LAGGING BEHIND: AUSTRALIA AND THE GLOBAL RESPONSE TO CLIMATE CHANGE

The Climate Council is an independent, crowd-funded organisation providing quality information on climate change to the Australian public.

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Preface

The Climate Council is an independent, non-profit organisation, funded by donations from the public. Our mission is to provide authoritative, expert information to the Australian public on climate change. This is the 17th publication of the Climate Council.

Updating the Climate Commission's report on 'Global Action Building on Climate Change' published in 2013, this report describes international efforts in the past year – focusing on China, the United States of America (US) and the European Union (EU) block of 28 member states, together responsible for more than half of global carbon dioxide emissions. The report also considers developments in Australia – one of the world's largest emitters of greenhouse gases – with a new government and host of the Group of Twenty (G20) Summit in Brisbane from 15 to 16 November 2014. With the G20 quickly approaching the report considers how Australia's national approach to climate change compares with key allies and trading partners.

The report describes trends in emissions, renewable energy uptake, climate change policies and renewable energy targets in China, the US, EU and Australia. Despite many positive developments, global greenhouse gas emissions, which are driving climate change, continue to rise. Yet if we are to stabilise the climate system and keep global warming below 2°C this century, then deep cuts in greenhouse gas emissions are needed. Collective action is required and the international community will have an ideal opportunity to create a new road map to tackle climate change at the United Nations (UN) Climate Summit in Paris from 30 November to 11 December 2015. Australia must play its role in contributing to global efforts.

We are very grateful to our team of reviewers whose comments and suggestions improved this report. The reviewers were: Howard Bamsey (Australian National University), Pep Canadell (CSIRO, Global Carbon Project), Mark Mills (Generation Investment Management LLP), Arek Sinanian (Enproc Pty Limited) and community reviewer Kath Rowley. We thank the Climate Council staff for their many contributions to the production of this report. The authors retain sole responsibility for the content of the report.

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Key Findings

1. China and the US have firmly moved from laggards to global leaders on climate change.

Whereas in years gone by China and the US may have been viewed as laggards, today they are providing substantial global leadership.

CHINA: The renewable energy powerhouse

- China now has the world's second largest carbon market in the world with seven domestic emissions trading schemes in operation covering a quarter of a billion people.
- China consolidated its position as the world's renewable energy powerhouse in the past year. China is number one in the world for installed renewable energy capacity, new installations and investment. In 2013, for the first time China installed more renewable energy capacity than fossil fuels.
- Renewable energy now provides nearly one fifth of China's annual electricity generation and renewable energy provides 2.6 million jobs.
- China retired 77 gigawatts (GW) of coal power stations between 2006 and 2010 and aims to retire a further 20 GW by 2015.
- All this effort has driven a decline of 26 percent in carbon intensity over the last eight years. China is on track to meet its goal of cutting its carbon intensity by 45 percent by 2020.

US: Stepping up to the plate

- The US is on track to meeting its international commitment to reduce emissions by 17 percent below 2005 levels by 2020.
- In May this year President Obama announced a new national plan to reduce greenhouse gas emissions. The centerpiece of the plan is historic rules to cut pollution from coal power plants by 30 percent.
- The US is second in the world for installed renewable energy due to a range of state based renewable energy targets, incentives and initiatives. The share of renewable energy generation in the US was 12.9 percent in 2013.
- Over half of the states of the US have renewable energy targets and ten states operate emissions trading schemes, including California the world's 9th biggest economy.

2. In the last five years most countries around the world have accelerated action on climate change as the consequences have become more and more clear.

- Global action on climate change includes countries putting a price on carbon and setting renewable energy targets.
- Thirty nine countries and over twenty sub-national jurisdictions are putting a price on carbon – up from 35 countries and 13 sub-national

jurisdictions in 2013. A further 26 countries are currently considering introducing a price on carbon.

- In early 2014, 144 countries had renewable energy targets and 138 had renewable energy support policies in place (up from 138 and 127 respectively in the previous year).
- The European Union, the world's third largest emitter, has reduced emissions by 19.2 percent since 1990. The EU has adopted a new emission reduction target of 40 percent below 1990 levels by 2030 and a renewable energy target of 27 percent by 2030.

3. Australia: a crucial player moves from leader to laggard.

- Australia is a major climate change player. Australia is the 15th largest emitter of greenhouse gases, larger than 170 other countries. On a per capita basis Australians emit more than Europeans or Chinese. This means that Australia has a responsibility to play its part and that Australian actions have a global influence.
- Australia's emission reduction target (5 percent reduction by 2020) has been found by the Climate Change Authority to be too low and out of step with our allies and trading partners.
- The future of Australia's renewable energy industry remains highly uncertain due to a lack of clear federal government renewable energy policy. Consequently investment in renewable energy in 2014 has dropped by 70 percent compared with the previous year.
- In the last few months the government has repealed the carbon tax (pricing mechanism) and introduced an incentive scheme called the Emission Reduction Fund. However, there remains uncertainty as to whether the scheme can meet the 5 percent national emission reduction target.
- Any emission 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.
- Australia is already experiencing the consequences of more frequent and severe extreme weather. Australia's global influence in averting these risks will depend on how effectively we implement policy solutions at home.

4. Global action must accelerate to protect Australia and the world from the consequences of a changing climate, sea level rise and more frequent and intense extreme weather.

- Greenhouse gas emissions are already at dangerous levels and continue to increase globally. To prevent catastrophic rises in global temperature humanity must substantially curtail the use of coal and other fossil fuels.
- The International Monetary Fund estimates that governments around the world spend nearly $2 trillion annually subsidising oil, natural gas, coal and electricity production. For every $1 spent to support renewable energy, another $6 are spent on fossil fuel subsidies. Without phasing out fossil fuel subsidies, the 2°C target will not be reached.
- The global community is building up to an important milestone in international negotiations on tackling climate change, the Paris Conference in 2015. Fora like the G20 will be important opportunities for countries to express their commitment to tackling climate change.

Introduction

This report considers global efforts in the past year to tackle climate change, focusing on China, the US and the EU, together responsible for more than half of global emissions (53 percent). This report also considers and compares developments in Australia over the past year, as the world's 15th (out of 186 countries) largest emitter of greenhouse gases (Climate Change Authority 2014) and 18th largest emitter of carbon dioxide (Global Carbon Project 2014) – emission figures throughout the report are either for greenhouse gas or carbon dioxide emissions and are stated accordingly.

In the past twelve months, China and the US have significantly stepped up their efforts to tackle climate change. The third largest emitter, the EU, has almost already achieved its 2020 target for reducing emissions and looks set to take on ambitious 2030 targets for emissions, energy consumption and renewable energy (Figure 1).

China has pledged to cut its carbon intensity (CO_2 emissions per unit of gross domestic product) by up to 45 percent by 2020 relative to 2005. And China now has the second largest carbon market in the world after successfully launching seven pilot emissions trading schemes. In September 2013, a new National Action Plan for Air Pollution Prevention and Control was introduced to reduce air pollution from fossil fuels and limit the proportion of coal in China's energy mix to 55 percent by 2040. In 2013, for the first time China installed more renewable energy capacity than fossil fuels and nuclear.

Similarly, there have been positive developments by another global energy giant, the United States of America. In 2014, the US announced measures to cut pollution from coal power plants by 30 percent. And the US is on track to meeting its international commitment to reduce emissions by 17 percent below 2005 levels by 2020. At the state level there is also positive momentum, with over half of US states having renewable energy targets or goals in place and ten states operating emissions trading schemes.

It is clear that many countries around the world are continuing to tackle climate change. The most common types of action include carbon pricing and supporting renewable energy. The number of countries and sub-national jurisdictions putting a price on carbon continues to increase. Now, about 39 countries and over 20 sub-national jurisdictions are putting a price on carbon – up from 35 countries and 13 sub-national jurisdictions in 2013. A further 26 countries are currently considering introducing a price on carbon (World Bank 2014). The largest emitters are also leading the world in development and investment in renewable energy. China and the US

Figure 1: Global comparisons

"We will declare war against pollution and fight it with the same determination we battled poverty."

Li Keqiang, Chinese Premier 2014

CHINA

Largest emitter globally

Increased CO_2 emissions by 4.2% in 2013

Target to reduce carbon intensity by 40–45% by 2020 compared with 2005 levels

19.6% of renewables in electricity generation for 2013

15% final energy from renewables by 2020

"Climate change is a fact. And when our children's children look us in the eye and ask if we did all we could to leave them a safer, more stable world, with new sources of energy, I want us to be able to say yes, we did."

Barack Obama, US President 2014

UNITED STATES

2nd largest emitter globally

Increased CO_2 emissions by 2.9% in 2013

Target to reduce emissions by 17% below 2005 levels by 2020

13% of renewables in electricity generation for 2013

No national renewable energy target

"We will be striving to forge an interregional consensus to agree on an ambitious roadmap for cuts in global greenhouse gas emissions."

Herman van Rompuy, President of the European Council 2014

"The greater a country's responsibilities and capabilities, the more ambitious its contributions ought to be. We in Europe are taking this principle very seriously."

Angela Merkel, German Chancellor 2014

EUROPEAN UNION

3rd largest emitter globally

Reduced CO_2 emissions by 1.8% in 2013

Target to reduce emissions by 20% below 1990 levels by 2020. And cut greenhouse gas emissions by at least 40% by 2030.

23.5% of renewables in electricity generation for 2013

20% final energy from renewables by 2020. 27% renewable energy target by 2030.

"We think that climate change is a significant problem, it's not the only or even the most important problem the world faces but it is a significant problem and it's important every country should take the action that it thinks is best to address emissions"

Tony Abbott, Australian Prime Minister 2014

AUSTRALIA

18th largest emitter globally

Reduced CO_2 emissions by 3.1% in 2013

Target to reduce emissions by 5% below 2000 levels by 2020

14.8% of renewables in electricity generation for 2013

41,000 GWh renewable energy by 2020 (20% of projected demand)

remained the top two countries for installed renewable energy capacity (REN21 2014). Worldwide, the number of countries with policies supporting renewable energy also continues to increase. In early 2014, 144 countries had renewable energy targets and 138 had renewable energy support policies in place (up from 138 and 127 respectively in the previous year).

Global efforts to turn down emissions will take time to impact on the trajectory of global emissions. Despite the positive progress, global greenhouse gas emissions continue to increase and the Earth continues to warm strongly. 2013 was the 37th year in a row of above average global temperature (NOAA 2014). In Australia heatwaves have already become more extreme, more frequent and are lasting longer, while bushfire conditions have worsened (Climate Council 2013; 2014a; IPCC 2014a). The impacts on our nation are clear.

