

HALFWAY TO PARIS: HOW THE WORLD IS TRACKING ON CLIMATE CHANGE



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Key Findings

1. The world is stepping up action on climate change, with Australia's major allies and trading partners setting strong emissions reduction targets.

- › The United States aims to reduce its greenhouse gas emissions by 26-28% below its 2005 level in 2025 setting a path towards deep, economy-wide emission reductions of 80% or more by 2050.
- › The European Union has a reduction target of 40% by 2030 relative to 1990 levels.
- › By 2030, China aims to lower carbon dioxide emissions per unit of GDP by 60% to 65% from the 2005 level, and the world's largest emitter aims to peak its greenhouse gas emissions by 2030, possibly earlier.
- › Australia is expected to submit its emissions reduction target by mid-2015.

2. Australia is a crucial global climate change player.

- › Australia is one of the largest emitters per capita and the 13th largest greenhouse gas emitter in the world, ahead of 182 other countries.
- › The emissions from Australia's coal resources alone, if developed, would consume two-thirds of the world's remaining carbon budget.

3. Australia's domestic climate change policies are receiving more international scrutiny than ever before.

- › China, the US and other big emitters have questioned the credibility of Australia's climate change targets and direct action policies.
- › Australia was singled out as the first developed country to take a legislative step backwards from action on climate change with the repeal of the carbon price in a recent report on global climate change legislation.
- › Australia was lambasted as a 'free-rider' on other nation's efforts to tackle climate change in a report by former UN chief Kofi Annan.

4. Australia must cut its greenhouse gas emissions much more deeply and rapidly to contribute its fair share in meeting the climate change challenge.

- › A 2030 target of a 40-60% reduction below 2000 levels (or a range of approximately 45 to 65% below 2005 levels) is the bare minimum for Australia to be both in line with the science and the rest of the world.

5. Strong climate change action is needed to protect Australians from worsening extreme heat, bushfires and sea level rise.

- › The number of record hot days in Australia has doubled in the last 50 years and climate change is driving longer, hotter and more intense heatwaves.
- › These hot, dry conditions have a major influence on bushfires and are driving up the likelihood of very high fire danger weather, especially in Australia's southwest and southeast.
- › Australia is extremely vulnerable to coastal flooding from sea level rise, with more than \$226 billion in commercial, industrial, road, rail and residential assets around Australia's coasts are potentially exposed to flooding and erosion hazards at a sea level rise of 1.1 m. In Southeast Queensland, the costs of coastal flooding could double by 2030 and quadruple by 2070.

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1. Introduction

Rising global temperatures, driven by the burning of fossil fuels (coal, oil and gas), are already driving serious impacts on human wellbeing and, left unchecked, will have even more harmful and potentially catastrophic consequences for humanity. In response, governments around the world have agreed to keep global temperature rise to no more than 2°C above pre-industrial levels (UNFCCC 2010). While 2°C may not sound like much, it is a very substantial change to the Earth System and will have serious impacts on the lives and livelihoods of people all over the world.

With just 0.9°C of warming, Australia has already experienced adverse consequences (CSIRO and BoM 2015). Hot days have doubled in the last 50 years (CSIRO and BoM 2012), while heatwaves have become hotter, last longer and occur more often (Perkins et al. 2012; Climate Council 2014a). Heatwaves are the most significant natural hazard in Australia in terms of loss of life and the elderly, the very young, and those with chronic disease are most at risk (PwC 2011). Similarly, extreme fire weather has increased over the last 35 years in southeast Australia, putting people and property at risk (Johnston 2009; Climate Council 2013). Property and infrastructure across Australia has been built for previous climatic conditions and much of it is ill-prepared to cope with increasingly frequent and/or intense extreme weather. For instance, over \$226 billion in commercial, industrial, road and rail and residential assets around Australian coasts are potentially exposed to a sea-level rise of 1.1 metres, possible by the end of the century under a high emissions scenario (DCCEE 2011; Climate Council 2014b).

Australia's Asia-Pacific neighbours are also on the front line of climate change. One of the most significant challenges facing low-lying islands and atolls in the region is sea level rise, which will increase severe flooding and erosion risks, as well as degrade fresh groundwater resources (Nurse et al. 2014). Increases in sea surface temperature are already increasing coral bleaching and

reef degradation, negatively affecting island communities and livelihoods (Nurse et al. 2014). The very existence of some atoll nations is threatened by sea level rise, despite the minimal contribution these nations make to global greenhouse gas emissions. Australia's proximity and relative prosperity in the Asia-Pacific region leave it well placed to assist its neighbours with adapting to the impacts of climate change, but also to do its fair share in reducing its emissions to limit the risks of climate change.

Despite rising energy use, for the first time in 40 years, global carbon dioxide emissions from power generation remained stable in 2014 while the global economy grew. This stabilisation of global emissions has been attributed to increased uptake of renewable energy and improvements in energy efficiency (REN21 2015). Moreover, Australia can cut greenhouse gas emissions while growing the economy (Jotzo and Kemp 2015), but delaying action will become increasingly costly (Stern 2007; Garnaut 2011; IEA 2011; IPCC 2014). For example, the International Energy Agency have stated that "delaying action is a false economy: for every \$1 of investment in cleaner technology that is avoided in the power sector before 2020, an additional \$4.30 would need to be spent after 2020 to compensate for increased emissions" (IEA 2011). Furthermore, the IPCC reinforced the cost of delay, outlining that delaying emissions reductions by 15 years could increase the overall cost of reducing emissions by up to 82% (IPCC 2014).

The more we know about climate change, the riskier it looks. This observation underscores the urgency in stabilising the climate system as soon as possible to minimise the high-end risks, and emphasises the need to dramatically reduce greenhouse gas emissions from fossil fuel combustion. Now is the time for strong international action.

