



United Nations
Association
of Australia
Victorian Division

NET ZERO:

TOWARDS A NATIONAL CLIMATE MANAGEMENT FRAMEWORK FOR AUSTRALIA

**PAPER 1:
CLIMATE MANAGEMENT IN AUSTRALIA -
POLICIES AND ACTIVITIES TO DATE**

A WORKING PAPER FOR DISCUSSION AT THE
PRACTITIONERS' WORKSHOP ON 10 AUGUST 2016

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INTRODUCTION

The United Nations Association of Australia is co-ordinating the “Net Zero” project. The purpose of the project is to encourage the implementation in Australia of the UN’s Paris Climate Agreement. This is being done by promoting the design and introduction of a framework of measures to facilitate the involvement of all Australians in the urgent process of reducing the emissions of greenhouse gases to net zero over the next few decades. This means that the emissions of the gases are to be no greater than their rate of removal by greenhouse gas sinks.

Identifying such measures requires an understanding of the relevant past and current activities undertaken within each of the key sectors of the community.

This document is a compilation of such activities. This appears to be the first time that such a compilation has been attempted. It is not feasible to identify and record every activity relevant to the management of the climate. Instead, the intent is to provide a sense of the range and depth of activities upon which future measures and programs can be built. As such the document is still incomplete and is being used as working draft which will be progressively augmented as further information comes to hand.

OVERVIEW

Climate management in Australia has passed through several phases. Following early climate modelling by the CSIRO and others, the establishment of the Intergovernmental Panel on Climate Change and the passage of the United Nations Framework Convention on Climate Change (UNFCCC) in 1992, the Council of Australian Governments endorsed the National Greenhouse Response Strategy. Its target was to reduce the emissions of greenhouse gases by 20% by 2005.

By 1997 the strategy was considered to be ineffective. Under the UNFCCC the Kyoto Protocol was adopted and the agreed emissions target for Australia was an 8% increase by 2012. Over the next ten years a revised Greenhouse Gas Abatement Program was established and the mandatory Renewable Energy Target (RET) and emissions reporting scheme introduced. Energy efficiency schemes were established.

The five years from 2007 saw further initiatives. There was a new unconditional emissions target of 5% below 2000 levels by 2020, the RET was increased and the National Carbon Offset Standard introduced. In 2011 the *Clean Energy Act* was passed setting a long-term goal of reducing emissions by 80% below 2000 levels by 2050. The Act provided for a price on carbon and the establishment of government organisations to administer the program, advise government and provide financial support to emission reduction projects.

Much of the Act was repealed in 2013 but the climate finance organisations and regulatory authority were retained. The Emissions Reduction Fund began to operate in 2015 and the associated Safeguard Mechanism in mid-2016. By then the Australian Government had submitted to the UN its post-2020 emissions reduction target of 26-28% below 2005 levels by 2030. In 2016 the Government signed the UN Paris Agreement on Climate Change.

Meanwhile the governments of all states, territories and cities as well as most other local governments had taken action to mitigate and adapt to climate change. Almost all states promote energy efficiency and have renewable energy targets. Most have target-based emission reduction schemes backed up by a strategy/plan and, in some cases, legislation. The ACT, South Australia and Victoria aim to have zero net emissions by 2050. All states have climate adaptation plans and, in some cases, regional adaptation plans.

All capital cities have climate action plans with most adopting emission reduction targets. Melbourne, Adelaide, Sydney and Canberra have targeted zero net emissions. Melbourne, Sydney and Canberra have targets for renewable energy with Canberra aiming for 100% by 2020.

TABLE 1: EMISSION REDUCTION AND RENEWABLE ENERGY TARGETS OF AUSTRALIAN GOVERNMENTS.