Countries around the world, including Australia, have agreed that global warming beyond 2°C would have devastating impacts. Consequently 2°C has been identified as a threshold that should not be crossed. This requires urgent, rapid and deep cuts in greenhouse gas emissions, particularly from fossil fuels like coal, oil and gas.

According to the Global Commission on the Economy and Climate (2014), economic activity and investment over the next 15 years will determine the future of the world's climate system:

> *Without stronger action in the next 10–15 years, which leads global emissions to peak and then fall, it is near certain that global average warming will exceed 2°C, the level the international community has agreed not to cross. On current trends, warming could exceed 4°C by the end of the century, with extreme and potentially irreversible impacts (Global Commission on the Economy and Climate 2014).*

According to the latest Intergovernmental Panel on Climate Change (IPCC) Synthesis Report, if global emissions continue to rise on a "business as usual" basis then global temperature will rise between 3.7 to 4.8 °C above preindustrial levels by 2100. This level of temperature increase would be catastrophic (IPCC 2014b).

We have the ability to tackle climate change and to build a more prosperous, sustainable future – and the big energy giants (China, the US and the EU) are leading the way.

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1. CHINA AND THE US STRENGTHEN THEIR RESPONSES TO CLIMATE CHANGE

Over the past year, both China and the US have taken strong steps toward positioning themselves as global leaders in renewable energy and putting themselves towards a path to reduce greenhouse gas emissions.

China

"We will declare war against pollution and fight it with the same determination we battled poverty."

Li Keqiang, Chinese Premier, March 2014 (National People's Congress of the People's Republic of China 2014)

In recent years China has significantly increased its response to climate change. China remains the world's renewable energy powerhouse, continuing to invest heavily in rapidly expanding its capacity since 2011. Building on its previous years' efforts to reduce emissions and tackle air pollution, China announced a new national plan to limit coal consumption and reduce PM2.5 emissions (PM2.5 is generally described as fine particles, 2.5 micrometers or less in diameter). With seven pilot emissions trading schemes successfully up and running, China now has the second largest carbon market in the world. China's emissions continue to increase for the time being, yet recent investment in renewable energy and new air pollution measures can help reverse growth in emissions. Strong leadership from China to reduce its emissions can help build the goodwill required for nations to create more ambitious climate change goals.

China's national and international commitments on emissions

China is the world's largest greenhouse gas emitter since overtaking the US in 2006, producing 28 percent of global CO_2 emissions in 2013 (IEA 2013a; Global Carbon Project 2014). China's CO_2 emissions continue to grow – at 4.2 percent in 2013 and 3 percent in 2012 – albeit at a lower rate compared to annual increases of about 10 percent over the last decade.

China's per capita emissions from burning fossil fuels and producing cement are 7.2 tonnes of carbon dioxide per person (tCO_2/capita), while Australia's fossil fuel emissions per person remain much higher at 14.6 tonnes of CO_2 (Global Carbon Project 2014).

It is noteworthy that about a quarter of China's emissions result from providing products to the developed world, and not for China's domestic use (The Economist 2013; Global Carbon Project 2014).

About a quarter of China's emissions result from providing products to the developed world, and not for China's domestic use

China has pledged internationally to reduce its carbon intensity – that is, CO_2 emissions per unit of gross domestic product (GDP) – by 40–45 percent in 2020 relative to 2005. This equates to reducing fossil fuel carbon intensity by around 3.9 percent every year until 2020. China appears to be broadly on track to achieving its target with a 3.9 percent fall in 2012, 3.5 percent in 2013, and an overall decline in carbon intensity of 26 percent between 2005 and 2013 (Jotzo and Teng 2014).

China's *Twelfth Five-Year Plan (2011–2015) for National Economic and Social Development* (Government of the People's Republic of China 2011) sets out

national goals for 2015 designed to meet China's international commitments:

- Reduce carbon intensity by 17 percent (relative to China's Eleventh Five-Year Plan)
- Reduce energy consumption per unit of GDP by 16 percent (relative to China's Eleventh Five-Year Plan)
- Increase the ratio of non-fossil fuelled energy to 11.4 percent, with renewable energy providing 9.5 percent
- Add 12.5 million hectares of new forests (relative to China's Eleventh Five-Year Plan) (IETA 2014a).

While China has not yet made any official announcements regarding post 2020 commitments, it is considered likely to place an absolute cap on emissions and coal for its next Five Year Plan (Climate Change Authority 2014; Jotzo and Teng 2014).

Air pollution and climate change

Air pollution continues to be a strong driver for China to reduce its coal consumption and tackle climate change (see, for example, Box 1).

In September 2013, China's State Council released a five-year National Action Plan for Air Pollution Prevention and Control (National Action Plan) aiming to reduce small particulate PM2.5 pollution, reduce the proportion of coal in China's energy mix to below 65 percent and increase non-fossil fuel energy sources to 13 percent of consumption by 2017 (Allens 2013; Clean Air Asia 2014).

The National Action Plan focuses on three regions cumulatively responsible for a third of China's coal consumption – Beijing-Tianjin-Hebei area, Yangtze River Delta and Pearl River Delta. The plan requires concentrations of PM2.5 fine particulates be reduced by 25 percent in the Beijing-Tianjin-Hebei area, 20 percent in the Yangtze River Delta and 15 percent in the Pearl River Delta compared to 2012.

The National Action Plan establishes specific targets for reducing coal consumption in Hebei (reduction of 40 million tonnes), Shandong – China's largest coal consumer (20 million tonnes) and Beijing (13 million tonnes) by 2017. New coal fired power stations are banned in Beijing, Shanghai and Guangzhou and emissions standards apply for new coal-fired plants proposed in ten other regions (IEA 2014).

New coal-fired power stations are banned in Beijing, Shanghai and Guangzhou

The National Action Plan also targets vehicle emissions, requiring all vehicles registered before the end of 2005 to be off the road by 2015 in the targeted regions (Beijing-Tianjin-Hebei, Yangtze River Delta and Pearl River Delta), and nationally across China by 2017.

After releasing the National Action Plan, China has continued to introduce further measures to tackle the problem of air pollution. Recently the country announced plans to set limits on coal imports with more than 16 percent ash and 3 percent sulphur from January 2015 (SMH 2014a).

BOX 1 – BEIJING CLEAN AIR ACTION PLAN

The city of Beijing has introduced local clean air action plans, setting out detailed targets for reducing coal consumption (Allens 2013; Clean Air Asia 2014).

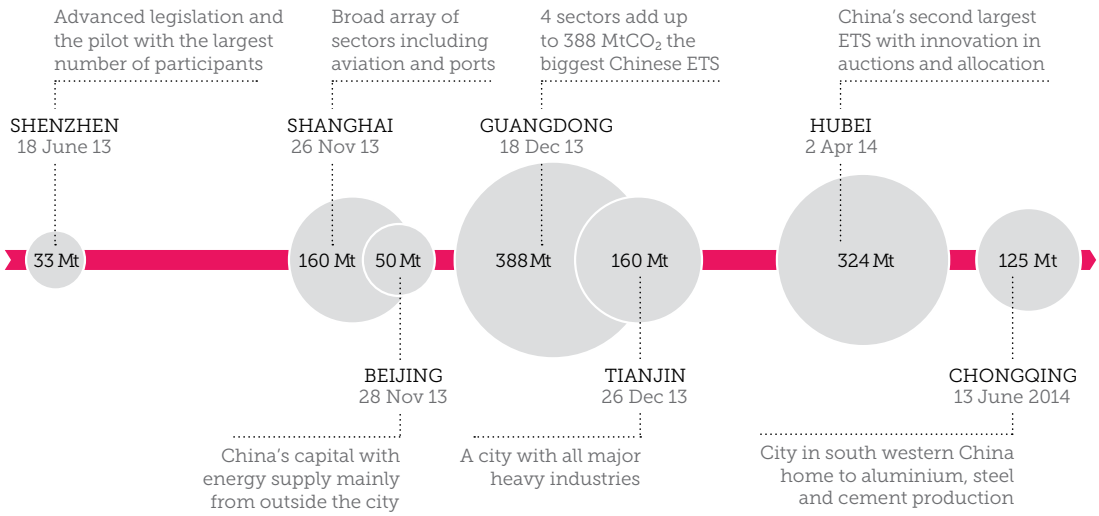
The Beijing Clean Air Action Plan details 84 actions to reduce air pollution, and sets targets to:

- Reduce coal consumption by 8 million tonnes per year by 2015 (compared with 2012 levels)
- Remove all coal-fired boilers within urban Beijing
- Permit no new conventional coal fired generation
- Complete a series of coal-gasification and liquefied natural gas projects as well as transmission lines to bring in clean energy from western China
- Limit vehicle registrations to less than 6 million.

Carbon pricing

China has introduced seven emissions trading schemes (Figure 2) which are now operating in five cities (Beijing, Tianjin, Chongqing, Shanghai and Shenzhen) and two provinces (Hubei and Guangdong), with a combined population of quarter of a billion people. These pilot schemes are intended to set the foundation for a national scheme to be brought in during the 13th Five-Year Plan, in 2016 to 2020 (IETA 2014a).

Figure 2: China's emissions trading schemes



Sources: Adapted from World Bank 2014. Chongqing data from ICAP 2014

China's pilot emissions trading schemes collectively cover 1,115 $MtCO_2e$, which means China is now home to the second largest carbon market in the world, after the EU (2,084 $MtCO_2e$) (World Bank 2014).

China is home to the world's second largest emissions trading scheme

Diverse provinces and cities were selected for the pilot emissions trading schemes representing the range of development and economic activity across China (Figure 2). Together the seven pilot cities and provinces account for around 19 percent of China's population, 33 percent of its GDP, 20 percent of its energy use and 16 percent of China's CO_2 emissions (based on 2010 figures) (World Bank 2014).

Most of the pilot schemes have set absolute limits on emissions apart from Shenzhen, which has a mandatory emissions intensity cap. By June 2014 all of the seven pilot schemes were operating. Carbon prices (per tonne) have so far ranged from approximately US$ 20 in Shenzhen to US$ 3.60 in Hubei (World Bank 2014).

Coal in China

Increasing global demand for fossil fuels, particularly coal, has seen global emissions rising significantly in the last few decades. To prevent catastrophic rises in global temperature humanity must substantially curtail the use of coal and other fossil fuels.

Coal continues to supply the majority of China's energy requirements (69 percent), and China accounts for almost half of global coal consumption (IEA 2014). However, the US Energy Information Administration (US EIA 2014a) projects the proportion of coal in China's energy mix to decline over time to 63 percent by 2020 and 55 percent by 2040, as the country tackles air pollution and invests in non-fossil fuel energy. This movement away from a reliance on coal and the closure of older, inefficient power plants is one of the most impressive examples of China's intent to tackle climate change. China retired 77 gigawatts (GW) of coal power stations between 2006 and 2010 and aims to retire a further 20 GW by 2015 (IEA 2014).