This report describes how 2015 is a pivotal year for global action on climate change, as the international community converge in Paris to negotiate a new climate agreement that aims to limit an increase in global average temperature to no more than 2°C above pre-industrial levels. Moreover, the report describes how it is in Australia's national interest to set strong and fair emissions reduction targets as part of a concerted global effort.

In the lead up to the United Nations conference, countries are submitting their emissions reduction targets, known as Intended Nationally Determined Contributions (INDCs). This report summarises the emissions reduction targets submitted so far, describing the strong intent of Australia's major trading partners and allies (e.g. China, the EU and the US) to tackle climate change. Emissions reduction targets are important because they signal the commitment of individual countries to tackle climate change. Moreover, by combining all of the countries emissions reduction targets, a more complete picture can be developed of how the world is (or is not) tracking towards limiting global warming to 2°C.

2. International action

Australia's major trading partners and allies have ramped up their efforts to tackle climate change. In this report, we focus on their emissions reduction targets, already submitted to the United Nations Framework Convention on Climate Change (UNFCCC), leading up to the UN climate conference in Paris at the end of this year. Australia is expected to submit its emissions reduction target by mid-2015.

"Australia's major trading partners and allies have ramped up their efforts to tackle climate change."

2.1 Emissions reduction targets

An emissions reduction target represents the commitment a country makes to reduce its greenhouse gas emissions. It is based on a quantifiable reduction in greenhouse gas emissions by a certain date or over a specified period. For instance, Australia has committed to reduce emissions by 5% on 2000 levels by 2020. Emissions reduction targets are important because they become a benchmark to measure a country's action and track whether it is sufficient.

The UNFCCC has 196 Parties (195 member states (including Australia) and the economic and political bloc, the European Union). Its goal is to stabilise greenhouse gas concentrations in the atmosphere at a level that will prevent "dangerous human interference with the climate system" (UNFCCC 2014a). From 30 November to 11 December 2015, France will host the 21st Session of the Conference of the Parties to UNFCCC (COP21), where countries will meet to negotiate a new international agreement on climate with the aim of keeping global warming below 2°C (Republic of France 2015).

"As scientific knowledge has improved, it is clear that other risks previously anticipated to lie only above 2°C may well occur at lower temperatures."

A 2°C rise in temperature has long been considered a threshold that should not be crossed given the potential for catastrophic consequences. For instance, the threshold to trigger the melting of the Greenland ice-sheet, which would eventually raise sea level by about seven metres, inundating major cities world-wide, lies between a 1 and 4°C rise, with the risk increasing through that temperature range. Moreover, as scientific knowledge has improved, it is clear that other risks previously anticipated to lie only above 2°C may well occur at lower temperatures.

Rising greenhouse gas emissions, primarily from the burning of coal, oil and gas, drive climate change. The most important gas is carbon dioxide, denoted in this report as CO₂. To tackle climate change the solution is simple: we need to reduce CO₂ emissions to virtually zero by the middle of the century, requiring a rapid rate of reduction from now. It is important that Australia and its trading partners and allies work with the international community by setting strong and fair emissions reduction targets.

This year, unique to previous climate negotiation processes, signatories of the UNFCCC are required to submit their national emissions reduction targets ahead of time, known as Intended Nationally Determined Contributions (INDCs¹). This process is driving momentum in the lead up to the global negotiations.

At the time of writing, 46 Parties to the UNFCCC have formally submitted their emissions reduction targets. This includes the European Union and the 28 countries of the European Union, as well as Andorra, Canada, China, Ethiopia, Gabon, Iceland, Liechtenstein, Mexico, Morocco, New Zealand, Norway, Republic of Korea, Russia, Serbia, Singapore, Switzerland, and the United States of America (UNFCCC 2015a; Table 1; Figure 1).

¹ More information about INDCs is available online: http://unfccc.int/focus/indc_portal/items/8766.php.

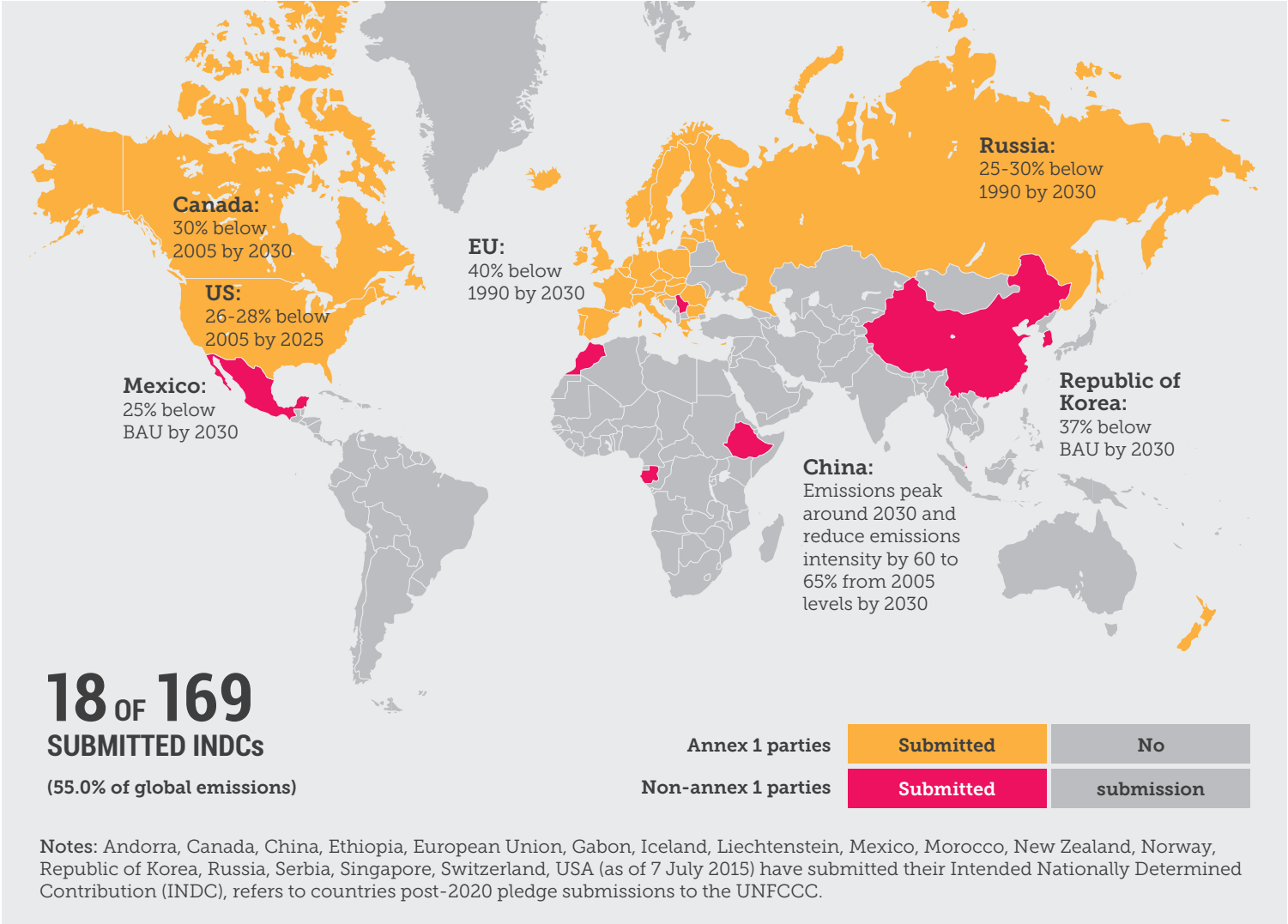
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Table 1: Party Submissions to UNFCCC (as of 7 July 2015).