EMISSION REDUCTION TARGETS

FEDERAL		5% below 2000 levels by 2020 26-28% below 2005 levels by 2030
STATE	ACT	40% below 1990 levels by 2020 Net zero emissions by 2050
	New South Wales	
	Northern Territory	60% below 2007 levels by 2050 Become carbon neutral by 2018
	Queensland	
	South Australia	Net zero emissions by 2050
	Tasmania	
	Victoria	Net zero emissions by 2050
	Western Australia	
CAPITAL CITIES	Adelaide	35% below 2006 levels by 2020 Carbon neutral by 2025
	Melbourne	Net zero emissions by 2020
	Sydney	Net zero emissions by 2050
	Brisbane	Council operations C neutral by 2031
	Darwin	
	Perth	20% below 2011 levels by 2020 32% below 2014 levels by 2031
	Canberra	40% below 1990 levels by 2020 Net zero emissions by 2050
	Hobart	30% below 2009 levels by 2020

RENEWABLE ENERGY TARGETS FOR ELECTRICITY GENERATION

FEDERAL		23.5% renewable energy by 2020
STATE	ACT	100% renewable energy by 2020
	New South Wales	20% renewable energy by 2020
	Northern Territory	Become world leader in renewable energy production for remote communities
	Queensland	50% renewable energy by 2030 One million homes with rooftop solar by 2020
	South Australia	50% renewable energy by 2025
	Tasmania	90% renewable energy by 2020
	Victoria	25% renewable energy by 2020 40% renewable energy by 2025
	Western Australia	
CAPITAL CITIES	Adelaide	
	Melbourne	25% renewable energy by 2018
	Sydney	50% renewable energy by 2030
	Brisbane	
	Darwin	
	Perth	
	Canberra	100% renewable energy by 2020
	Hobart	

Of Australia's other over 500 local councils almost half surveyed have set emission reduction or renewable energy targets. In some cases the target is zero net emissions and 100% renewable energy. Regional organisations, such as those responsible for managing natural resources, greenhouse alliances of local governments and renewable energy collectives are also active.

Such actions by governments at all levels affect the context for the involvement of the private sector and on-ground change. So far the carbon market in Australia has been limited to arrangements under the Kyoto Protocol and the reverse auctions associated with the Emissions Reduction Fund. Trading in Renewable Energy Certificates contributes to the Renewable Energy Targets. The availability of finance is a limiting factor. Loans are provided through the major banks and the Clean Energy Finance Corporation. Green bonds have been issued by banks and, most recently, by a State government.

The pathway to net zero emissions is still being explored. While most of the technical components are available the challenge of change at the necessary rate remains. Research and innovation are critical to climate management. Since the 1980s a wide range of monitoring, data analysis, research and education relating to climate

management has evolved. Major organisations such as the CSIRO and Bureau of Meteorology have been joined by research and teaching programs at most of Australia's forty-three universities. Co-operative research centres have addressed various aspects. There are three now operating. Australia also has a substantial pool of expertise in specialist groups and consulting organisations.

Finally, responsibility for managing the climate also rests with individual citizens. Australia has the highest proportion of households with solar PV in the world. Individuals can respond to government schemes for energy efficiency and use of renewable energy. They can also modify their lifestyle, consumption patterns and investments. There are voluntary pledging schemes in Victoria and Perth.

What has all these activities over the last two decades achieved? The emissions of greenhouse gases per capita and the emissions per unit of GDP have decreased. However, the nation's total emissions have not fallen below those in 1990. They rose from 1990, peaked in 2006, fell back to 1990 levels but have been rising again since mid-2014. 85% of electricity is still generated from fossil fuels.



