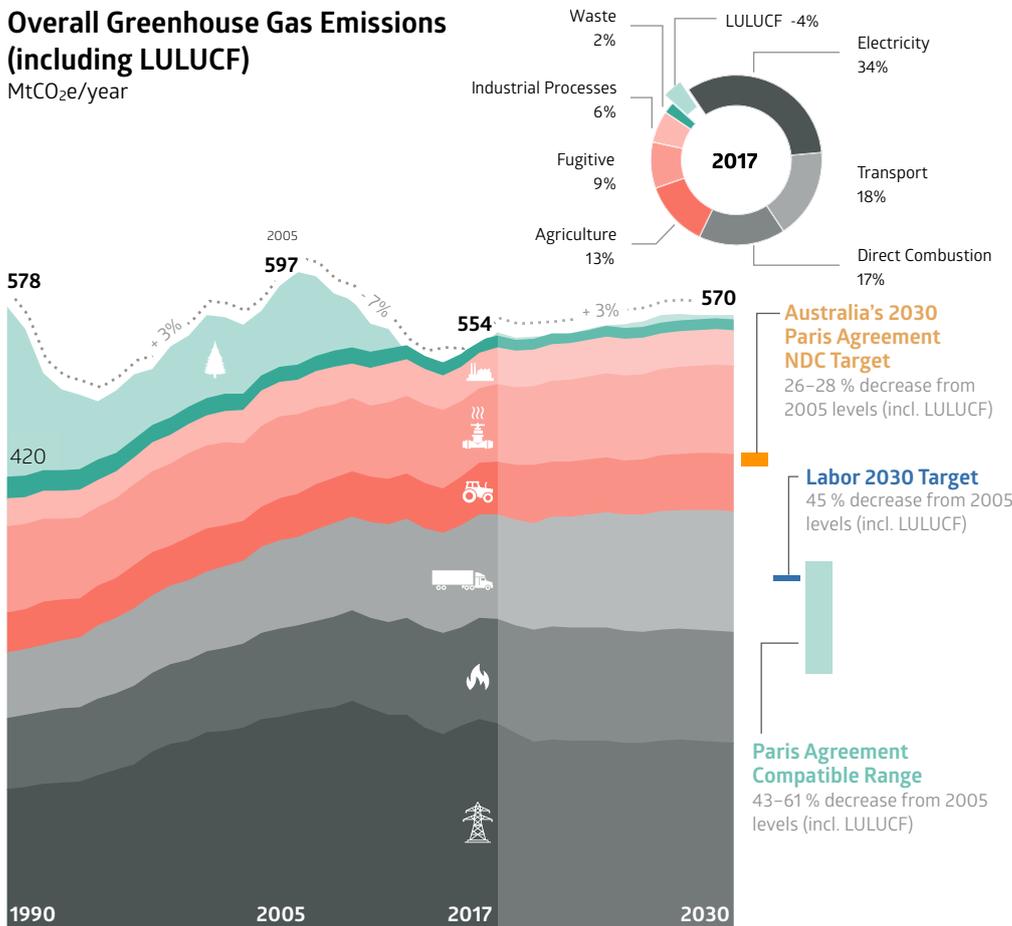
## Energy Productivity 1990 - 2030



# AUSTRALIA'S EMISSIONS PROFILE: 1990 - 2030

## Overall Greenhouse Gas Emissions (including LULUCF)

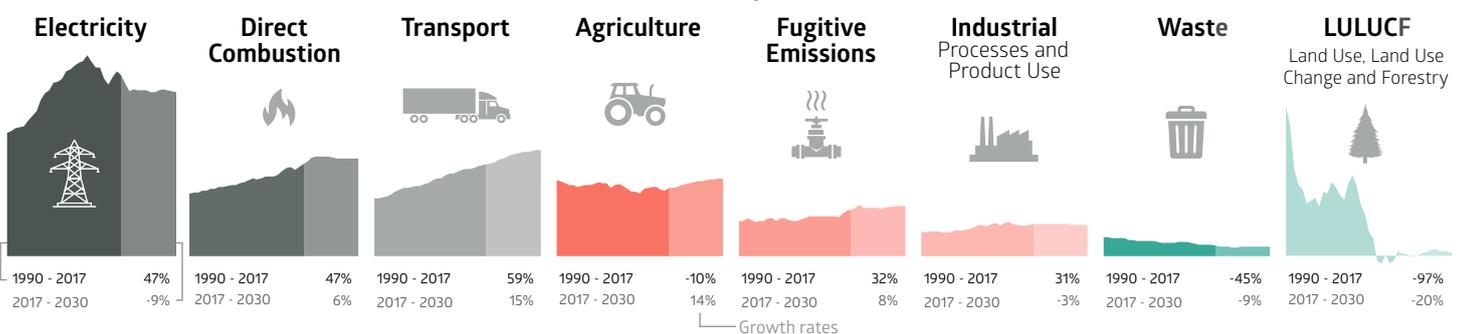
MtCO<sub>2</sub>e/year



Headline statements from the Government that emissions are reducing belie the fact that Australia's emissions have been climbing in almost every sector except electricity. Leaving out the uncertain LULUCF emissions, the only sustained period of emissions reduction was experienced while the carbon price was in operation from 2012 to 2014. **Australia's emissions (excluding LULUCF) have increased by 5.3% since 2005 and are expected to increase another 3.3% by 2030.** Including LULUCF one gets a very different picture - a 7-12% decrease since 2005 (depending on the data source used).

Emissions from electricity production are by far the biggest component (34%) of overall greenhouse emissions and have been slowly reducing due to increases in renewables and retirement of brown coal. They are expected to stop reducing after 2020 if the Renewable Energy Target (RET) is not extended or replaced. Emissions in other sectors are expected to mostly increase, especially in transport.