This movement away from a reliance on coal and the closure of older, inefficient power plants is one of the most impressive examples of China's intent to tackle climate change

China on track to meet renewable energy targets

China has committed internationally to increase its share of non-fossil fuel energy sources in primary energy consumption to 15 percent by 2020. In order to meet this target, China has set specific 2015 and 2020 targets for types of installed renewable capacity (Table 1). By the end of 2013, China was nearly halfway towards achieving its 2020 renewable energy capacity targets (REN21 2014). According to Bloomberg New Energy Finance (2014), China is aiming to add 14 GW of solar PV capacity in 2014.

Table 1: China's installed renewable energy capacity and targets

Renewable energy type	Installed capacity 2013 (GW)	2015 capacity target (GW)	2020 capacity target
Hydro	260	290	420
Solar PV	21	35	50
Wind	91	100	200
Biomass	6.2	13	30
Concentrating Solar Power	~0	1	200
Total	378	439	900

(REN21 2014)

Note: Installed capacity provides a measure of the amount of renewable energy being added. However capacity should not to be confused with electricity generated over time – the more relevant for emissions. Electricity generated is affected by the capacity of a power station, and the proportion of capacity used.

China consolidated its position as world leader in renewable energy in the past year, and is now number one in installed renewable energy capacity, new installations and investment. In 2013, China invested US$ 56.3 billion in renewable energy – more than all of Europe combined. China is now home to about a quarter (24 percent) of the world's renewable energy capacity (REN21 2014).

Notably in 2013, for the first time China installed more renewable energy capacity than fossil fuels and nuclear (REN21 2014).

In 2013, for the first time China installed more renewable energy capacity than fossil fuels and nuclear

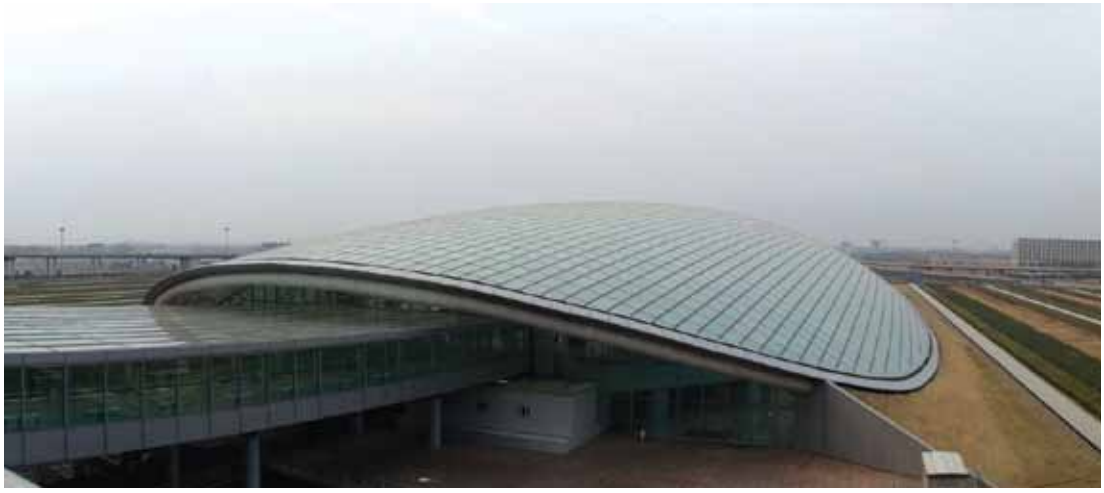
BOX 2 – CHINA BREAKING WORLD RECORDS IN SOLAR PV

In 2013, China set a new world record for solar PV installations (Figure 3), installing 12.9 GW of new capacity.

China is a major exporter of clean technology, and its solar PV industry generated a national income of US$ 52 billion in 2013 (IRENA 2014).

Renewable energy supports 2.6 million jobs in China. Over half, 1.6 million, of these jobs are in solar PV (IRENA 2014).

Figure 3: Solar PV in China



China Snapshot

In 2013–2014, China:

- Cemented its intent to become a global leader in acting on climate change.
- Continued to lead the world in total renewable energy capacity (and led in total wind and hydro power capacity) – 378 GW of installed capacity
- Led the world in new renewable energy installations
- Set a new world record for solar PV installations – 12.9 GW
- Provided nearly one fifth (19.6 percent) of its annual electricity generation from renewables (RenewEconomy 2014a).
- Generated national income of US$ 52 billion in 2013 from its solar PV industry (IRENA 2014)

Table 2: China – 2013 key statistics

Population	1,385 million
Total CO_2 emissions from burning fossil fuels and producing cement ($MtCO_2$)	9,977 (increased 4.2% on 2012)
Emissions per capita from burning fossil fuels and producing cement (tCO_2/person)	7.2
New investment in clean energy (US$)	54.2 billion
Jobs in renewable energy	2.6 million

(Global Carbon Project 2014, REN21 2014)

Table 3: China's Solar PV and wind capacity

	Installed solar PV capacity	Installed wind capacity
2005	100 MW	1,300 MW
2012	7,000 MW	75,000 MW
2013	21,000 MW (200% increase on 2012)	91,000 MW (44% increase on 2012)
2015 target	35,000 MW	100,000 MW
2020 target	50,000 MW	200,000 MW

(REN21 2006; 2013; 2014)

2020 emissions target

- Reduce carbon intensity by 40–45 percent compared with 2005

2020 renewable energy target

- Increase non fossil fuel energy to 15 percent of final energy, including specific targets for installed capacity – 420 GW hydro, 50 GW solar PV, 200 GW wind, 30 GW biomass and 200 GW concentrating solar power

Carbon pricing

- National emissions trading scheme planned for 2016–2020
- Seven pilot emissions trading schemes operating
- China now has the second largest carbon market in the world (after the EU) covering the equivalent of 1,115 $MtCO_2e$ (World Bank 2014)

United States (US)

> *"Climate change is a fact. And when our children's children look us in the eye and ask if we did all we could to leave them a safer, more stable world, with new sources of energy, I want us to be able to say yes, we did."*
>
> Barack Obama, US President
> (The Whitehouse 2014)

Like China, the US again stepped up its efforts to tackle climate change over the last year. Building on the direction set out in his State of the Union Address, President Obama announced a new national plan to reduce greenhouse gas emissions, prepare for climate change impacts and lead international efforts (The Whitehouse 2013a). The centrepiece of the Obama Administration's plan are historic rules to cut pollution from coal power plants by 30 percent.

Although this is a historic move in terms of US federal action, US states have long been leading the way on tackling climate change. More than half of US states now have renewable energy targets or goals in place and ten states have operating emissions trading schemes.

More than half of US states now have renewable energy targets

US commitments on emissions

The US is the world's second largest emitter (responsible for 14 percent of global emissions). Since 2007 US emissions have been declining (US EPA 2014a). The exception is last year where CO_2 emissions from burning fossil fuels and producing cement increased by 2.9 percent, due to higher gas prices leading to increased coal consumption, and an overall increase in demand for energy due to a cold winter (Global Carbon Project 2014; US EIA 2014b). US emissions per person remained among the highest at 16.4 tCO_2/capita (Global Carbon Project 2014).

The US's international commitment to reduce emissions remains unchanged with a pledge to reduce emissions by 17 percent below 2005 levels by 2020. The US is likely to meet or exceed this target (Climate Change Authority 2014).

The US is on track to reduce its emissions by 17% below 2005 levels by 2020

Vehicle emissions standards introduced nationally in 2011 are estimated to significantly reduce US emissions, in the order of 6,000 $MtCO_2e$ between 2011 and 2025 (Climate Change Authority 2014). An energy efficiency program that reduces greenhouse gas emissions by 4,700 metric tons of CO_2 per year has the same impact as removing 1,000 vehicles from the road (EPA 2014). Reducing emissions by 6,000 $MtCO_2e$ over 15 years (2011–2025) is the equivalent of removing over 85 million cars during that period.

The Environment Protection Authority recently issued "Flexible Carbon Pollution Standards for Power Plants" to help curb pollution from coal. Nationwide, the EPA projects the new regulations would achieve 30 percent reductions on 2005 levels by 2030 in electricity generation CO_2 emissions (US EPA 2014b).

The US submission to the UN set out an indicative pathway to a 30 percent reduction in emissions in 2025 and a 42 percent reduction in 2030, in line with the goal to reduce emissions 83 percent by 2050 (US DoS 2010).

BOX 3 – US CLIMATE ACTION PLAN

In June 2013, President Obama announced the "*US Climate Action Plan*" outlining new actions to reduce emissions, prepare for climate change impacts and lead international efforts. The plan establishes a goal to double renewable electricity generation by 2020 (The Whitehouse 2013a).

The *US Climate Action Plan* uses the President's executive powers to:

- Establish carbon pollution standards for new and existing fossil fuelled power plants, requiring new generators to incorporate carbon capture and storage
- Guarantee $8 billion in loans for fossil energy projects employing carbon capture and storage, or other technologies designed to reduce greenhouse gas emissions
- Increase regulation of methane emissions from oil and gas production
- Permit enough renewable energy on public lands by 2020 to power more than six million homes (10 GW)
- Install 100 MW of renewable energy on federally assisted housing by 2020
- Expand and modernize the electricity grid, streamlining the process for installing new transmission lines
- Increase federal funding for clean energy to nearly US $8 billion
- Maintain the commitment to deploy renewables on military installations
- Expand fuel economy standards to cover heavy duty vehicles from 2014
- Implement a wide range of energy efficiency policy measures
- Expand major new and existing international climate change initiatives, including bilateral initiatives with China, India, and other major emitting countries
- Lead global public sector financing towards cleaner energy, calling for the end of US government support for new coal-fired powers plants overseas, except for the most efficient coal technology available in the world's poorest countries, or facilities deploying carbon capture and storage technologies
- Require federal government agencies to reach 20 percent renewable energy for energy consumed by 2020 through installing renewable energy on-site at federal facilities, or purchasing renewable energy certificates

(The White House 2013a; 2013b; Climate Institute 2014)

Carbon pricing

Ten US states – with a combined population of 79 million – already have operating carbon pricing schemes, and two more states, Oregon and Washington, are currently considering adopting carbon pricing.