Country	GHG emissions reduction target	Target year	Reference year
Andorra	37%	2030	BAU*
Canada	30%	2030	2005
China	Peak CO ₂ emissions by 2030 (earlier if possible); reduce emissions intensity per unit of GDP by 60 to 65% from 2005 levels by 2030.	2030	2005
Ethiopia	64%	2030	BAU
European Union	≥40%	2030	1990
Gabon	≥50%	2025	2000
Iceland	40%	2030	1990
Liechtenstein	40%	2030	1990
Mexico	25%	2030	BAU
Morocco	32%	2030	BAU
New Zealand	30%	2030	2005
Norway	≥40%	2030	1990
Republic of Korea	37%	2030	BAU
Russia	25-30%	2030	1990
Serbia	9.8%	2030	1990
Singapore	Reduce emissions intensity by 36% from 2005 levels by 2030, and stabilise its emissions with the aim of peaking around 2030.	2030	2005
Switzerland	50%	2030	1990
USA	26-28%	2025	2005

Sources: Data from UNFCCC (2015a). Note: *BAU (business-as-usual).

Figure 1: Post-2020 Emissions Reduction Targets.



Sources: Data from UNFCCC 2015a and WRI 2015a; adapted from Bloomberg New Energy Finance 2015.

2.1.1 Emissions reduction targets of Australia's major allies and trading partners

When submitting emissions reduction targets to the United Nations Framework Convention on Climate Change, Parties should provide, for example, information on the reference point (including a base year), time frames and/or periods for implementation. Parties should also describe how their emissions reduction target is fair and ambitious (UNFCCC 2015a).

Some countries propose 'absolute' emissions reductions, for example, to reduce emissions by 10% compared to 2005 emissions, while some targets are expressed as a change in emissions intensity.

Emissions intensity is the level of GHG (greenhouse gases, primarily CO₂) emissions per unit of economic activity, usually measured at the national level as

GDP. Irrespective of whether or not it is an absolute or intensity-related target, an emissions reduction target should fulfil two major requirements:

(i) is consistent with avoiding dangerous climate change (the objective of the UNFCCC) by limiting global temperature rise to no more than 2°C above pre-industrial levels and (ii) provides clear enough information for other countries to understand what is actually being committed to (Climate Institute 2014). Importantly, targets can only be met if they are underpinned by policies and measures that make emissions reductions happen (CCA 2014).

This section describes the emissions reduction targets of some of Australia's major trading partners and allies that have recently been submitted in the lead up to the Paris climate conference.