## Emissions by Sector



# AUSTRALIA IS NOT CUTTING EMISSIONS



## THE PARIS AGREEMENT WHAT DOES IT MEAN?

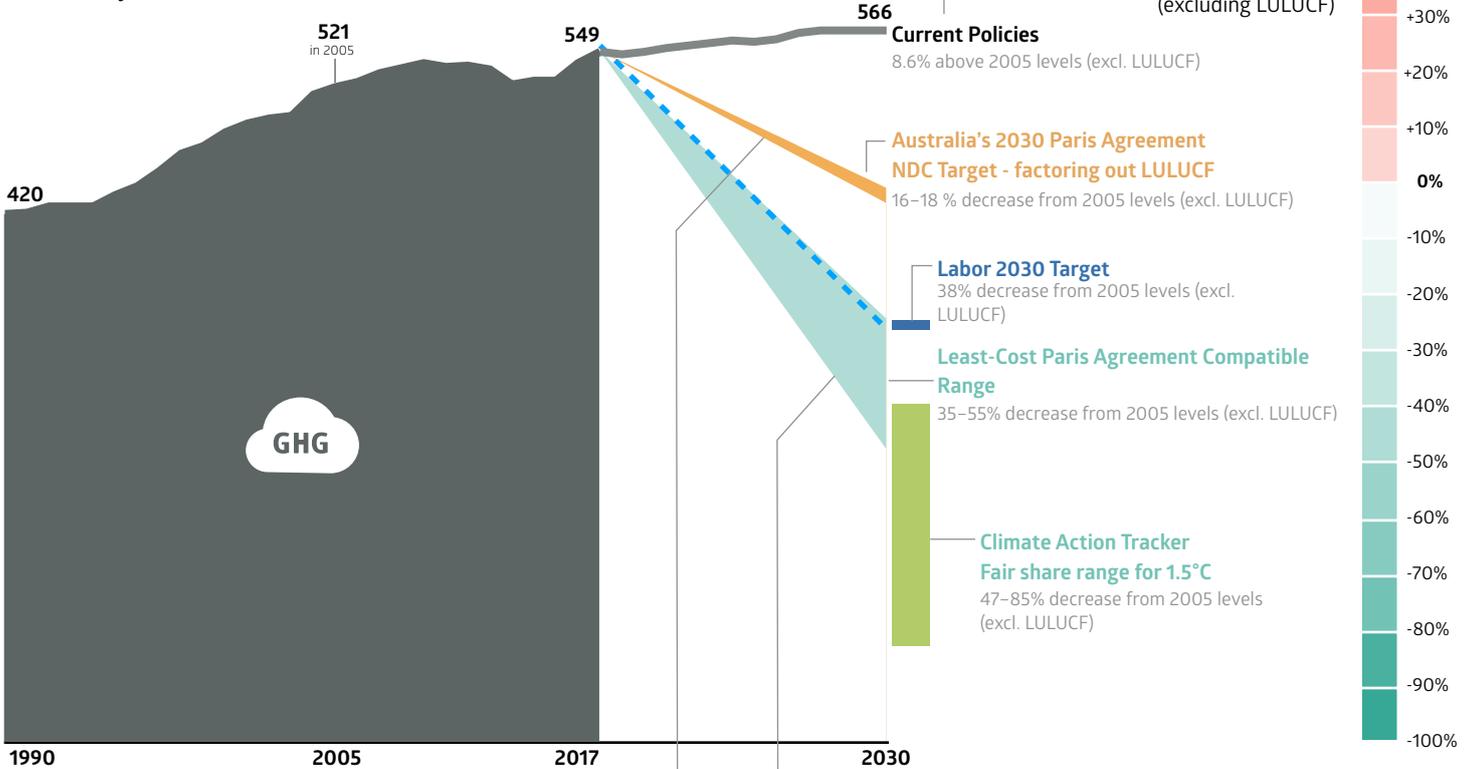
The Paris Agreement, ratified by 181 governments, is a remarkable achievement in international diplomacy and aims to reduce the risks and impacts of climate change by limiting the increase of global temperature increase to 1.5°C above preindustrial levels<sup>2</sup>. From an emissions perspective this means global greenhouse gas emissions need to peak by around 2020, rapidly decline and reach net zero levels in the second half of the century - carbon dioxide emissions need to reach zero earlier, by around 2050. On a country-by-country basis, this can be translated into domestic emissions reductions pathways - assuming that overall, globally, the warming limit is achieved at lowest cost.

## CURRENT POLICIES

### EMISSIONS PROJECTED TO GROW BY 8.6% BY 2030

Australia's current policies fall far short of the emissions reductions required to meet the 26-28% reduction from 2005 levels by 2030 target it put forward under the Paris Agreement. Under policies in place now, Australia's total greenhouse gas emissions including LULUCF are projected to be 570 MtCO<sub>2</sub>e, about 5% below 2005 emissions of 597 MtCO<sub>2</sub>e. Factoring out LULUCF, emissions are projected to rise to 552 MtCO<sub>2</sub>e, by 2020 and 566 MtCO<sub>2</sub>e by 2030 - **this is equivalent to an increase in emissions of 8.6% by 2030 above 2005 levels (excl. LULUCF)**. To meet its 2030 emissions targets, Australian emissions (excl. LULUCF) actually need to decrease by an average annual rate of 1.7 to 1.9 per cent until 2030. Instead, emissions are expected to increase by 0.24% per year. This is the equivalent to a 35% increase in emissions from 1990 levels.