The Regional Greenhouse Gas Initiative is a cap and trade emissions trading scheme involving nine US states – Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New York, Rhode Island, and Vermont. These states cooperate to place an upper limit on CO_2 emissions from the power sector, reducing these emissions over time. The scheme officially started in 2008 when the first CO_2 allowances were auctioned. The *Regional Greenhouse Gas Initiative* only covers the utility sector and involves individual state-based cap and trade programs trading between one another. In January 2014, the *Regional Greenhouse Gas Initiative* tightened emissions limits on its cap and trade scheme by 45 percent resulting in prices above US$ 4 per tonne of CO_2 (Business Spectator 2014; Climate Institute 2014; World Bank 2014).

Ten US states – with a combined population of 79 million – are using carbon pricing to bring down emissions, including California the world's 9th biggest economy

California, the world's 9th largest economy, now has a multi-sector cap-and-trade program after formally commencing in 2013. The scheme is designed to contribute to the state's economy-wide target for reducing emissions to 1990 levels by 2020. In January 2014, California officially linked its emissions trading scheme with Quebec, Canada. And from 2015, this will be the first such scheme in the world to include emissions from transport fuels (World Bank 2014).

Renewable energy

The US is second in the world for installed renewable energy due to a range of state based renewable energy targets, incentives and initiatives. The share of renewable energy generation in the US was 12.9 percent in 2013 (up from 12.2 percent in 2012).

State based renewable energy targets, incentives and initiatives has seen the US placed second in the world for installed renewable energy

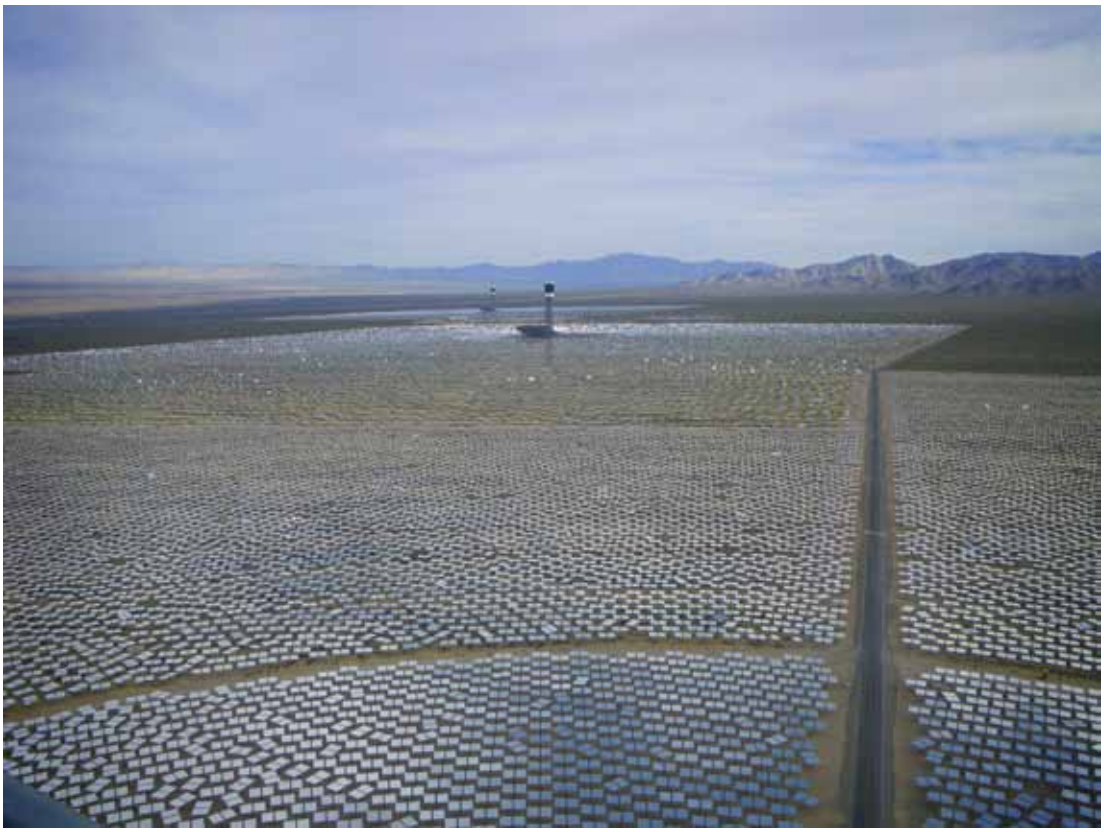
In 2013 renewable energy generated in the US was mainly from hydroelectric power (52 percent), followed by wind (32 percent), biomass (12 percent) geothermal (3 percent), and solar (2 percent) (US EIA 2014c).

In 2011, the US Department of Energy initiated the SunShot initiative with the aim of making solar power in the US cost competitive with other electricity sources within ten years. The initiative has specifically encouraged 'utility-scale' solar PV (generally projects with more than a megawatt capacity) and concentrating solar power projects feeding directly into the grid. In 2013, a record 2.3 GW of utility scale solar was installed across the US. Only three years into the initiative, solar electricity prices are already falling dramatically (from $0.21 per kWh in 2011 to $0.11 in 2014) and are more than halfway to achieving the goal of $0.06 per kWh (US Department of Energy 2014b; 2014c).

The US is leading the world in new installations of concentrating solar power plants due to tax incentives and federal and state grants for utility scale solar power. In 2013, the US commissioned the three largest concentrating solar power plants in the world: Ivanpah (391 MW tower with direct steam generation; Figure 4), Solana (280 MW with six-hour storage) and Crescent Dunes (110 MW with ten-hour storage). Installed solar PV capacity reached 12 GW, up 68 percent on 2012 (REN21 2014). Two further projects in southern California – Mojave (250 MW) and Genesis (250 MW) – will become fully operational this year (Power Engineering 2014).

The US is leading the world in new installations of concentrating solar power plants

Figure 4: US concentrating solar power plant



However, policy uncertainty affected new wind energy installations in the US, which only totalled 1 GW in 2013 compared to 13 GW in 2012. The fall in new installations was due to the anticipated closure of renewable production tax credits at the end of 2014 which have since been extended (IEA 2014a).

BOX 4 – TEXAS COMPETITIVE RENEWABLE ENERGY ZONE

In 2014, extensive new transmission lines were completed in the Panhandle and Western parts of Texas, designed to open up new high quality wind resources. 3,600 miles of new high voltage power lines were constructed linking high wind resource areas to customers in Dallas-Fort Worth, Austin and Houston at a cost of US $7 billion (more than the US spends annually on transmission lines in some years). The new Competitive Renewable Energy Zone has been successful in attracting new renewable energy projects with developers working on 7 GW of new capacity at the end of 2013. The grid operator is already exploring additional transmission expansions due to high demand (The New York Times 2014).

Texas is leading the US in wind energy

In 2013–2014, Texas wind energy (Figure 5):

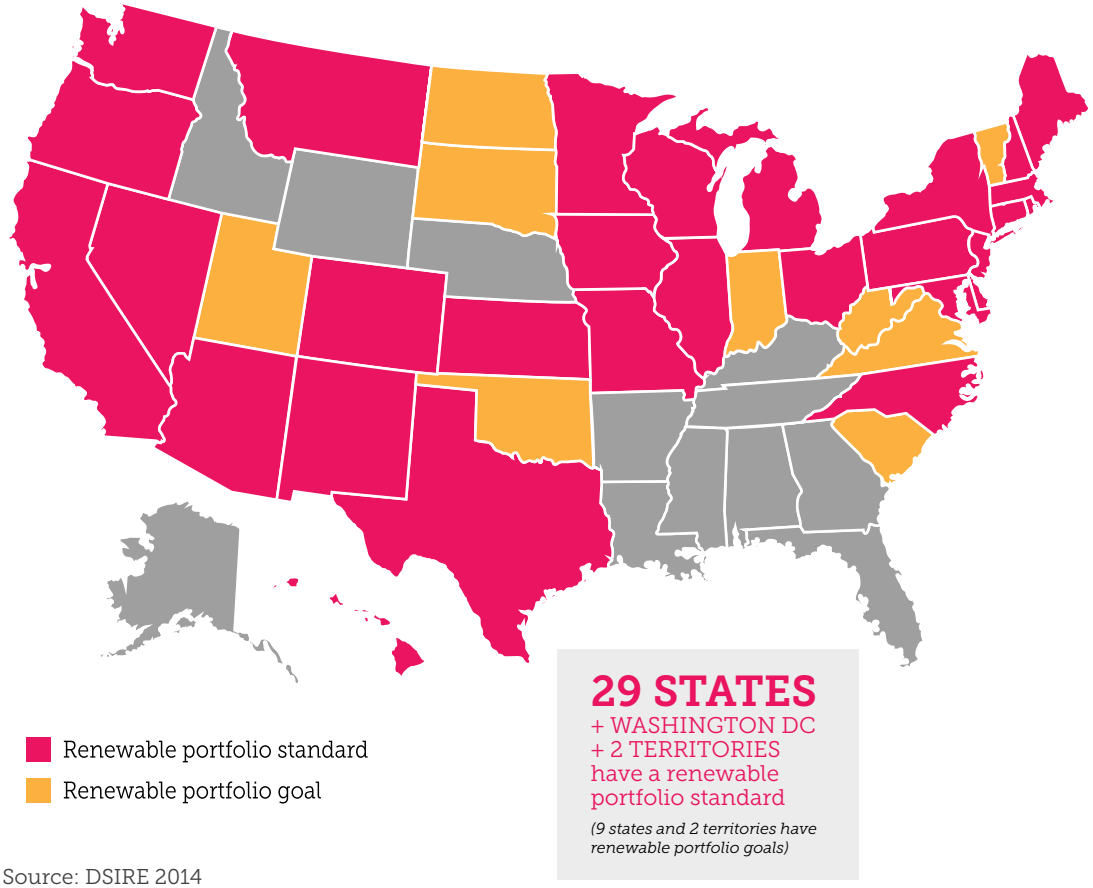
- Set a new US record on 26 March 2014, generating 10,296 MW at 8:48PM, or nearly 29 percent of electricity on the power grid in that moment
- Reached 11,000 MW of installed capacity, with 8,000 MW due to come on line soon and more than 26,700 MW under study
- Contributed 9.9 percent to the state's overall electricity supply
- Provided over 8,000 jobs

(Forbes 2014, American Wind Energy Association 2014)

Figure 5: A wind farm north of Corpus Christi, Texas

More than half of US states have State Renewable Energy Portfolio Standards in place. Many states have set ambitious targets for renewables. For example, California is aiming for renewables to make up 33 percent of final energy (all energy consumed) by 2020, and New York is aiming for 30 percent of final energy from renewables by 2015.