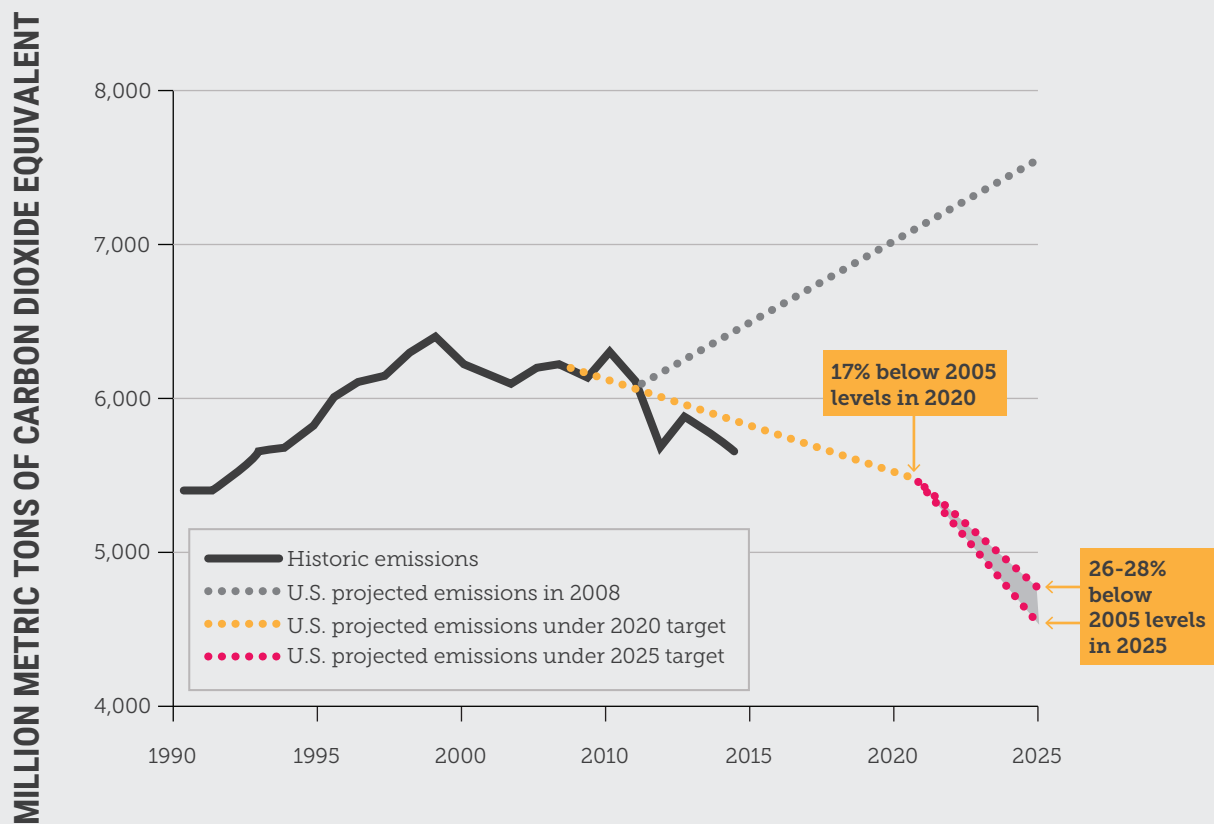
"Targets can only be met if they are underpinned by policies and measures that make emissions reductions happen."

US



On 31 March 2015, the US submitted its new climate action plan to the UNFCCC. The United States intends to achieve an economy-wide target of reducing its GHG emissions by 26-28 percent below its 2005 level in 2025 (UNFCCC 2015b; Figure 2).

Figure 2: US Emissions under 2020 and 2025 targets.



Source: Adapted from UNFCCC 2015b.

Achieving the 2025 target represents a substantial acceleration of the current pace of GHG emission reductions. Meeting the 2025 target requires two significant escalations. Firstly, emissions will need to be further reduced by 9-11% beyond the 2020 target, compared to the 2005 baseline. Secondly the yearly pace of emissions reductions from 2005-2020 will need to almost double, rising to 2.3-2.8% per year. This target paves the way for strong emissions reductions from 2020, to deep, economy-wide emissions reductions of 80% or more by 2050. In its submission to the UNFCCC,

the US described this target as part of a strategy to transition to a low-carbon (low emissions) global economy as rapidly as possible (UNFCCC 2015b). The US has also stepped up its efforts to tackle climate change over the past year, which is a positive indication for the US meeting the target. For example, it plans to cut pollution from coal power plants by 30% from 2005 levels (US EPA 2014).

"The US has accelerated the current pace of emission reductions."

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EU



The European Union (EU) has a reduction target of 40% by 2030 relative to 1990 levels. This economic and political bloc of 28 nations (including France, Germany and the UK) considers that this target is in accordance with an 80-95% reduction in emissions by 2050 (relative to 1990). The EU has reduced its emissions by 19% on 1990 levels while its total GDP increased 44% over the same period. As a result, the EU's average per person emissions have fallen from 12 tonnes carbon dioxide equivalent (CO₂-eq.) in 1990 to 8.22 tonnes CO₂-eq. in 2012 and are projected to drop to around 6 tonnes CO₂-eq. in 2030 (UNFCCC 2015c; see Table 2 below).

China



By 2030, China aims to (i) lower carbon dioxide emissions per unit of GDP by 60% to 65% from the 2005 level, (ii) increase the share of non-fossil fuels in primary energy consumption to around 20%; and (iii) increase the forest stock volume by around 4.5 billion cubic meters on the 2005 level. China also aims to peak its emissions by 2030, possibly earlier (UNFCCC 2015d).

Canada



Canada's submission to the UNFCCC outlines its commitment to reduce greenhouse gas emissions by 30% by 2030 relative to 2005 levels. This builds on Canada's emissions reduction of 3.1% between 2005 to 2013, despite economic growth totalling 12.9% (UNFCCC 2015e).

New Zealand



New Zealand aims to reduce GHG emissions to 30% below 2005 levels by 2030. New Zealand's emissions reduction target will remain provisional pending confirmation of the approaches to be taken in accounting for the land sector, and confirmation of access to carbon markets (UNFCCC 2015f).

G7

G7

As the Paris climate talks approach, the nations who make up the G7 (Canada, France, Germany, Italy, Japan, the UK and the US) are mobilising action on climate change. As part of the G7 talks (Figure 3) world leaders agreed to decarbonise the global economy (i.e., to transition to a zero emissions economy) by the end of the century, to transform the energy sector by 2050 and to facilitate a wider rollout of renewables across Africa (G7 2015).

Figure 3: G7 leaders in summit talks, June 2015, Germany.



2.2 Emissions reduction recommendations for Australia

Australia's current international commitments for reducing greenhouse gas emissions include:

- › An unconditional target of 5% reduction on 2000 levels by 2020.
- › Up to 15% reduction by 2020 if major developing economies commit to restraining emissions and advanced economies take on comparable commitments to Australia's.
- › Up to 25% reduction by 2020 conditional on comprehensive international action capable of stabilising CO₂ concentrations at 450 ppm or lower.