## Greenhouse Gas Emissions (excluding LULUCF) MtCO<sub>2</sub>e/year



## 2030 PARIS AGREEMENT TARGET INSUFFICIENT CONTRIBUTION TO GLOBAL GOAL

Australia's Paris Agreement 2030 target put forward under its NDC is rated as "Insufficient" by the Climate Action Tracker. Australia's climate commitment is not a fair contribution to the global effort, and is not consistent with the Paris Agreement's 1.5°C limit, unless other countries make much deeper reductions and comparably greater effort. A fair share based on a range of approaches to equity would correspond to 47-85% reductions.

Integrated models of the global economy and energy systems estimate a cost-effective distribution of emissions reductions. Based on this, Australia would reduce emissions by 35-55% in 2030 from 2005 levels. The difference to the fair share could be contributed through financing reductions in other countries.

## 1.5°C CONSISTENT PATHWAY ZERO CO<sub>2</sub> EMISSIONS BY MID CENTURY

Carbon dioxide emissions from burning of fossil fuels for power, transport or heat will need to be reduced faster than overall greenhouse gas emissions, and reach zero by no later than 2050: Australia needs to decarbonise its economy by mid century.

The power sector needs to reduce fastest, with coal out of the power sector by about 2030. Other greenhouse gas emissions will also need to be reduced substantially by 2030.

Delays getting onto this pathway mean more difficult and faster efforts later on, lost economic opportunities and an increased reliance on pulling carbon out of the air using uncertain negative emissions technologies.

## KEY STEPS TO REACH ZERO EMISSIONS

POWER

**PHASE-OUT COAL**

Coal needs to be phased out globally latest by 2050, with OECD countries - including Australia - going first with a 2030 phase-out.

**ZERO-CARBON ELECTRICITY**

Instead of coal and gas, the future, 2050 power system will consist entirely of renewables and other zero and low carbon sources, with renewables showing the most promise.

POWER

TRANSPORT

**CARS**

By 2035, most cars sold need to be zero-emission vehicles, given that a new car will stay on the road for around 15 years.

**TRUCKS**

By 2030, the freight sector needs to achieve mass market deployment of electric and fuel cell trucks supplied with renewables. They are already available.

**SWITCHING TRANSPORT MODES**

The transition will be much easier by reducing demand for personal transport, increasing public transport, and shifting freight transport to rail where possible.

**AVIATION & SHIPPING**

There is significant untapped potential through increased efficiency, using biofuels and reducing travel demand. Therefore, to be in line with 1.5°C, both sectors should drive adoption of existing technologies as well as development of a 1.5°C-compatible vision.

TRANSPORT

BUILDINGS

**RENOVATE BUILDINGS**

Due to their long lifespan, existing buildings will need to be retrofitted. Building renovation rates should increase from <1% in 2015 to 5% by 2020. Governments can help through offering cheap loans and setting retrofit obligations.

**NEW BUILDING STANDARDS**

All new buildings should be fossil free and near zero energy by 2020. Policies can catalyse change through setting minimum building standards, extending obligations from public buildings to the whole economy, and through providing low-interest loans.

BUILDINGS

INDUSTRY

**NEW LOW CARBON FACTORIES**

From 2020, all new installations to be built according to the best available low carbon technology standard, which excludes building conventional blast furnaces. Further development and rapid introduction of new technologies, e.g. near-zero emissions steelmaking, cement, ammonia and petrochemicals.

**ENERGY EFFICIENCY**

Decarbonising the industry sector needs to be achieved through increasing energy efficiency as well as emissions efficiency (fuel switching and process changes/innovation), material efficiency, and demand reductions.

INDUSTRY

AGRICULTURE

**BETTER PRACTICES**

There is significant emissions reduction potential from adopting best practice. There is additional potential from healthy diets, food waste reduction and advancing research and development.

**ELIMINATE DEFORESTATION**

Net deforestation needs to stop by the 2020s - in addition to - and not as an alternative to - reducing fossil fuel CO<sub>2</sub> emissions.

FORESTRY

# POLICY CHECKLIST



## 2050 LONG-TERM GHG TARGET AND/OR LONG-TERM LOW GHG EMISSION DEVELOPMENT STRATEGY

When the Paris Agreement was adopted governments committed collectively to peak global emissions as soon as possible and achieve net-zero emissions of GHGs in the second half of this century. At the national level this requires long-term planning: 2050 targets and a long-term strategy are vital for real world action. Under the Paris Agreement, Governments are to submit their strategies by 2020.

Australia does not have a long-term low greenhouse gas emissions development strategy. It does not even have a 2050 target.

## SPOTLIGHT ON: UNITED KINGDOM

The UK submitted its Clean Growth Strategy to the UNFCCC in early 2018. With its legally binding carbon budgets, the UK has set clear interim steps to achieve the overall goal.

Australia	USA	China	Japan	India	Chile	S. Africa	France	UK	Germany	Italy	EU
✗	✗	✗	✓	✗	✗	✓	✓	✓	✓	✗	✓



## ALIGNMENT OF CURRENT COMMITMENT AND PROJECTED EMISSIONS WITH THE PARIS AGREEMENT

Most governments' 2030 targets are not yet aligned with the Paris Agreement temperature limit, many have not yet implemented sufficient policies and as a consequence their emissions are not projected to be in line with their targets.

Australia's commitment under the Paris Agreement is not yet aligned with the reductions needed to meet the global temperature limit. Emissions are projected to rise and thus fail to meet Australia's already insufficient NDC target.

## SPOTLIGHT ON: INDIA

India's climate commitment in 2030 is within the range of what is considered to be a fair share of global effort but is not consistent with the Paris Agreement. Its current emissions are projected to overachieve its target.