Figure 6: US states with renewable energy portfolio standards



Source: DSIRE 2014

US Snapshot

In 2013–2014, the US:

- Stayed on track to reduce emissions 17% on 2005 levels by 2020.
- Was second in the world on renewable power capacity
- Led the world in new installations of concentrating solar power capacity, biodiesel and fuel ethanol production
- Led the world in total installed biopower and geothermal power capacity
- 70 percent of the value of wind turbines installed in the US are "Made in the USA"

Table 4: US 2013 key statistics

Population	320 million
Total CO_2 emissions from burning fossil fuels and producing cement ($MtCO_2$)	5,233
Growth rate	increase 2.9% on 2012
Emissions per capita from burning fossil fuels and producing cement (tCO_2/person)	16 (2013)
New investment in clean energy (US$)	33.9 billion (2013)
Jobs in renewable energy	625,000 (2013)

(Global Carbon Project 2014; REN21 2014)

Table 5: US Solar PV and wind capacity

	Installed solar PV capacity	Installed wind capacity
2005	200 MW	9,150 MW
2012	7,200 MW	60,000 MW
2013	12,100 MW (68% increase on 2012)	61,000 MW (1.7% increase on 2012)

(REN21 2006; 2013; 2014)

2020 emissions target

› Reduce emissions by 17 percent below 2005 levels

2050 emissions target

› Reduce emissions by 83 percent below 2005 levels

2020 renewable energy targets

› Federal agencies are required to increase renewable energy consumption to 20 percent (The White House 2013)

› More than half US states have State Renewable Energy Portfolio Standards or targets. 29 states plus Washington DC and two territories have mandatory targets, 9 states have voluntary targets in place (DSIRE 2014).

Carbon pricing

› Emissions trading schemes currently operate in ten US states, but there is no national scheme.

2. ONGOING EFFORTS IN THE EU CONTINUE TO REDUCE EMISSIONS

In the EU, which comprises 28 countries and some of the world's largest economies, ongoing efforts to reduce emissions are delivering consistent results. The EU has decreased emissions by 19.2 percent below 1990 levels (in 2012), close to achieving its 2020 emissions reduction target of 20 percent below 1990 levels. Emissions per capita in the EU have continued to decrease from 9.1 tonnes in 1990 to 6.8 tonnes in 2013.

The EU is now looking to redouble its efforts post 2020, with the EU Commission launching a new framework in January 2014 outlining even more ambitious 2030 targets for reducing emissions and increasing renewable energy.

EU commitments on emissions

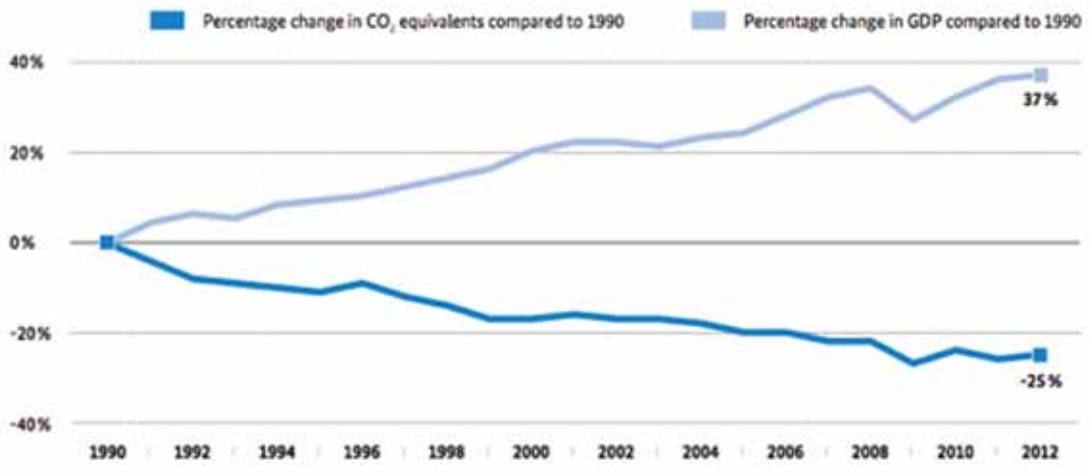
The EU has the third highest emissions (representing 10 percent of global CO_2 emissions) after China and the US. CO_2 emissions have steadily declined in the EU since the 1990s and decreased a further 1.8 percent in 2013 (Global Carbon Project 2014).

The EU has pledged to reduce its emissions to 20 percent below 1990 levels by 2020 and is already well on the way to achieving this goal. In 2012, greenhouse gas emissions in the EU had decreased by 19.2 percent since 1990 with Germany (Box 5) and the United Kingdom together responsible for almost half of the decrease. Spain experienced the largest emissions increase over the same time period, despite the country's rapid deployment of renewable energy technologies (European Environment Agency 2014). More recently, at its Climate and Energy Summit in October 2014, the EU pledged to make even further cuts in its greenhouse gas emissions, setting a target of at least 40 percent in emissions reductions by 2030 and a 27 percent renewable energy target by 2030 (European Council 2014).

BOX 5 – GERMANY DECOUPLING ECONOMIC GROWTH FROM CO_2

Germany is demonstrating an effective economic model of reducing emissions while growing its economy (BMUB 2014; Figure 7).

Figure 7: Germany decoupling economic growth from emissions



Source: http://www.umweltbundesamt.de/presse/presseinformationen/treibhausgasausstoss-im-jahr-2013-erneut-um-12
and Working Group on Energy Balances (Arbeitsgemeinschaft Energiebilanzen): Selected efficiency indicators for Germany's energy balance

EU has set new targets for 2030

Carbon pricing

The EU established the first multi-national cap and trade emissions trading scheme in 2005, which has now been operating for almost a decade. The EU emissions trading scheme is the largest carbon market in the world in terms of coverage, scale and value (IETA 2014b). The EU emissions trading scheme:

- Covers 11,000 power plants
- Over 31 countries
- The equivalent of 2,039 $MtCO_2e$ in 2013
- Around 45 percent of EU emissions (World Bank 2014)

Being one of the first emissions trading schemes for carbon dioxide, the EU scheme has had a number of significant teething issues that continue to affect it. In 2013, the EU emissions trading scheme continued to be affected by the economic downturn in Europe, leading to a surplus of allowances and depressed prices, in the range of US$ 5–9. The low carbon price was partly responsible for some EU member states (United Kingdom, Spain, Germany and France) increasing their coal consumption (REN21 2014).

Renewable energy in Europe

The EU's target for renewable energy is 20 percent of gross final energy consumption from renewable sources by 2020, and 27 percent by 2030 (European Council 2014). The EU has reached 11 percent to date (2012) (European Commission 2014).

In the EU, renewables made up 72 percent of new capacity installed in 2013 – this is a complete contrast to ten years ago when fossil fuels accounted for 80 percent of new capacity (REN21 2014).

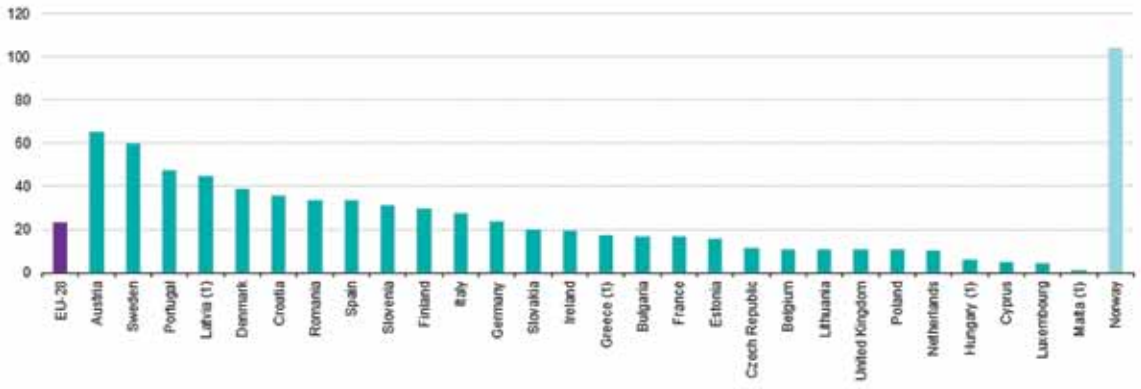
Biomass, renewable waste and hydropower are the main sources of renewable energy in the EU, however output from wind and solar energy has rapidly expanded (REN21 2014). In 2012, Germany, France, Sweden and Italy were the largest producers of renewable energy in the EU (European Commission 2014; Figure 8).

Each EU member state has negotiated domestic targets contributing to EU wide targets, for example:

- France – 23 percent final energy from renewables by 2020
- Germany – 45 percent of electricity generation from renewables by 2035
- UK – 15 percent final energy from renewables by 2020

Renewable energy now provides almost a quarter (23.5 percent) of the EU's electricity needs (European Commission 2014). Figure 8 shows the proportion of electricity generated from renewables in 2012 by different EU member countries.

Figure 8: Proportion of electricity generated by renewables in EU countries



(1) Estimate.
Source: Eurostat (online data code: tsdcc330)

EU Snapshot

In 2013–2014:

- The EU is the third largest emitter (10 percent of global emissions) after China and the US
- European countries – Germany, Spain and Italy – remained among the top five countries for installed renewable power capacity (together with China and the US)
- Germany led the world in total installed solar PV capacity and Spain led the world in total installed concentrating solar power capacity
- Research by the EU Commission found increased use of renewables saved the EU €10 billion in avoided imported fuel in 2012
- Commercial solar power reached grid parity in Italy, Germany and Spain and will soon do so in France (IRENA 2014)
- The EU struck a deal to cut greenhouse gas emissions by at least 40 percent by 2030 and set a 27 percent renewable energy target by 2030 (European Council 2014)

Table 6: EU 2013 key statistics

Population	509 million
Total CO_2 emissions from burning fossil fuels and producing cement ($MtCO_2$)	3,483
Growth rate	Decreased 1.8% on 2012
Emissions per capita from burning fossil fuels and producing cement (tCO_2/person)	6.8
New investment in clean energy ($US)	46.4 billion
Jobs in renewable energy	1.25 million

(Global Carbon Project 2014; REN21 2014)

Table 7: EU Solar PV and wind capacity

	Installed solar PV capacity	Installed wind capacity
2005	1700 MW (EU25)	40,500 MW (EU25)
2012	69,000 MW (EU27)	106,000 MW (EU27)
2013	80,000 MW (EU28)	117,000 MW (EU28)

(REN21 2006; 2013; 2014)

2020 emissions target

- Reduce emissions by 20 percent below 1990 levels
- Decrease primary energy use by 20 percent below 1990 levels

2030 emissions target

- Cut greenhouse gas emissions by at least 40 percent by 2030

2020 renewable energy targets

- Increase final energy from renewables to 20 percent

2030 renewable energy targets

- 27 percent renewable energy target by 2030

2050 emissions target

- Reduce greenhouse gas emissions by 80 to 95 percent below 1990 levels

Carbon pricing

- The EU emissions trading scheme is the largest carbon market in the world covering the equivalent of 2,039 $MtCO_2e$ in 2013 (World Bank 2014).