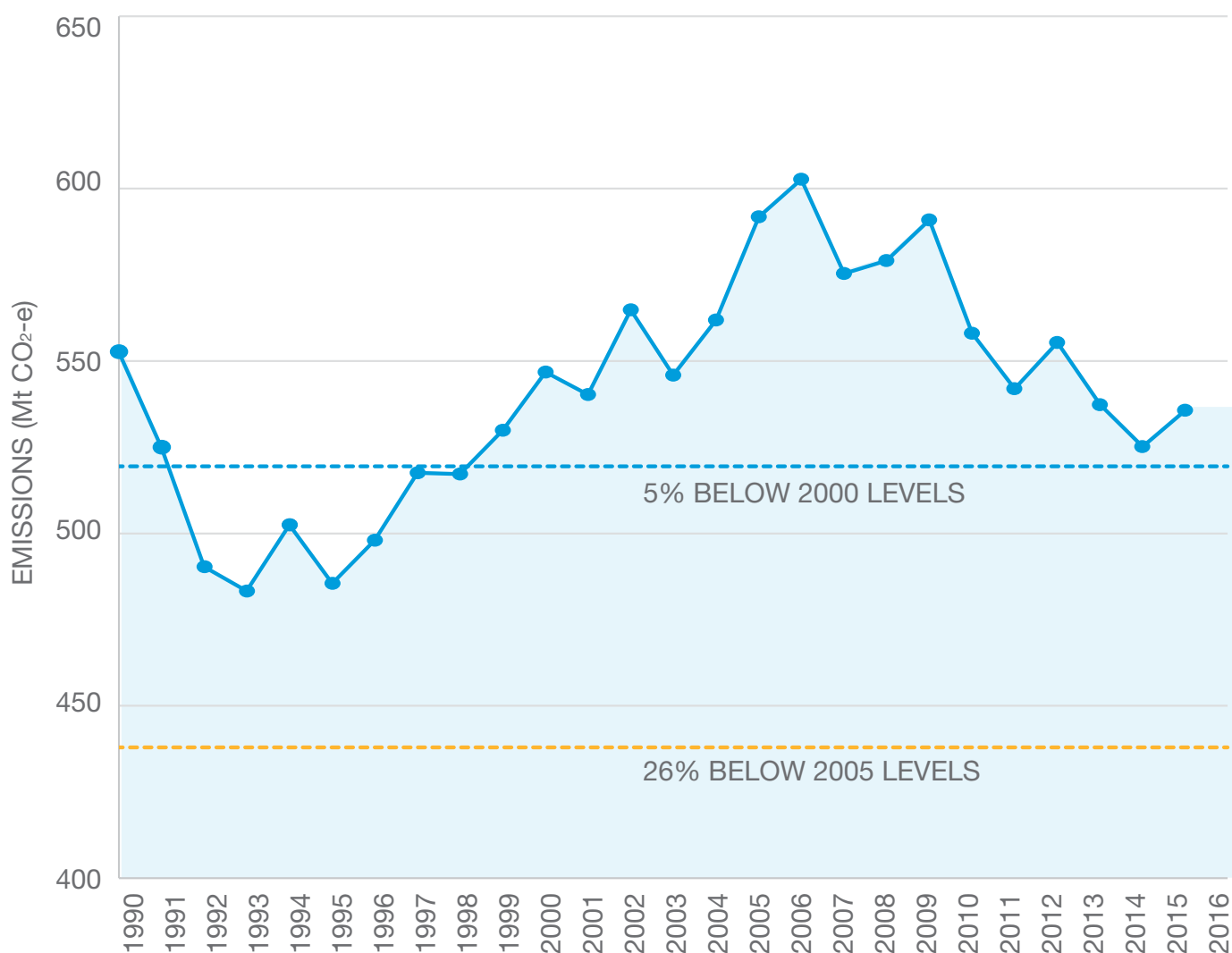
Australia's accelerated transition to net zero emissions required under the Paris Agreement is just beginning.

GREENHOUSE GAS EMITTERS

▼ TREND

As reported in the Australian Government's Quarterly Update of Australia's Greenhouse Gas Inventory (December 2015), annual emissions for the year to December 2015 are estimated to be 535.7 Mt CO₂-e, a 1.1% increase over emissions from the year to December 2014. While annual emissions have increased in the past two years, emissions per capita and emissions intensity have continued to decrease with overall reductions of 30.6% and 55.1% from 1990 respectively, however both appear to be plateauing.