	Australia	USA	China	Japan	India	Chile	S. Africa	France	UK	Germany	Italy	EU
NDC target rating	Insufficient	Critically Insufficient	Highly Insufficient	Highly Insufficient	2°C Compatible	Highly Insufficient	Highly Insufficient	under EU	under EU	under EU	under EU	Insufficient
Policy on track to meet target?	✗	✗	✓	○	✓	○	○	under EU	under EU	under EU	under EU	○



## WHAT'S EXPECTED: PREPARING TO SCALE UP TARGETS BY 2020

The Paris Agreement has a built-in ratchet-up mechanism for targets and pledges. Government are expected to submit new, more ambitious commitments by 2020.

Prime Minister Morrison has declared Australia would not join other countries in ratcheting up emissions reduction targets by 2020 in line with climate science.

## SPOTLIGHT ON: EUROPEAN UNION

Several member states are calling on the EU to consider increasing its 2030 goal. Increased renewable energy and energy efficiency targets would enable the EU to strengthen its NDC.

Australia	USA	China	Japan	India	Chile	S. Africa	France	UK	Germany	Italy	EU
✗	✗	✗	✗	✗	✓	✗	✓	✓	✓	✓	✓



## EFFECTIVE CARBON PRICING, PRICING CO2 THROUGH TAXES AND EMISSIONS TRADING SYSTEMS

Pricing carbon correctly is a cost-effective way to reduce emissions. The OECD carbon pricing gap indicates the extent to which polluters do not pay for the damage from carbon emissions. Effective carbon pricing includes specific taxes on fuels and other energy use, carbon taxes and emissions trading. Globally, the 2018 gap was 76.5%.

Australia's 2015 effective carbon pricing gap is above the global average gap.

## SPOTLIGHT ON: FRANCE

France reduced its carbon pricing gap between 2012 and 2015 by increasing the carbon component rates in its excise duties on fuels.

	Australia	USA	China	Japan	India	Chile	S. Africa	France	UK	Germany	Italy	EU
Carbon pricing gap	78%	75%	89%	68%	80%	73%	87%	32%	38%	48%	39%	N/A

The OECD carbon pricing gap analysis compares the gap between actual effective carbon prices with a benchmark of EUR 30/tonne of CO<sub>2</sub>. The above percentages represent the carbon pricing gap.



## GOALS FOR ENERGY SAVINGS, SPENDING AND INCENTIVES FOR EFFICIENCY

Along with setting and encouraging efficiency standards, governments can support energy efficiency improvements across sectors by setting ambitious goals, providing funding and financial incentives. The American Council for an Energy-Efficient Economy (ACEEE) has scored these elements of national commitment and leadership.

Australia only has an energy productivity target, but no overall savings goal, no tax incentives for efficiency improvements.

## SPOTLIGHT ON: EUROPEAN UNION

The EU countries stand out for their national energy savings targets as well as programmes such as loans and tax incentives to encourage private investment in energy efficiency

Australia	USA	China	Japan	Chile	S. Africa	India	France	UK	Germany	Italy	EU
✗	✗	✗	✓	N/A	✗	○	✓	✓	✓	✓	✓

At least 8 points and more than 0 for goals. Orange: at least 4 points and more than 0 for goals.

# BENEFITS AND OPPORTUNITIES



There are many good reasons to make the transition to a green, zero-emissions society, a society that works for people, the environment and the economy. Avoiding the multiple, interacting damaging and potentially catastrophic impacts of climate change is just one aspect; building the economy of the future is another.



## ESCAPING THE RISKS

Australia is very exposed to the biophysical risks of climate change like sea level rise, coral reef loss and extreme weather events. Coastal commercial, industrial, road, rail, and residential infrastructure and assets are at significant risk. Accelerating climate change is exacerbating extreme weather events including record temperatures and low rainfall, hitting the Australian agriculture sector, as well as marine and terrestrial ecosystems.



## SAFEGUARDING OUR ECONOMY

Every incremental increase in temperature results in significantly greater economic losses due to negative effects on the economy such as - but not limited to - lost productivity of workers, premature deaths, reduced agricultural output. Australia benefits more than other developed countries from limiting the temperature to 1.5°C - impacts at higher levels are projected to lead to significant economic damage.



## REDUCING AIR POLLUTION

The Australian Institute of Health and Welfare estimates that about 3000 deaths are attributable to urban air pollution in Australia each year. The health costs from mortality alone are estimated to be in the order of \$11–24 billion a year. Transforming the energy system to clean renewables and transport towards zero emission vehicles will substantially reduce air pollution.



## PROTECTING THE TOURISM INDUSTRY

Temperature increases and sea level rise puts Australia's tourism industry at risk. The top five attractions for international visitors - Australian beaches, wildlife, the Great Barrier Reef, wilderness areas and national parks - are all at risk from climate change. This would put some half a million jobs and billions of tourism dollars on the line.



## PRESERVING AT LEAST SOME CORAL REEFS

Limiting warming to 1.5°C preserves some chance of survival of the world's tropical coral reefs, whereas as at 2°C they will be all but wiped out. The difference between 1.5°C and 2°C is likely to be the key to survival. For Australia, every tenth of a degree of warming will increase the risk of a complete loss of the Great Barrier Reef.



## SAFEGUARDING CROP YIELDS

Holding warming to 1.5°C limits the risks of reductions of crop yields and damage to livestock, which have already been observed in Australia, by limiting the increase in exposure to heatwaves, drought and other weather extremes. The Millennium Drought caused significant economic losses, and dislocation to rural communities.



## CREATING JOBS

Medium to long-term job creation is one of the key advantages of tackling climate change, as the employment concentration and occupational intensity of low-emissions energy production is higher on average than for more polluting alternatives. Unlike other industry transitions which have seen jobs move offshore, a transition to renewables will create a net positive employment effect for each state.