3. AN UPDATE ON INTERNATIONAL ACTION

Emissions

Global carbon dioxide emissions from burning fossil fuels and producing cement set a new record in 2013 – *the highest in human history* – at 36 billion tonnes ($GtCO_2$). This was a 2.3 percent increase on 2012 and 61 percent above 1990 levels. This record is likely to be broken again in 2014 with 40 billion tonnes (an increase of 2.5 percent) predicted (Global Carbon Project 2014). China, the US and EU remained the largest emitters of carbon dioxide, with Australia in 18th place, this means Australia is a larger emitter than over 160 countries (Global Carbon Project 2014). Australia is also one of the world's largest emitters of greenhouse gases (15th out of 186 countries) (Climate Change Authority 2014). Australia's carbon dioxide emissions are similar to France (344 $MtCO_2$/yr), Italy (353 $MtCO_2$/yr) and Turkey (325 $MtCO_2$/yr) – countries all with around three times the population of Australia (Global Carbon Project 2014).

But there is hope, as described in previous sections, China, the US and the EU are investing heavily in renewable energy, the EU has pledged further emission reductions targets, China plans to reduce its reliance on coal and the US has set new targets to limit emissions from coal-fired power stations.

To stabilise the climate system this century at no more than 2°C above pre-industrial levels, requires urgent, rapid and deep cuts in greenhouse gas emissions, particularly carbon dioxide emissions. The 2°C target is a commitment made by the international community, which includes Australia, at the UN climate talks in in 2009 and 2010 to limit climate change.

The carbon budget approach provides the clearest framework for understanding the nature and magnitude of this challenge (Meinshausen et al. 2009; IPCC 2013).

The global carbon budget is the maximum amount of carbon dioxide that can be emitted to the atmosphere by human activities to meet the 2°C target. The budget approach accommodates a risk management framework. The more stringent the budget, the greater the chance we'll meet the 2°C target, and vice versa. To have a good chance – two-thirds or greater – of stabilising the climate at the 2°C target, the world has a total budget of 1,000 billion tonnes of carbon emissions from all human sources since the beginning of the Industrial Revolution. By 2011, half of the global carbon budget had already been consumed and as the rate of emissions is rising, we are consuming the remaining budget at an ever-increasing rate (Carbon Tracker and Grantham Institute 2013; Climate Commission 2013b; IPCC 2014b).

If we are to have any chance at all of meeting the 2°C carbon budget, and stabilising the climate system, this is the critical decade for action.

Commitments

The number of countries with climate change pledges under the United Nations Framework Convention on Climate Change (UNFCCC) continues to grow. In 2014, 99 countries had pledged emissions reduction targets and actions, representing 80 percent of global emissions (Climate Change Authority 2014; Figure 9).

Figure 9: Countries with emissions goals

In September 2014, leaders of government, business, finance and civil society affirmed support for stronger action on climate change at the United Nations Climate Summit:

- *Leaders committed to limit global temperature rise to less than 2°C from pre-industrial levels.*
- *Many leaders called for all countries to take national actions consistent with a less than 2°C pathway and a number of countries committed to doing so.*
- *Leaders committed to finalise a meaningful, universal new agreement under the UNFCCC at COP-21, in Paris in 2015, and to arrive at the first draft of such an agreement at COP-20 in Lima, in December 2014* (United Nations 2014).

Carbon pricing schemes

The number of countries and sub-national jurisdictions putting a price on carbon continues to increase. Now, about 39 countries and over 20 sub-national jurisdictions are putting a price on carbon (such as carbon taxes, emissions trading schemes or crediting mechanisms) (Figure 10)– up from 35 countries and 13 sub-national jurisdictions in 2013. A further 26 countries are currently considering introducing a price on carbon (World Bank 2014).

Figure 10: Countries putting a price on carbon

Data source: World Bank 2014

These carbon pricing schemes now cover about 12 percent (6GtCO_2e) of global greenhouse gas emissions. Internationally, carbon prices range from US$1–$175 per tonne CO_2e (World Bank 2014). Carbon pricing schemes are now operating in China, the US and the EU.

The World Bank (2014) *'State and Trends of Carbon Pricing'* report contrasted moves to repeal Australia's Carbon Pricing Mechanism to positive steps in other countries:

> ***The reach of carbon pricing is steadily increasing*** *Carbon pricing systems are now in operation in sub-national jurisdictions of the US and China...Progress across the globe is steady. A total of eight new carbon markets opened their doors in 2013 alone...*

Countries combining carbon taxes together with emissions trading is an emerging trend, with combined policies introduced in Mexico and South Africa. Linking schemes was also a feature of the past year, with California and Quebec officially linking their emissions trading schemes in January 2014.

Recently, at the United Nations Climate Summit (United Nations 2014), delegates from seventy-three national governments, eleven regional governments and more than 1,000 businesses and investors – representing 52 percent of global GDP, 54 percent of global greenhouse gas emissions and almost half of the world's population – supported pricing carbon.

Fossil fuel subsidies

Fossil fuel subsidies work to counteract emissions reduction efforts (such as investing in renewable energy and pricing carbon) by effectively creating an incentive to emit greenhouse gases. The exact amount of global fossil fuel subsidies is difficult to estimate because there is no standard definition or calculation method. Therefore, estimates vary widely from $523 billion to over $1.9 trillion, depending on what is considered a "subsidy" and how exactly they are tallied (Worldwatch Institute 2014). The International Monetary Fund (IMF) estimates that governments around the world spend nearly $2 trillion annually subsidising oil, natural gas, coal and electricity production. Almost 9 percent of all annual national budgets are spent supporting the fossil fuel industry, which roughly amounts to 2½ percent of global GDP. The largest energy subsidiser, the US, provided $502 billion in 2011. China, the second-highest energy subsidiser, gave $279 billion (IMF 2013), and Australia allocated over $10 billion to subsidise fossil fuel use (The Guardian 2014b).

Currently, 15 percent of global CO_2 emissions receive an incentive of $110 per tonne in the form of fossil-fuel subsidies, while only 8 percent of emissions are subject to a carbon price (OECD/IEA 2013). For every $1 spent to support renewable energy, another $6 are spent on fossil fuel subsidies (OECD/IEA 2013).

Without phasing out fossil fuel subsidies, the 2°C target will not be reached (ODI 2013). The IMF calculates that by eliminating energy tax subsidies, CO_2 emissions would be reduced by 4½ billion tonnes, representing a 13 percent decrease in global energy-related CO_2 emissions. Eliminating subsidies would also yield significant health benefits by reducing local pollution from fossil fuels (IMF 2013). This reform would result in a reduction of 10 million tonnes in sulphur dioxide (SO_2) emissions and a 13 percent reduction in other local pollutants (IMF 2013).

Growing budget pressures illustrate the need for fossil-fuel subsidy reform in many importing and exporting countries. Political support for removing subsidies has been building in recent years with G20 and Asia-Pacific Economic Cooperation (APEC) member countries committing to phase out inefficient fossil-fuel subsidies (OECD/IEA 2013). The Global Commission on Climate and the Economy recommended that phasing out the $600 billion currently spent on subsidies for fossil fuels (compared to $100 billion on renewable energy) will help to improve energy efficiency and make funds available for poverty reduction (Global Commission on the Economy and Climate 2014; Box 6).

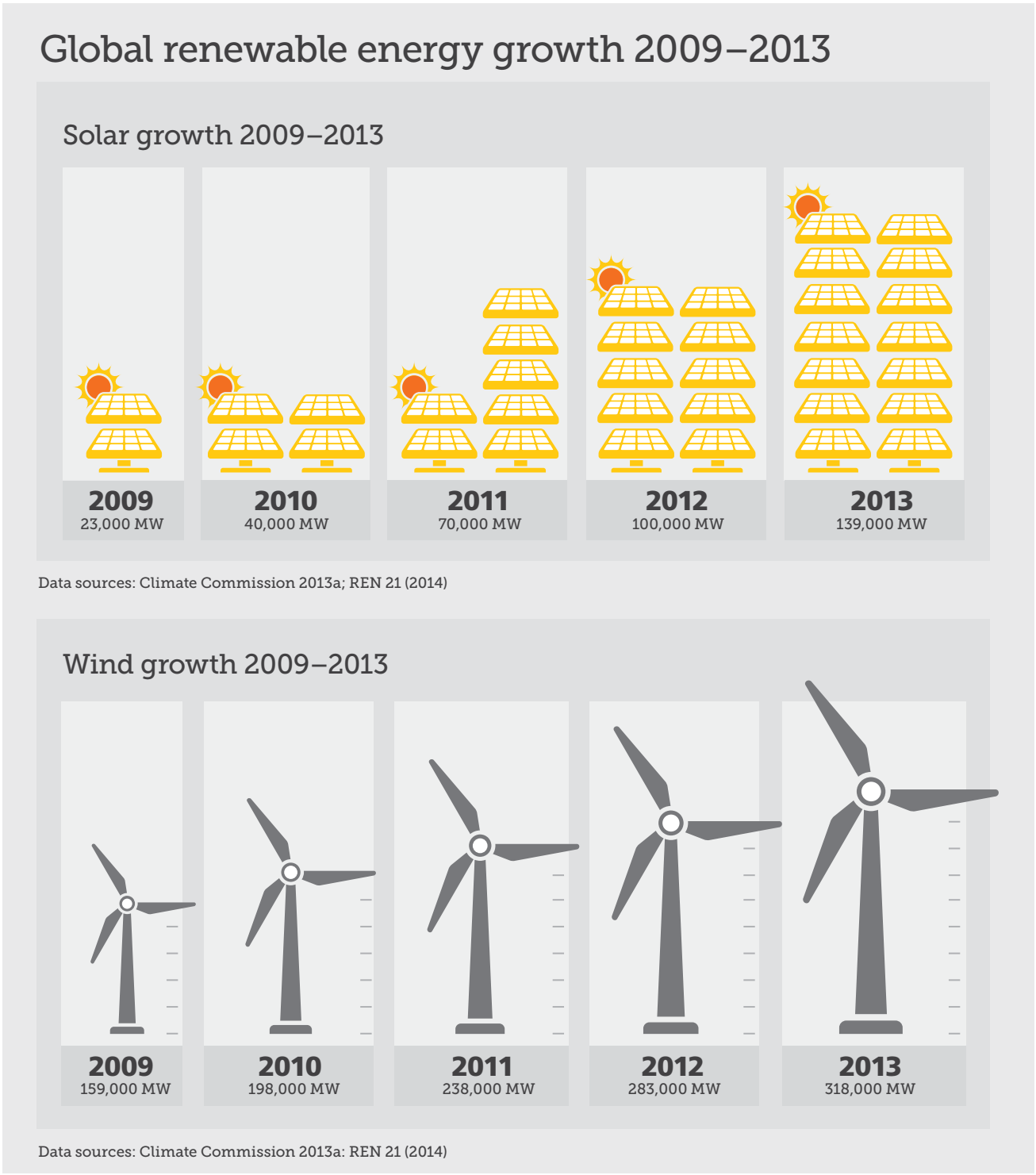
Renewable energy

Worldwide, the number of countries with policies supporting renewable energy also continues to increase. In early 2014, 144 countries had renewable energy targets and 138 had renewable energy support policies in place (up from 138 and 127 respectively in the previous year) (REN21 2014; Figure 11).