The Climate Change Authority, Australia's top climate policy advisory body, considered that significant progress had been made internationally to support Australia's target moving beyond 5%. The Authority concluded that climate science, international action and economic factors all justify stronger action, and

recommended Australia move to a minimum 19% target by 2020 (taking into account Kyoto protocol carryover) as a defensible contribution to the global climate change effort (Climate Change Authority 2014).

The CCA has recently completed a comprehensive evaluation of Australia's emissions reduction targets, recommending that Australia's post-2020 target should include:

- › A 2025 target of a 30% reduction in its emissions below 2000 levels (or a 36% reduction if the Government opts for 2005 as its preferred base year); and
- › Further reductions within a range of 40 to 60% below 2000 levels by 2030 (or a range of approximately 45 to 65% below 2005 levels).

Note: A 2005 baseline year would mean a higher percentage reduction than if the reference year was 2000. This is because Australia's emissions were higher in 2005 compared to 2000 (see Section 4.1).

“The CCA recommendations should be seen as a bare minimum for Australia’s contribution to tackling climate change in concert with the rest of the world.”

The CCA considers these targets credible vis-à-vis: (i) what the science requires, (ii) what many of Australia’s major trading partners and allies are doing; and (iii) setting a global emissions reduction path consistent with a reasonable chance of limiting the increase in global warming to 2°C (CCA 2015a).

It is important to note that the CCA’s recommendations are based on a two-thirds chance of avoiding 2°C warming. For a stronger chance, the target should be higher. Therefore, if global average temperature is to stay below 2°C then the CCA recommendations should be seen as a bare minimum for Australia’s contribution to tackling climate change in concert with the rest of the world.

The Climate Change Authority contends the recommended emissions reduction targets “would send a credible signal to domestic and international stakeholders alike that the Government is intent on playing a leadership role in guiding Australia’s long-term transition to a sustainable, low carbon world” (CCA 2015a). They would create an opportunity for Australia to move from a laggard on climate change to action more commensurate with what the rest of the world is doing.

3. Australia's national interest to set strong targets

National emissions reduction targets are integral to global action on climate change. Australia, as a major economy and one of the highest emitters in the world, has a responsibility to set strong targets relative to what the rest of the world is doing.

Yet Australia has repealed the carbon tax (pricing mechanism) and there remains uncertainty as to whether the new Emissions Reduction Fund will meet the 5% national emissions reduction target by 2020 (see, for example, Christoff 2015). Moreover, the protracted uncertainty around the Renewable Energy Target resulted in an 88% drop in investment in large scale renewables in Australia in the last year and a 13% fall in jobs (BNEF 2014; Ecogeneration 2015; RenewEconomy 2015). The cut in the target in June 2015 will further reduce investment in the renewables sector over the medium term.

However, by setting a strong emissions reduction target leading up to the Paris climate conference, Australia has an opportunity to move from a laggard to a constructive contributor to global action on climate change.

"By setting a strong emissions reduction target leading up to the Paris climate conference, Australia has an opportunity to move from a laggard to a constructive contributor to global action on climate change."

3.1 Australia is a significant emitter of greenhouse gases

Australia is described as a “high-emitting, highly developed country with strong capacity to address climate change” (CCA 2014).

Australia is the 13th largest emitter of greenhouse gases out of 195 countries (WRI 2015b; Figure 4) and it is one of the highest emitters per person (WRI 2015c; Table 2).

Not only is Australia a significant emitter, it is also a highly developed nation with both the responsibility and capacity to significantly reduce its greenhouse gas emissions. Furthermore, based on a 75% chance of meeting the 2°C target, if all of Australia’s coal resources were burned, it would consume two-thirds of the remaining global carbon budget (Climate Council 2015).

“Australia is 13th largest emitter of greenhouse gases out of 195 countries.”

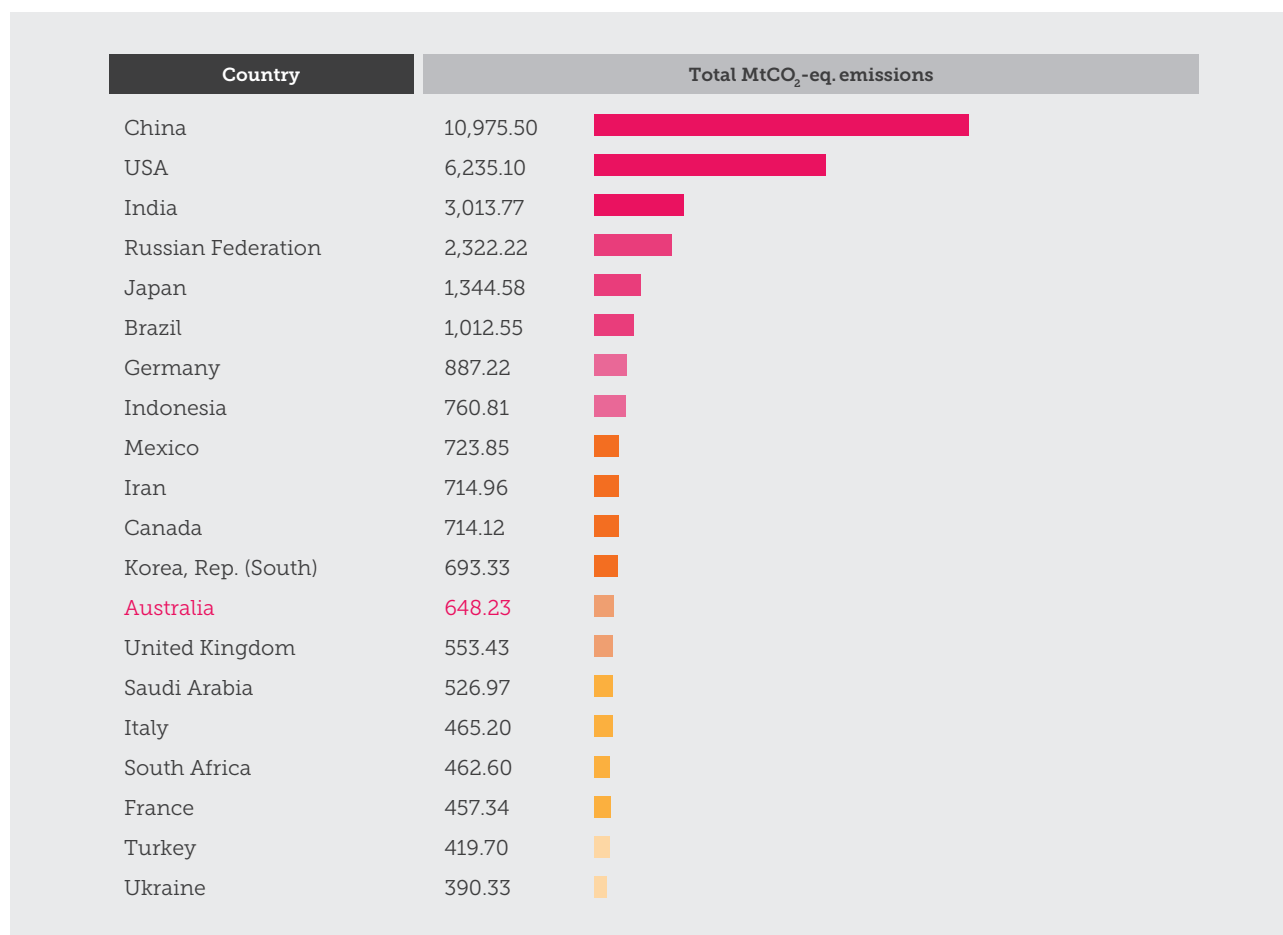
Table 2: Total GHG Emissions Including Land-Use Change and Forestry Per Capita (2012).