## GLOBAL REVENUE GENERATION

Ambitious climate action could generate, through subsidy reform and carbon pricing alone, an estimated US\$2.8 trillion in government revenues per year in 2030 globally - equivalent to the total GDP of India today - funds that can be used to invest in other public priorities or reduce distorting taxes.

## WHAT ARE OTHER COUNTRIES DOING?

### CARBON NEUTRALITY COALITION 19 COUNTRIES TO GO CARBON NEUTRAL

In September this year, the UK, Canada, Denmark and Spain joined a group of countries, including New Zealand, France, Germany, the Netherlands, Finland, Portugal, Sweden, Norway, Mexico, Colombia and other countries and cities who will develop long-term low-greenhouse gas emission climate resilient development strategies. These strategies are to be in line with the Paris Agreement long-term temperature goal and prepared ahead of 2020, and if possible by 2018. In their declaration they state: "The evidence is now clear that taking climate action does not compromise sustainable development. On the contrary, both the economy and climate win. We can see the equation works, and we are ready to act boldly now."

### CHILE REAPING THE BENEFITS OF RENEWABLES

Chile's overall policy planning is shifting towards renewables due to their record-low cost. It will not build any new coal-fired power plants (without CCS) and will develop a plan to phase out coal. Chile's 2050 Energy Strategy aims for renewable energy targets of at least 60% by 2035 and 70% by 2050 for electricity generation. The Energy Route 2018–2022 includes actions such as increasing energy efficiency, promoting small distributed renewable energy and starting the process of decarbonising Chile's energy matrix. Its Electromobility Strategy sets out an action plan to achieve a 40% electric share of the private vehicle fleet—and 100% of public vehicles— by 2050. All promising developments towards bending Chile's emissions curve.

# AUSTRALIA'S CLIMATE POLICY FAILURE

## REVIEW OF CLIMATE POLICY COMPLETE FAILURE: NO NEW POLICIES

In 2017 the Government published its review of climate change policies, claiming not only that Australia was on track to meet its Paris Agreement target but also that the set of policies - with some adjustments - would be the right approach to meet the target. Independent analysis does not confirm this finding and even the government's own projections show that Australia's emissions are set to far exceed its 2030 Paris Agreement target.

The review fails to recognise the lack of effective policies across all sectors. Instead, the only adjustments proposed in the review relate to the implementation of the National Energy Guarantee, which has since been abandoned by the Morrison government. The review further signalled a simplification of the safeguard mechanism, which already led to an increase in emissions.

While acknowledging that the net benefits of a light vehicle fuel efficiency standard could range from \$5.8 to \$13.9 billion over 20 years, and could save motorists between \$237 and \$519 per year in fuel costs in 2025, no progress has been made in implementation. With nearly 80% of new light duty vehicles globally sold already being subject to some emissions or fuel economy standard, Australia is lagging significantly behind in failing to adopt any standard.

The 2017 Government review contained plans to reintroduce international carbon offsets, subject to a global system being finalised after 2020, leaving the door open for Australia to rely on credits to meet its emissions target and postponing the necessary domestic emissions reductions and introducing new policies to address the structural change needed.

The review is a "recipe for business as usual", instead of recognising the need for effective policies across all sectors for a much-needed change of direction towards a decarbonised economy.

## EMISSIONS REDUCTIONS FUND NOT SUITABLE AS A POLICY CENTREPIECE

Australia's Emissions Reduction Fund (ERF) is a reverse auction mechanism that aims to "reduce emissions at lowest cost over the period to 2020". The emissions reductions from ERF projects can then be used as emissions offsets, that is as compensation for emissions incurred elsewhere.

This so-called "centrepiece" of the Australian Government's policy suite to reduce emissions does not set Australia on a path towards meeting its (inadequate) Paris Agreement target. Further, the safeguard mechanism risks counteracting the emissions reductions the ERF is supposed to deliver by increasing emissions allowances for large industrial facilities.

The fund is plagued by a mismatch of its abatement profile (concentrated in the land sector) with Australia's emissions profile, which is driven by the industrial and power sectors. The government-appointed Climate Change Authority has reiterated its advice that Australia should not rely on the ERF and should introduce new policies aiming at decarbonisation and structural change.

An audit of the ERF by the Climate Change Authority also found a "significant risk" of reversal of stored carbon in land sector projects being emitted again. There are also serious doubts about the "additionality" of many of the ERF projects. That means that many of these projects claim reductions that would have occurred anyway.

The government keeps referring to the ERF as the centrepiece of its climate policies, but has not provided further funding for it, nor indicated plans to replace it with more effective policies.

## STATES AND TERRITORIES LEADING THE WAY

### ACT PRACTICE AS YOU PREACH

The ACT has set a nation-leading target to achieve a reduction of 40% below 1990 levels by 2020 and net zero greenhouse gas emissions by 2045, as well as a Climate Change Strategy and Action Plan (known as AP2). In 2016, the ACT Government enacted a new target of 100% renewable electricity by 2020.

Under a dedicated action plan the ACT will encourage the transition to zero emissions vehicles such as electric cars and electric bikes, thereby actively tackling the expected increase in emissions from transport, mainly resulting from the use of private cars, and leveraging the benefits of its targeted decarbonised electricity sector.

To set a good example, the ACT government aims to achieve carbon neutrality in its own operations by 2020, through a range of actions, such as energy efficiency measures and renewable energy initiatives.



### VICTORIA CERTAINTY FOR RENEWABLES AND CLIMATE

Victoria just hosted its first - and Australia's largest - large-scale renewable energy auction which was met with overwhelming interest by the market, proof that policy certainty is vital in creating swift and decisive market responses.