Figure 11: Global renewable energy targets and investment

Data source: REN 21 (2014)

Figure 12: Global renewable energy growth 2009–2013



The largest emitters were also leading the world in development and investment in renewable energy. China and the US remained the top two countries for installed renewable energy capacity (REN21 2014).

In 2013, a new record of 123 GW was set for global renewable energy capacity additions (IEA 2014a). Renewables provided more than half (56 percent) of the net additions to power capacity (REN21 2014). Globally, investment in renewable energy now exceeds fossil fuels. In 2013, US$ 192 billion was invested in new renewable power, whereas US$ 102 billion was invested in fossil fuel plants (Frankfurt School of Finance and Management 2014; Figure 11).

In 2013, global investment in renewables was 14% lower than 2012 levels and 23% lower than 2011 (a record high), a decline in part due to policy uncertainty and reduced support for renewables in some countries, but also due to rapidly falling costs of many renewable energy technologies, particularly solar PV (REN21 2014).

China remains "the anchor" of new renewable capacity, accounting for almost 40 percent of the global expansion (IEA 2014a). Overall, global renewable energy growth between 2009 and 2013 has been impressive (Table 8 and Figure 12).

Table 8: Renewable Energy Indicators 2013

		Start of 2004	End of 2012	End of 2013
Investment				
New investment (annual) in renewable power and fuels	Billion US$	39.5	249.5	214.4
Power				
Renewable power capacity (not inc hydro)	GW	85	480	560
Renewable power capacity (inc hydro)	GW	800	1440	1560
Hydro	GW	715	960	1000
Biopower	GW	36	83	88
Geothermal	GW	8.9	11.5	12
Solar PV	GW	2.6	100	139
CSP	GW	0.4	2.5	3.4
Wind	GW	48	283	318
Policies				
Number of countries with renewable energy targets	#	48	138	144

(REN21 2014)

Policy settings are vital to the competitiveness of renewable energy, and conversely policy uncertainty, is a key challenge. Without clear and stable regulatory parameters a national market is not attractive for international investors. The International Energy Agency, the World Bank and the Global Commission on the Economy and Climate all cite consistent, long term policy and support measures for renewables as essential.

> *Even with growing competitiveness, policies remain vital to stimulating investment in capital intensive renewables. Scaling up deployment to higher levels would require stable, long-term policy frameworks and market design that prices the value of renewables to energy systems and increases power system flexibility.*
>
> (IEA 2014b)

Ongoing policy uncertainty remains one of the largest sources of risk for investment in renewable technologies

(IEA 2014a)

Consistent, credible, long-term policy signals are crucial. By shaping market expectations, such policy encourages greater investment, lowering the costs of transition to a low-carbon economy. By contrast, policy uncertainty in many countries has raised the cost of capital, damaging investment, jobs and growth.

(Global Commission on the Economy and Climate 2014)

BOX 6 – THE NEW CLIMATE ECONOMY

One of the most urgent, yet complex challenges facing countries is achieving economic prosperity and development while tacking climate change.

To help countries respond to this challenge, the Global Commission on the Economy and Climate (2014) – comprising former heads of government and finance ministers, and leaders in the fields of economics and business – was commissioned by seven countries (Colombia, Ethiopia, Indonesia, Norway, South Korea, Sweden and the United Kingdom) to report to the international community.

The report finds that there are major opportunities to achieve strong growth and lower emissions in three sectors of the global economy – cities, land use and energy.

Over the next 15 years, around US $90 trillion will be invested in infrastructure in the world's cities, agriculture and energy systems. This presents an opportunity to invest in low-carbon growth, bringing multiple benefits including jobs, health, business productivity and quality of life.

To achieve this growth, governments and businesses need to improve resource efficiency, invest in high-quality infrastructure, and stimulate technological and business innovation, including:

- Cities: Building better connected, more compact cities based on mass public transport can save over US $3 trillion in investment costs over the next 15 years. These measures will improve economic performance and quality of life with lower emissions.
- Land use: Restoring just 12 percent of the world's degraded lands can feed another 200 million people and raise farmers' incomes by $40 billion a year – and also cut emissions from deforestation.
- Energy: As the price of solar and wind power falls dramatically, over half of new electricity generation over the next 15 years is likely to be from renewable energy, reducing dependence on highly polluting coal.
- Resource efficiency: Phasing out $600 billion currently spent on subsidies for fossil fuels (compared to $100 billion on renewable energy) will help to improve energy efficiency and make funds available for poverty reduction.
- Infrastructure investment: New financial instruments can cut capital costs for clean energy by up to 20percent.
- Innovation: Tripling research and development in low-carbon technologies to at least 0.1 percent of GDP can drive a new wave of innovation for growth.

Source: Global Commission on the Economy and Climate 2014

4. AUSTRALIA: "TWO STEPS FORWARD, ONE STEP BACK"

''We think that climate change is a significant problem, it's not the only or even the most important problem the world faces but it is a significant problem and it's important every country should take the action that it thinks is best to address emissions''

Prime Minister Tony Abbott, June 2014 (SMH 2014b)

As China, the US and the EU all clearly set out to build on their previous actions on climate change, Australia's year was more mixed. In 2013, Australia reduced greenhouse gas emissions and increased its share of renewable energy on the one hand. On the other, in 2014, Australia removed the price on carbon and introduced new uncertainty due to another review of the Renewable Energy Target.

In the last year the federal government has also abolished the Climate Commission and attempted to abolish Clean Energy Finance Corporation, the Australian Renewable Energy Agency and the Climate Change Authority, on the 29th of October the government introduced an incentive scheme, called the Emission Reduction Fund, as the government's response to climate change. However, there remains uncertainty as to whether this scheme can meet the 5% national emission reduction target.

There have been concerns raised about Australia's role in global climate change negotiations after the Prime Minister Tony Abbott did not attend the UN Climate Summit. Australia was recently rated last out of 60 countries on leadership on climate change (Global Green Economy Index 2014).

Australia's international commitments on emissions

Australia is a high-emitting, highly developed country with strong capacity to address climate change (Climate Change Authority 2014).

Australia is the 18th largest emitter of CO_2 in the world and one of the largest emitters per capita (Global Carbon Project 2014) and the 15th largest emitter of greenhouse gases (out of 186 countries) (Climate Change Authority 2014).

Australian emissions have been declining since early 2012 (Department of Environment 2014). A recent Australian National University study found that Australia cut carbon dioxide emissions from its electricity sector by 17 million tonnes because of the carbon price. The report, undergoing peer-review, found the two years of the carbon price had a discernible impact on emissions even assuming conservative responses by consumers and businesses (SMH 2014c). Australia's total greenhouse gas emissions (excluding land use change) for 2013 were 538.4 $MtCO_2e$, 0.8 percent less than in 2012. This reduction in emissions is because while lower electricity demand and more renewables in the electricity generation mix reduced emissions; agriculture and fugitive emissions have increased. Furthermore, this reduction in greenhouse gas emissions in 2013 is likely to be even less because of increased deforestation (+2.7 percent) and a reduction in reforestation (-12.2 percent) (see Department of Environment 2014). Emissions from burning fossil fuels and producing cement fell by 3.1 percent (Global Carbon Project 2014).

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

- An unconditional target of 5 percent reduction on 2000 levels by 2020
- Up to 15 percent reduction by 2020 if major developing economies commit to restraining emissions and advanced economies take on comparable commitments to Australia's
- Up to 25 percent reduction by 2020 conditional on comprehensive international action capable of stabilising CO_2 concentrations at 450 ppm or lower.

The Climate Authority recently recommended Australia move to a 19% emission reduction target to stay in line with international action

The Climate Change Authority (2014) recently assessed Australia's commitments to determine what Australia's target should be. The Climate Change Authority considered that significant progress had been made internationally, to support Australia's target moving beyond 5 percent. The Authority concluded that climate science, international action and economic factors all justify stronger action, and recommended Australia move to a minimum 19 percent target (taking into account Kyoto protocol carryover) as a defensible contribution to the global climate change effort (Climate Change Authority 2014).

Abolition of Australia's price on carbon

For more than a decade, Australian Governments from both major parties (Labor and Coalition) have considered introducing a national emissions trading scheme. The Howard Government initiated discussions in 1999 with the release of a number of discussion papers on emissions trading. At the 2007 election, both major parties promised to introduce an emissions trading scheme if elected. However in 2008, when the Rudd Government sought to introduce its proposed Carbon Pollution Reduction Scheme, the scheme failed to pass the Senate (Parliament of Australia 2013a).

In 2011, the Gillard Government introduced the Carbon Pricing Mechanism as part of an agreement to form a minority government with independents and the Greens. The price on carbon was introduced in 2011 as part of the Clean Energy Future package. The Carbon Pricing Mechanism was designed as a permit system with a fixed price for the first three years transitioning to an emissions trading scheme in 2015 (Parliament of Australia 2013a).

In July 2014, Prime Minister Tony Abbott delivered on the Coalition's 2013 election commitment to repeal the price on carbon. The repeal of the Carbon Pricing Mechanism followed shortly after an Australian National University study (O'Gorman and Jotzo 2014) found the two-year old scheme had successfully reduced:

- Electricity demand between 2.5 and 4.2 TWh per year
- Emissions intensity of power supply in the National Electricity Market by between 16 and 28kg CO_2/MWh
- Greenhouse gas emissions between 11 and 17 million tonnes CO_2 in total over two years.

Any emission 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

It is too soon for changes in emissions resulting from the abolition of the Carbon Pricing Mechanism to be reflected in Australia's National Greenhouse Accounts. However, in the first 100 days since the carbon price repeal, National Electricity Market emissions were up 4 million tonnes on the equivalent period last financial year (Sandiford 2014). This increase in emissions corresponds with growth in the share of coal in electricity generation, from 69.6% in July 2014 to 76.4% in October 2014, while output from hydro dropped (RenewEconomy 2014b). Any emission 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).