Country	tCO ₂ -eq. per person
Australia	30.14
Canada	24.64
US	18.55
New Zealand	13.26
Japan	9.46
EU	8.22
China	7.91

Source: WRI 2015c.

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Figure 4: Top 20 countries in terms of GHG emissions.



Source: Data from WRI 2015b; adapted from SMH 2015a.

The idea that developed nations, with a longer history of contributing to global emissions, have a greater capacity and responsibility to reduce their emissions relative to developing nations is encapsulated in the 'Common but Differentiated Responsibilities and Respective Capabilities' (CBDR-RC) principle. The CBDR-RC principle is enshrined within the United Nations Framework Convention on Climate Change (UNFCCC), to which Australia is a signatory, and recognises that whilst all nations must work together to reduce emissions, differing social and economic conditions limits the capacity of certain

countries to do so (Climate Nexus 2015). Whilst the CBDR-RC is an evolving and sometimes contested principle, at its heart is the notion that developed nations like Australia need to play a strong role in reducing their greenhouse gas emissions. This is an idea that Australia, along with 195 nations, recently reiterated at the 2014 Conference of the Parties in Lima. The 'call to action' statement asserted that a 2015 agreement in Paris should, "reflect the principle of common but differentiated responsibilities and respective capabilities, in light of different national circumstances" (UNFCCC 2014b).

3.2 Australia is losing ground on the world stage

In the last five years, countries around the world have accelerated action as the consequences of climate change become much more clear.

Thirty-nine countries and over 20 sub-national jurisdictions are putting a price on carbon – up from 35 countries and 13 sub-national jurisdictions in 2013. One hundred and forty-five countries have introduced renewable energy policies (REN21 2015). A further 26 countries are currently considering introducing a price on carbon (World Bank 2014; Climate

Council 2014c). At the time of writing, 46 Parties to the UNFCCC have already submitted emissions reduction targets (see Section 2.1).

Meanwhile, a report led by Kofi Annan, the former UN Secretary General, described Australia as a “free-rider” on other nations’ efforts to tackle climate change (Africa Progress Panel 2015). The 2015 Global Climate Change Legislation study, released by the UK Grantham Institute on Climate Change and Environment, found that Australia has become the first developed country

Figure 5: UN climate talks in Bonn, Germany, June 2015.



"Australians expect their government to take a leadership role internationally on emissions reductions."

to take a legislative step backwards from action on climate change (Nachmany et al. 2015). Moreover, France, as host of the UN climate conference, has urged Australia to set a strong emissions reduction target and live up to its international commitment to limit global warming to 2°C over pre-industrial levels (ABC 2015a). In addition, China, Brazil, the US, the EU and others have questioned the international credibility of Australia's 2020 emissions reduction targets and domestic policies (Climate Institute 2015a). For example, at recent climate talks in Bonn (Figure 5), Australia's Emission Reduction Fund was closely scrutinised by delegates (ABC 2015b; SMH 2015b).

Australia is signatory to the UNFCCC and has therefore committed to take strong climate action. However, several analyses have argued that Australia's 5% 2020 emissions reduction target is too low (CCA 2015b; Climate Institute 2014), and the Climate Change Authority

recommends that Australia move to a 19% emissions reduction target to stay in line with international action (CCA 2014, see Section 2.2. above). In addition, any emissions reductions achieved over the past few years in Australia's electricity sector have effectively been cancelled out since the repeal of the carbon pricing mechanism (Sandiford 2014; Pitt and Sherry 2015).

Australia's Renewable Energy Target was cut despite new global investment in renewable energy surging to more than US\$ 300 billion last year. These examples show how Australia is now lagging behind its allies and trading partners on climate action. Yet in the lead-up to the United Nations climate change conference in Paris, most Australians expect their government to take a leadership role internationally on emissions reductions (Lowy Institute 2015).

4. Setting Australia's emissions reduction targets

The Australian government will shortly announce Australia's emissions reduction targets beyond 2020. This is an important moment as it establishes the credibility, or otherwise, of Australia's efforts to tackle climate change.