**NET-ZERO  
BY 2050**



Like the ACT, Victoria, South Australia and other states, are increasingly taking matters into their own hands to escape the national void and investor uncertainty.

A Climate Change Bill successfully passed through the Victorian Parliament in 2017 and establishes not only a long-term emissions reduction target of net zero emissions by 2050 but also requires five yearly interim targets to keep track of progress. This means the government must develop a strategy every five years to set out how it intends to meet its targets.

The Victorian Government has also committed to reducing emissions by 15-20 percent below 2005 by 2020 and to renewable energy generation targets of 25% by 2020, 40% by 2025 and 50% by 2030.

# ABOUT THE AUTHOR



Supporting science-based policy to prevent dangerous climate change, enabling sustainable development.

Climate Analytics is a non-profit climate science and policy institute based in Berlin, Germany with offices in New York, USA, Lomé, Togo and Perth, Australia, which brings together interdisciplinary expertise in the scientific and policy aspects of climate change. Our mission is to synthesise and advance scientific knowledge in the area of climate change.

[climateanalytics.org](http://climateanalytics.org)

## REFERENCES AND DATA SOURCES

### Page 1

#### Australia is among the top 20 emitters per person

Source: Union of concerned scientists (2017). Each country's share of CO<sub>2</sub> emissions. Link: [https://www.ucsusa.org/global-warming/science-and-impacts/science/each-country-s-share-of-co2.html#\\_W6\\_evZNKiRs](https://www.ucsusa.org/global-warming/science-and-impacts/science/each-country-s-share-of-co2.html#_W6_evZNKiRs)  
Global Carbon Atlas (2016). CO<sub>2</sub> emissions. Link: <http://www.globalcarbonatlas.org/en/CO2-emissions>

#### Australians emit more than twice as much as the G20 average.

Source: Climate Transparency (2018). Australia Country Profile. Link: [www.climate-transparency.org/wp-content/uploads/2018/11/BROWN-TO-GREEN\\_2018\\_Australia.pdf](http://www.climate-transparency.org/wp-content/uploads/2018/11/BROWN-TO-GREEN_2018_Australia.pdf)

Graph: Greenhouse Gas Emissions per Person 1990 - 2030 (excluding LULUCF)  
Graph: Greenhouse Gas Emissions per Person 1990 - 2010 (including LULUCF)

Source: UNFCCC United Nations Framework Convention on Climate Change (2016)  
Flexible GHG data queries Link: [unfccc.int/di/FlexibleQueries/Event.do?event=go](http://unfccc.int/di/FlexibleQueries/Event.do?event=go)

Source: UN United Nations, Department of Economic and Social Affairs, Population Division (2017) World Population Prospects: The 2017 Revision. Medium fertility projections Link: [population.un.org/wpp/Download/Standard/Population/](http://population.un.org/wpp/Download/Standard/Population/)  
Source: Climate Action Tracker Data Portal (2018). Link: [climateactiontracker.org/decarbonisation/](http://climateactiontracker.org/decarbonisation/)  
Source: UNFCCC United Nations Framework Convention on Climate Change (2018) Detailed data by party Link: [di.unfccc.int/detailed\\_data\\_by\\_party](http://di.unfccc.int/detailed_data_by_party)

Government claim: Target one of the strongest of major economies on per capita basis: Source: Australian Government (2017). Australian Government response to the Climate Change Authority Special Review: Emission Reduction Targets, Emissions Trading and Post-Paris Action. Link: <https://www.environment.gov.au/system/files/resources/139c111c-91d8-4291-a563-79e18949e087/files/govt-response-climate-change-authority-special-review.pdf>

Australian Government (2017): Tracking to Australia's Emissions Reduction Targets. Link: <https://www.environment.gov.au/system/files/resources/eb62f30f-3e0f-4bfa-bb7a-c87818160fcf/files/tracking-australias-emissions-reduction-targets.pdf>

Source: World Bank World Development Indicators (2017) Link: [data.worldbank.org/data/views/reports/tableview.aspx](http://data.worldbank.org/data/views/reports/tableview.aspx)  
Source: Climate Action Tracker Data Portal (2018). Link: [climateactiontracker.org/decarbonisation/](http://climateactiontracker.org/decarbonisation/)  
Source: UNFCCC United Nations Framework Convention on Climate Change (2018) Detailed data by party Link: [di.unfccc.int/detailed\\_data\\_by\\_party](http://di.unfccc.int/detailed_data_by_party)

#### Graph: CO<sub>2</sub> Emissions Intensity of Energy 1990 - 2014

Source: UNFCCC United Nations Framework Convention on Climate Change (2016)  
Flexible GHG data queries Link: [unfccc.int/di/FlexibleQueries/Event.do?event=go](http://unfccc.int/di/FlexibleQueries/Event.do?event=go)  
Source: IEA International Energy Agency (2016) Based on IEA data from Energy Statistics and Balances 2016 Link: [www.iea.org/statistics](http://www.iea.org/statistics)

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#### The Australian government has postulated that its target is strong compared to other economies on an emissions intensity reduction basis:

Source: Australian Government (2017). Australian Government response to the Climate Change Authority Special Review: Emission Reduction Targets, Emissions Trading and Post-Paris Action. Link: <https://www.environment.gov.au/system/files/resources/139c111c-91d8-4291-a563-79e18949e087/files/govt-response-climate-change-authority-special-review.pdf>

Graph: Greenhouse Gas Emissions Intensity of GDP 1990 - 2030 (excluding LULUCF)  
Graph: Greenhouse Gas Emissions Intensity of GDP 1990 - 2010 (including LULUCF)