Recently the government announced a deal with the Palmer United Party to pass its Emission Reduction Fund. This involved committing to retain the Climate Change Authority and task it with assessing whether Australia should have an emission trading scheme in the future and what conditions should trigger the introduction of such a scheme (The Guardian 2014c).

The Emission Reduction Fund

The government describes the recently introduced Emission Reduction Fund as the "centrepiece" of its policy program to reduce emissions. The $2.55 billion fund is an incentive scheme to encourage businesses to reduce carbon emissions. Allocations from the fund will begin in 2015. Environment Minister Greg Hunt insists the scheme will deliver Australia's promised 5% reduction. However the scheme remains controversial with economists and scientists who are concerned the scheme lacks transparency and is not designed to meet Australia's target (The Conversation 2014).

Uncertainty surrounding Australia's Renewable Energy Target

Australia's Renewable Energy Target was considered to have bipartisan support up until recently (Parliament of Australia 2013b). The mandatory target was initially introduced by the Howard Government in 2001 (with a target for 9,500 GWh by 2010) and in 2009 the Renewable Energy Target was increased to 20 percent of projected demand (45,000 GWh) by 2020.

Australia's Renewable Energy Target has significantly expanded renewable energy, and reduced emissions with only a moderate impact on consumer bills (Commonwealth of Australia 2014a; Box 7). The Clean Energy Council states that if the RET is kept in its current form, it will generate a further $14.5 billion of investment and generate 18,400 new jobs by 2020. (Clean Energy Council 2014a).

BOX 7 – RENEWABLE ENERGY TARGET REVIEW FINDINGS

The Report of the Expert Panel (Commonwealth of Australia 2014a) found Australia's Renewable Energy Target had broadly met its objectives:

- *Encouraged significant new renewable electricity generation, which has almost doubled as a result of* the scheme
- Delivered modest emissions reductions of 20 Mt CO_2e between 2001 and 2012, and
- The net impact on customer b*ills is moderate*.

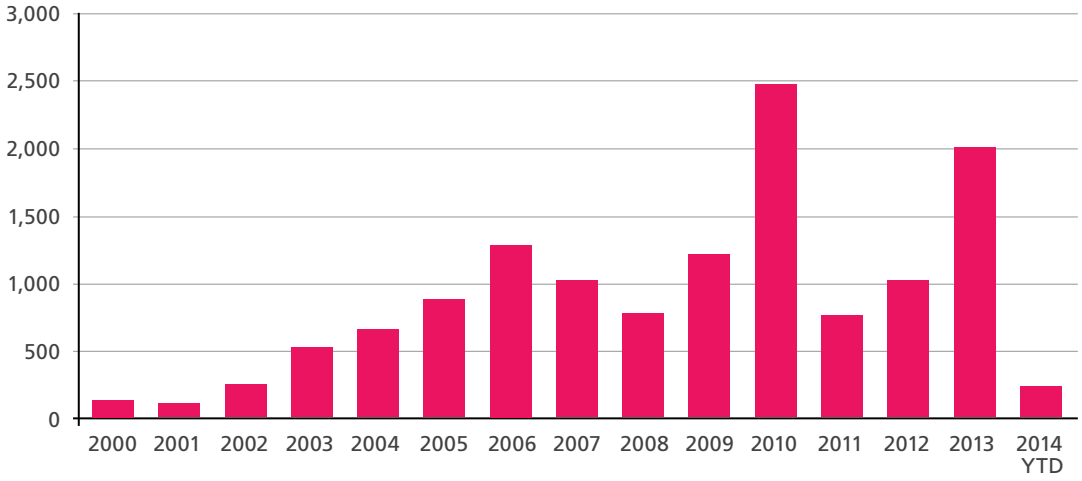
The panel recommended two options for adjusting the Renewable Energy Target: closing the scheme to new renewable power stations while supporting existing projects until 2030; or ensuring new renewable power generation makes up half of any future growth in electricity demand (note that Australia's electricity demand is currently in decline).

The panel also recommended ending financial incentives to households installing solar hot water or power systems and other small-scale renewable technologies (Commonwealth of Australia 2014a).

In August 2014, a Federal Government-appointed review panel, called the "Warburton Review", recommended substantially winding back Australia's Renewable Energy Target and scrapping key elements (Commonwealth of Australia 2014a).

The Abbott Government is yet to announce its final position to the review of the Renewable Energy Target, however the Government has commenced negotiations by announcing its commitment to a "real 20 percent" target and to reducing pressure on energy intensive trade exposed sectors (Minster for Industry 2014). In contrast the Labor party, Greens and Palmer United Party have expressed their commitment to the original 41,000 GWh target. The target is now being reviewed again by the Climate Change Authority.

Figure 13: Annual large-scale renewable energy investment in Australia



Source: Bloomberg New Energy Finance 2014

The ongoing uncertainty surrounding Australia's Renewable Energy Target is already affecting investment (ABC 2014a, Clean Energy Council 2014b; Figure 13). Bloomberg New Energy Finance recently reported a 70 percent drop in renewable energy investment in Australia this year compared with 2013, which the group attributed to the government's review of the Renewable Energy Target (The Guardian 2014d; The Australian 2014).

Solar

The Abbott Government also abandoned its 2013 Million Solar Roofs election commitment to provide one million low-income households with solar hot water or photovoltaic power systems.

Coal in Australia

Australia (which relies heavily on coal for electricity) has an ageing and inefficient coal-fired power fleet, which means that most of its coal stations are much more emissions intensive than other countries, including the USA and China. Within the decade, around half of Australia's coal fuelled generation fleet will be over 40 years old, with some currently operating stations approaching 60 years. Australia's older power stations cannot be made more efficient without vast expense, and their age limits the potential to retrofit Carbon Capture and Storage investment (Climate Council 2014b).

Australia's Energy Green Paper – rationalising emissions reduction actions

> *"Lets have no demonization of coal. Coal is good for humanity, coal is good for prosperity, coal is an essential part of our economic future, here in Australia, and right around the world."*
>
> Prime Minister Tony Abbott, October 2014 (SMH 2014d)

The Australian Government released its Energy Green Paper on 23 September 2014 (Commonwealth of Australia 2014b), indicating the Government's direction on energy policy before finalising its position in an Energy White Paper. The paper centres on four key themes: attracting investment, putting downward pressure on electricity prices, gas supply and market development, and future energy supply.

Specific goals in the Energy Green Paper relating to climate change or renewable energy include goals to *"rationalise emissions reduction actions"* in order to reduce electricity costs and improving energy productivity to reduce greenhouse gas emissions intensity (Commonwealth of Australia 2014b).

The Energy Green Paper cites International Energy Agency predictions for increasing global demand for renewables – demand for oil predicted to increase by 13 percent, coal by 17 percent, natural gas by 48 percent, nuclear by 66 percent and renewables by 77 percent. However, the paper does not foresee a major role for renewables as part of Australia's main electricity grid without the development of large-scale energy storage:

> *"It will be important that coal produces the most energy for the lowest emissions, but this requires major capital investment in a market that is currently oversupplied. Gas provides a lower emissions source of energy for electricity generation, but in Australia it is becoming an increasingly more expensive fuel source than coal. Nuclear energy remains a serious consideration for future low emissions energy, while renewable energy will*

continue to play an important role, especially in regional and remote areas that are off the main electricity grid. The development of large-scale energy storage could be a game changer as it can smooth the intermittent supply that typifies renewable energy, and reduce the need for reliable baseload energy from other sources."

(Commonwealth of Australia 2014b)

Australia Snapshot

- Employment in the renewable energy sector has grown rapidly over the past decade, from 6,200 employees in 2008 to 21,000 in 2013 (excluding research and development) (Commonwealth of Australia 2014b)

In 2013–2014, Australia:

- Installed its one-millionth rooftop solar PV system (Clean Energy Council 2014b)
- Opened its largest wind farm to date, the 140-turbine, 420 MW Macarthur Wind Farm in Victoria
- Reduced energy demand for the fifth consecutive year (Australian Energy Market Operator 2014)
- Generated 14.8 percent of electricity from renewables and 85.2 percent from fossil fuels (Clean Energy Council 2014b)
- Repealed its carbon pricing mechanism, after two years of operation
- Created uncertainty for investment in renewables by reviewing the national Renewable Energy Target

Figure 14: A wind farm in Victoria

Table 9: Australia 2013 key statistics

Population	23 million
Total greenhouse gas emissions ($MtCO_2e$)	538.4 (552.9 including land use change)
Total CO_2 emissions from burning fossil fuels and producing cement ($MtCO_2$)	341
Growth rate	3.1% decrease on 2012
Emissions per capita (tCO_2e/person)	23.2 (23.8 including land use change)
Emissions per capita from burning fossil fuels and producing cement (tCO_2/person)	15
Emissions per GDP from burning fossil fuels and producing cement (kg CO_2/GDP)	0.4
New investment in clean energy ($US)	4.4 billion
Jobs in renewable energy	21,000

(Global Carbon Project 2014; Clean Energy Council 2014b; Department of Environment 2014)

Table 10: Australia solar PV and wind capacity

	Installed solar PV capacity	Installed wind capacity
2007	4.3 MW	817 MW
2012	2,400 MW	2,584 MW
2013	3,270 MW	3,240 MW

(Sustainability Victoria 2007; Clean Energy Council 2014a)

2020 emissions target

- Reduce emissions by 5 percent below 2000 levels (unconditional)
- Reduce emissions by 15 to 25 percent below 2000 levels (conditional on international action)

2020 renewable energy target

- At least 20 percent of electricity from renewables by 2020 (with interim binding annual targets setting a path to that goal). This target is currently under review

Carbon pricing schemes

- No carbon pricing schemes in place, due to the repeal of the Carbon Pricing Mechanism

Acronyms and abbreviations

APEC	Asia-Pacific Economic Cooperation
CO_2	Carbon Dioxide
GDP	Gross Domestic Product
EU	European Union
GW	Gigawatt
GWh	Gigawatt hour
IMF	International Monetary Fund
kWh	Kilowatt-hour
$MtCO_2e$	Million Tonnes of Carbon Dioxide Equivalent
MW	Megawatt
MWh	Megawatt hour
OECD	Organisation for Economic Co-operation and Development
PV	Photovoltaic
RET	Renewable Energy Target
SO_2	Sulfur Dioxide
TWh	Terawatt hour
UN	United Nations
UNFCCC	United Nations Framework Convention on Climate Change
G20	Group of Twenty

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