There are a range of factors in assessing the strength of a target and whether a country is doing its fair share. This section, drawing on the CCA report "Comparing Countries' Emissions Targets: A Practical Guide" (CCA 2015b), is a simple guide for what to look out for when Australia sets its targets.

"There are a range of factors in assessing the strength of a target and whether a country is doing its fair share."

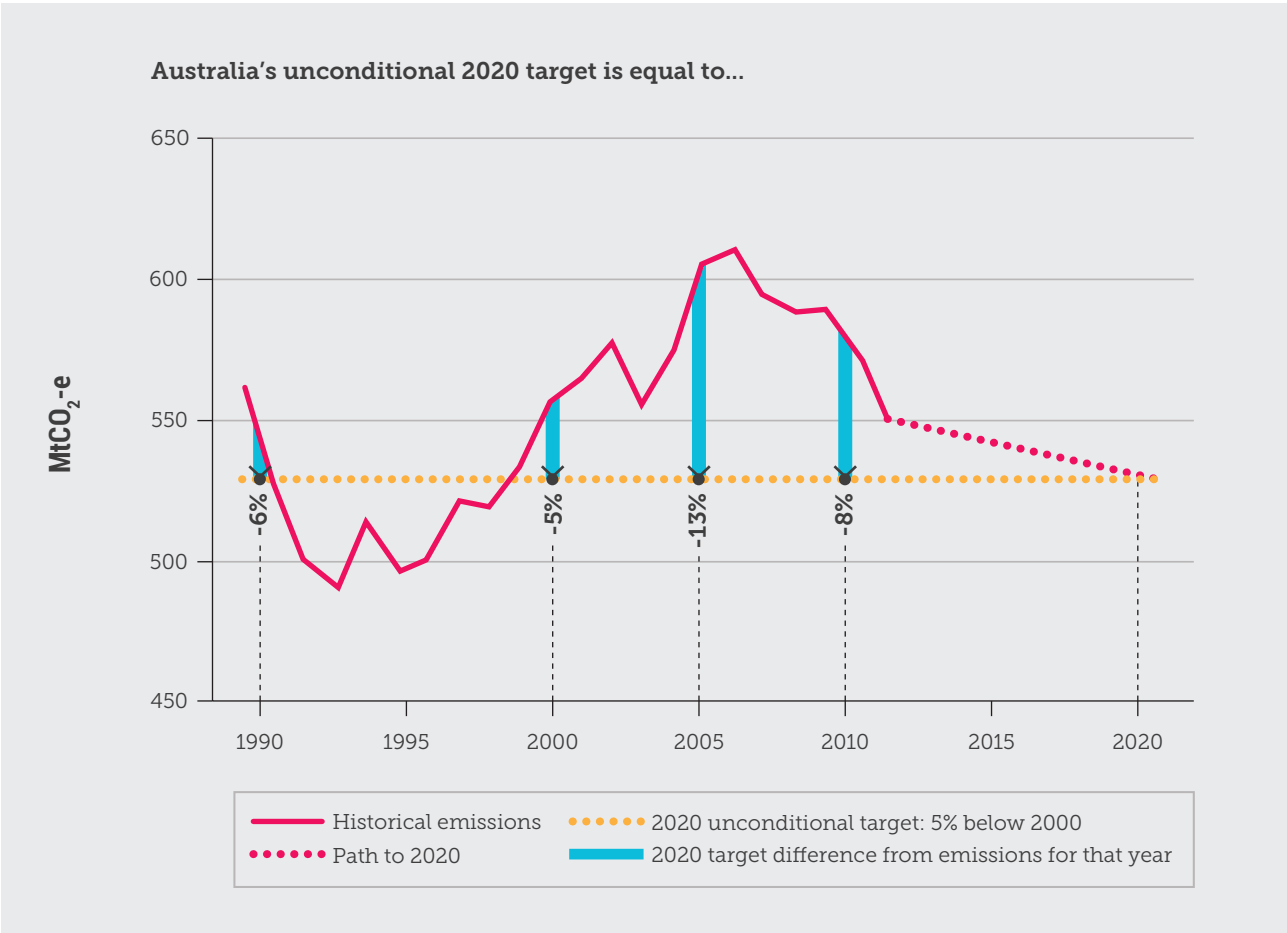
4.1 What is the baseline year?

A baseline year is a reference point in time against which emissions reductions in the future are measured. Countries measure their emissions reductions relative to the amount (usually measured in millions or billions of tonnes of GHGs) of their emissions in an earlier year (i.e., the baseline year). Emission targets are very sensitive to the baseline year chosen. If reductions are referenced to a year of unusually high emissions, it can make a country look like they are working harder than they actually are.

For example, Australia currently has an emissions reduction target of 5% by 2020 compared to 2000 levels (Figure 6). As 2005 was an unusually high year for Australia's emissions, if 2005 is used as a baseline the same emissions reduction target becomes a 13% reduction. If 2010 is used, the equivalent would be an 8% reduction target. You can see that the baseline year is important as it creates the impression of more (or less) effort, when in fact the actual amount of emissions reduced is exactly the same.

"Emission targets are very sensitive to the baseline year chosen. If reductions are referenced to a year of unusually high emissions, it can make a country look like they are working harder than they actually are."

Figure 6: Comparing targets to different reference years (1990 – 2020).



Source: Adapted from CCA 2015b.

4.2 How is a country's capacity to take action on climate change measured?

A country's capacity to reduce emissions is based on (i) levels of wealth, development and governance (i.e., lack of corruption); (ii) emission intensity (volume of emissions per unit of GDP, which reflects the structure of a country's economy, productivity and resource endowment), wealthy countries with very high emission intensities generally have more capacity to reduce; and (iii) resource endowments – e.g., renewable resources such as solar radiation and wind.