Source: UNFCCC United Nations Framework Convention on Climate Change (2016)  
Flexible GHG data queries Link: <http://unfccc.int/di/FlexibleQueries/Event.do?event=go>

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#### Graph: CO<sub>2</sub> Emissions Intensity of Energy 1990 - 2014

Source: UNFCCC United Nations Framework Convention on Climate Change (2016)  
Flexible GHG data queries Link: [unfccc.int/di/FlexibleQueries/Event.do?event=go](http://unfccc.int/di/FlexibleQueries/Event.do?event=go)  
Source: IEA International Energy Agency (2016) Based on IEA data from Energy Statistics and Balances 2016 Link: [www.iea.org/statistics](http://www.iea.org/statistics)

Graph: Greenhouse Gas Emissions Intensity of GDP 1990 - 2030 (excluding LULUCF)  
Graph: Greenhouse Gas Emissions Intensity of GDP 1990 - 2010 (including LULUCF)

Source: UNFCCC United Nations Framework Convention on Climate Change (2016)  
Flexible GHG data queries Link: <http://unfccc.int/di/FlexibleQueries/Event.do?event=go>  
Source: World Bank World Development Indicators (2017) Link: [data.worldbank.org/data/views/reports/tableview.aspx](http://data.worldbank.org/data/views/reports/tableview.aspx)

Source: Climate Action Tracker Data Portal (2018). Link: [climateactiontracker.org/decarbonisation/](http://climateactiontracker.org/decarbonisation/)  
Source: UNFCCC United Nations Framework Convention on Climate Change (2018) Detailed data by party Link: [di.unfccc.int/detailed\\_data\\_by\\_party](http://di.unfccc.int/detailed_data_by_party)

#### Australia's greenhouse gas emissions

Source: Australian Government (2017). "Australia's emissions projections 2017", <http://www.environment.gov.au/climate-change/publications/emissions-projections-2017>  
Note that this source shows different emissions for 2017 than the contemporaneous emissions inventory and also later inventories for the same year (e.g. "Quarterly Update of Australia's National Greenhouse Gas Inventory for March 2018", <https://bit.ly/2Cl9r2Q>). Consequently we note in the text that the decrease in emissions including LULUCF from 2005 to 2017 is 7-12%.

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#### What does the Paris Agreement mean?

Source: IPCC (2018). Global warming of 1.5C. Summary for Policymakers. Link: [http://report.ipcc.ch/sr15/pdf/sr15\\_spm\\_final.pdf](http://report.ipcc.ch/sr15/pdf/sr15_spm_final.pdf)

#### Current policies

Sources: Climate Action Tracker (2018). Australia. Link: <https://climateactiontracker.org/countries/australia/>; Australian Government (2017). "Australia's emissions projections 2017".

#### 2030 Paris Agreement Target

Source: Climate Action Tracker (2018). Australia. Link: <https://climateactiontracker.org/countries/australia/>

#### Long-term 1.5C consistent pathway

The pathway is derived from results from IAMs (Integrated Assessment Models) results under RCP 1.9 scenarios

Source: Rogelj, J., Popp, A., Calvin, K. V., Luderer, G., Emmerling, J., Gernaat, D., ... Tavoni, M. (2018). Scenarios towards limiting global mean temperature increase below 1.5 °C. Nature Climate Change. 1. Link: <https://doi.org/10.1038/s41558-018-0091-3>  
Sources: Sferra, F., Krapp, M., Roming, N., Schaeffer, M., Malik, A., & Hare, W. (2018). Towards optimal 1.5° and 2°C emission pathways for individual countries: a Finland case study. Energy Policy - in Review, submitted.

#### NDC:

UNFCCC United Nations Framework Convention on Climate Change (2016) NDC Registry (interim) Link: [www4.unfccc.int/ndcregistry/pages/Party.aspx?party=AUS](http://www4.unfccc.int/ndcregistry/pages/Party.aspx?party=AUS)

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Sources: Climate Action Tracker (2017). Improvement in warming outlook as India and China move ahead, but Paris Agreement gap still looms large. Link: <https://climateactiontracker.org/publications/improvement-warming-outlook-india-and-china-move-ahead-paris-agreement-gap-still-looms-large/>; IPCC (2018). Global warming of 1.5C. Summary for Policymakers. Link: [http://report.ipcc.ch/sr15/pdf/sr15\\_spm\\_final.pdf](http://report.ipcc.ch/sr15/pdf/sr15_spm_final.pdf)

#### Key short-term steps

Sources: Climate Action Tracker (2016). The ten most important short-term steps to limit warming to 1.5C. Link: <https://climateactiontracker.org/publications/the-ten-most-important-short-term-steps-to-limit-warming-to-15c/>

Mission2020 (n.d.) Milestones. Link: <http://www.mission2020.global/milestones-alternative-energy/>

Climate Action Tracker (2018). The highway to Paris: Safeguarding the climate by decarbonising freight transport. Link: <https://climateactiontracker.org/publications/highway-paris-safeguarding-climate-decarbonising-freight-transport/>  
New Climate Economy (2018). Unlocking the inclusive growth story of the 21st century: accelerating climate action in urgent times. Link: [https://newclimateeconomyreport/2018/wp-content/uploads/sites/6/2018/09/NCE\\_2018\\_FULL-REPORT.pdf](https://newclimateeconomyreport/2018/wp-content/uploads/sites/6/2018/09/NCE_2018_FULL-REPORT.pdf)  
Climate Analytics (n.d.). 1.5C - key facts. Link: <https://climateanalytics.org/briefings/1-5c-key-facts/>