Australia's capacity to reduce emissions is very high, although we have a relatively high share of energy- and emissions-intensive industries so face a bigger task

to restructure our economy than many other countries. On the other hand, our emission intensity is roughly twice that of the USA (twice as many tonnes of CO₂-eq. per \$million GDP) and about 2.5 times that of Europe. If we meet our minimum 5% reduction target in 2020, our emission intensity would still be higher than that of the USA or Europe in 2010. This suggests that Australia has relatively more opportunities to reduce our emissions in the future. We are also endowed with some of the best renewable energy resources, both solar and wind, of any country in the world.

In summary, Australia's capacity to reduce GHG emissions is large, and is comparable, or higher, than the capacity of other developed countries such as the USA and the countries of the EU.

"Australia's capacity to reduce GHG emissions is large, and is comparable, or higher, than the capacity of other developed countries such as the USA and the countries of the EU."

4.3 Is the target in line with the science?

This criterion measures the effectiveness of a country's target in terms of meeting the 2°C temperature limit. Australia's share of the global emissions reduction target was assessed by the Climate Change Authority, which assigned it to a group of countries that have similar economies and levels of development. The USA, EU and Australia are in the same group.

Judged by this criterion, Australia's current 2020 target of a 5% reduction on 2000 levels is much too weak. If the world copied Australia's level of effort, we'd have little chance of staying below a 2°C rise in temperature.

The CCA has recommended that Australia should reduce its emissions 40 to 60% below 2000 levels by 2030 (or a range of approximately 45 to 65% below 2005 levels). It is important to note that the CCA's recommendations are based on a two-thirds chance of avoiding 2°C warming. For a stronger chance, the target should be higher. Therefore, if global average temperature is to stay below 2°C, then the CCA recommendations should be seen as a bare minimum for Australia's contribution to tackling climate change in concert with the rest of the world. The Climate Institute assessment recommends a 60% reduction by 2030 (65% below 2005 levels) to have a 75% chance of remaining below 2°C (Climate Institute 2015b).

"If the world copied Australia's level of effort, we'd have little chance of staying below a 2°C rise in temperature."

4.4 Is Australia doing its fair share?

This criterion attempts to take into account emissions levels in the past as well as in the present and future. It is a vexed issue that has bedeviled climate negotiations since their inception.

Although total emissions are vitally important for dealing with the climate change challenge (e.g., China is the biggest emitter), emissions per person is a better measure of responsibility. For example, in 2010 Australia ranked 13th amongst the world's 195 countries in terms of total emissions, but was one of the very highest of all countries (and was the highest of all developed countries except Luxembourg) in terms of emissions per person. Thus, Australia has a high responsibility compared to other developed countries and needs relatively stronger targets to converge over time to average levels of emission reductions per person.

"Australia is one of the very highest of all countries in terms of emissions per person. It has a high responsibility to set a strong emissions reduction target."

4.5 Is Australia reducing its fossil fuel emissions?

The CCA guidelines did not discuss “net emission reductions” via enhanced carbon uptake by trees via reforestation and forestry operations. These are often called “offsets” and are used to estimate a net emission reduction for a country – i.e., net emissions = fossil fuel emissions – uptake of carbon by forestry operations. That is, a country could achieve an apparent emission reduction with no reduction in fossil fuel emissions by increasing the uptake of carbon in forests.

This is a scientifically flawed approach. Reduction of fossil fuel emissions represents the retention of fossil carbon underground, locked away from the active carbon cycle (e.g., locked away from the atmosphere). Forestry uptake

represents a shift in the active carbon cycle from atmosphere to land systems; this stored carbon is vulnerable to loss back to the atmosphere via increased fire activity, increased insect infestation and human-driven forestry operations or clearing that release stored carbon back to the atmosphere (Mackey et al. 2013). Using forest uptake of carbon to “offset” fossil fuel emissions can actually become counterproductive by allowing the continual addition of “new carbon” from fossil sources to the atmosphere, and thus the active carbon cycle. Therefore, from a scientific perspective, fossil fuel emissions and land carbon release or uptake should be separated in any proper carbon accounting system. This means that effective climate action must focus on the reduction of GHG emissions from fossil fuel combustion.

“Effective climate action must focus on the reduction of GHG emissions from fossil fuel combustion.”

4.6 Is Australia reducing its emissions at home?

Countries can pay for reductions in carbon emissions elsewhere if it is cheaper than achieving the same level of emission reduction in their own country.

This “buys time” and does help reduce global emissions but ultimately is not a substitute for domestic emission reductions, which will ultimately be required everywhere to stabilise the climate system. Emissions trading can play a useful role to some extent, including by providing climate finance to poorer countries.

“Domestic emission reductions will be required everywhere to stabilise the climate system.”

5. The Paris climate conference: a crucial turning point

There is now an enormous body of evidence that climate change is already having increasingly negative impacts on almost every aspect of human society, as well as the environment that supports us (IPCC 2014).

Australia is on the front line of climate change. Annual average temperature over the continent has risen by 0.9°C since 1910 - not quite halfway to the 2°C warming limit - yet even at this seemingly modest increase in average temperature, climate change is already making many extreme weather events significantly worse.

Moreover, it is frequently contested that because Australia is such a small emitter, whatever it does won't make much difference to the global picture. This is wrong. Australia is the 13th largest emitter and is one of the largest per capita emitters in the world. The continent is also on the front line of climate change. It's in our national interest to set a strong emissions reduction target and work with the international community to tackle climate change. The upcoming Paris Conference, halfway through the Critical Decade, is a crucial point in turning the momentum towards rapid and deep decarbonisation of the global economy over the coming decades.

"The upcoming Paris Conference, halfway through the Critical Decade, is a crucial point in turning the momentum towards rapid and deep decarbonisation of the global economy over the coming decades."

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