**2050 long-term GHG target and/or long-term low GHG emission development strategy**

Sources: Climate Transparency (2018). Brown to Green Report 2018. Link: <https://www.climate-transparency.org/>  
UK Government (2018). The Clean Growth Strategy. Leading the way to a low carbon future. Link: <https://unfccc.int/sites/default/files/resource/clean-growth-strategy-amended-april-2018.pdf>

**Alignment of current commitment and projected emissions with the Paris Agreement**

Sources: Climate Action Tracker (2018). Country Analysis. Link: <https://climateactiontracker.org/countries/>

**Preparing for or considering scaling up targets by 2020**

Republic of the Marshall Islands (2018). (with 22 other countries.) Declaration for Ambition. Link: <https://www.docdroid.net/Dmk05kd/180621-declaration-for-ambition-rmi-press-release-declaration-final-combined.pdf>

**Carbon pricing**

OECD (2018). Effective Carbon Rates 2018 Pricing Carbon Emissions Through Taxes and Emissions Trading. Link: <https://doi.org/10.1787/9789264305304-en>

**Ambitious goals, spending and incentives for efficiency**

Source: American Council for an Energy-Efficient Economy (2018). The 2018 International Energy Efficiency Scorecard. Link: <http://www2.aceee.org/l/310911/2018-06-25/2v164b>  
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Link: <https://www.sustainablefinance.hsbc.com/our-reports/fragile-planet>  
Australian Government (2011). Climate Change Risks to Coastal Buildings and Infrastructure. Link: <https://www.environment.gov.au/system/files/resources/0f56e5e6-e25e-4183-bbef-ca61e56777ef/files/risks-coastal-buildings.pdf>  
Climate Council (2018). Climate change and drought. Link: <https://www.climatecouncil.org.au/resources/climate-change-and-drought-factsheet/>

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**Reducing air pollution**

Sources: Australia State of the Environment 2016. Link: <https://soe.environment.gov.au/theme/ambient-air-quality/topic/2016/health-impacts-air-pollution>

**Protect the tourism industry**

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New Climate Economy (2018). Unlocking the inclusive growth story of the 21st century: accelerating climate action in urgent times. Link: [https://newclimateeconomyreport/2018/wp-content/uploads/sites/6/2018/09/NCE\\_2018\\_FULL-REPORT.pdf](https://newclimateeconomyreport/2018/wp-content/uploads/sites/6/2018/09/NCE_2018_FULL-REPORT.pdf)

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Source: The Conversation (2017). The federal Climate Policy Review: a recipe for business as usual. Link: <https://theconversation.com/the-federal-climate-policy-review-a-recipe-for-business-as-usual-89372>

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**1 - Factoring in emissions from LULUCF (land use, land-use change and forestry)**

LULUCF emissions cover a wide spectrum of activities involving how carbon flows between the atmosphere and the land, but the removal of vegetation (deforestation) and restoring degraded land (afforestation) are the main drivers of the LULUCF sector. Because of this, emissions can be both positive and negative and, as such, different countries treat the LULUCF sector differently. While Australia and the US include the LULUCF sector in their Paris Agreement target, the EU defines its target without it and allows a limited crediting for some activities. Japan wants to account for LULUCF credits. China has a separate forestry target. Not all countries provide projections in this sector and these projections are very uncertain.

**Differences between excluding LULUCF and including LULUCF**

Due to Australia having significant levels of deforestation in 1990, per person emissions were significantly higher when including LULUCF than in the top graph where LULUCF was excluded, meaning that per capita emissions improvement including LULUCF appear much larger due to stopping this level of deforestation. The situation is the reverse in the United States, where significant amounts of land has been restored, resulting in negative emissions. This translates to lower emissions when including LULUCF and therefore different improvement rates. It is a similar story for China and the EU, however LULUCF emissions are proportionally much smaller and therefore have less of an impact on the overall picture.

**2 - Conceptualising the Paris Agreement's temperature goal**

More than two decades of international climate negotiations laid the groundwork for the Paris Agreement and it is with this rich history in mind this treaty should be understood and conceptualised, particularly with regards to the long-term temperature goal.

At the Earth Summit in Rio de Janeiro in 1992 the UN Framework Convention on Climate Change (UNFCCC) was adopted with the ultimate objective being the "stabilisation of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system" (United Nations, 1992). Importantly, it had neither been clarified what level of climate change is to be considered "dangerous", nor was there an agreement on the exact concentration levels required to reach that objective. It was only in the Copenhagen Accord from 2009 that the first long-temperature goal of limiting the global temperature increase to below 2 degrees Celsius was mentioned (UNFCCC, 2010). During the subsequent COP16 in Cancun in 2010 the Parties adopted the 2°C limit, expressed as the aim "to hold the increase in global average temperature below 2°C above preindustrial levels".

Notwithstanding this decision, in 2010 the UNFCCC established a review process to evaluate whether the long-term global temperature goal of holding warming below 2°C was adequate to avoid dangerous climate change and to consider "strengthening the long-term global goal on the basis of the best available scientific knowledge, including in relation to a global average temperature rise of 1.5°C". In 2015 the Structured Expert Dialogue ended with the conclusion that a warming of 2°C cannot be considered safe (UNFCCC, 2015b). This has ultimately led to the Paris Agreement's objective to "pursue efforts to limit" global warming to 1.5°C above preindustrial, while holding warming to "well below 2°C".

**The Paris Agreement's long-term temperature goal therefore goes beyond the Cancun Agreements' 2°C temperature limit.**

Under the long-term temperature goal (Article 2.1) of the Paris Agreement, Parties agreed to "holding the increase in the global average temperature to well below 2°C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5 °C above pre-industrial levels, recognising that this would significantly reduce the risk and impacts of climate change".