ANNUAL EMISSIONS (INCLUDING LULUCF)



34%
OF
EMISSIONS

ELECTRICITY PRODUCTION

Emissions from electricity production increased from 184.3 Mt CO₂-e in 2014 to 187.5 Mt CO₂-e in 2015, a change of 1.8%. This sector has experienced the largest growth with a 44.8% increase in emissions since 1990. Emissions from electricity production decreased from a peak in 2007 until 2014 when emissions started to increase again. This is mainly due to the decrease and subsequent increase in the burning of black and brown coal, which increased 4.9% and 2.9% respectively in 2015. Conversely, gas generation decreased 18.5%. In 2015 14.6% of electricity was generated from renewables (up from 13.5% in 2014) and 85.4% from fossil fuels. Of the renewables, hydro contributed 5.9%, wind 4.9%, solar 2.5%, and bioenergy 1.3%. As a proportion of all electricity generation renewables were highest in Tasmania followed by South Australia, Western Australia, Victoria, NSW and Queensland. Of the fossil fuels 73% was coal and 13% gas. Of the 23 coal-fired power stations in Australia all eleven with a capacity greater than 1000MW are located in Victoria, NSW and Queensland.

17%
OF
EMISSIONS

STATIONARY ENERGY EXCLUDING ELECTRICITY

Emissions from stationary energy excluding electricity were estimated to be 94.5 Mt CO₂-e in 2015, identical to 2014's. Emissions in this sector have increased steadily for the past ten years (despite seasonal fluctuations) and are up 43.6% since 1990.

17%
OF
EMISSIONS

TRANSPORT

Emissions from transport increased from 93.1 Mt CO₂-e in 2014 to 93.3 Mt CO₂-e in 2015, a change of 0.3%. Over 80% of these emissions are generated by road transportation. Emissions in this sector have increased steadily since 1990, with an average annual increase of 2.2%, culminating in a 52% overall increase on 1990 levels in 2015.

15%
OF
EMISSIONS

AGRICULTURE

Emissions from agriculture decreased from 70.6 Mt CO₂-e in 2014 to 68.5 Mt CO₂-e in 2015, a change of -2.9%. Emissions from this sector have generally fluctuated between 75 and 90 Mt CO₂-e over the past 25 years however have decreased overall by 14.4% since 1990. This is mainly due to a decrease in emissions from enteric fermentation (methane, CH₄) which makes up approximately 60% of emissions from this sector. Other agricultural emission sources include N₂O from soils, rice cultivation, CO₂ from application from lime and urea, etc.

7%
OF
EMISSIONS

FUGITIVE EMISSIONS

Fugitive emissions decreased from 40.0 Mt CO₂-e in 2014 to 39.6 Mt CO₂-e in 2015, a change of -1.1%. Emissions from this sector have fluctuated over the past two decades, reaching a peak of 40.3 Mt CO₂-e in 2007 and then decreasing to current levels. Overall emissions have increased by 5.0 - 9.9% on 1990 levels. A lack of baseline data is creating uncertainty in estimating the leakage from the 7000 coal seam gas wells in Australia.

6%
OF
EMISSIONS

INDUSTRIAL PROCESSES

Emissions from industrial processes increased from 32.8 Mt CO₂-e in 2014 to 33.7 Mt CO₂-e in 2015, a change of 2.9%. Emissions from this sector have increased by 29.2% since 1990.

2%
OF
EMISSIONS

WASTE

There has been no change in the emissions from the waste sector from 2014 to 2015, staying steady at 12.0 Mt CO₂-e. Emissions from this sector have increased by 38.9% since 1990.

1%
OF
EMISSIONS

VEGETATION CLEARING AND OTHER LAND USE CHANGES

Emissions from the LULUCF (land use, land use change and forestry) sector increased from 2.8 Mt CO₂-e in 2014 to 6.5 Mt CO₂-e in 2015. After consistently dropping from 2000 the doubling in the past year was largely a result of increasing land-clearing rates, particularly in Queensland.



NATIONAL GOVERNMENTS

Over the last two decades Australia's national governments have introduced a series of emission targets. Some have sought a reduction in emissions. The first target under the Kyoto Protocol allowed for an increase. The most recent target is a post-2020 target for the reduction in emissions over the next fifteen years. This was submitted last year to the UN as Australia's Intended Nationally Determined Contribution. The policies and programs of successive national Australian governments are listed below.

At times greenhouse and energy policies have been incompatible. While targets for a reduction in greenhouse gas emissions are one stimulus for the transition to renewable energy, other reasons, such as costs, energy security and reducing energy imports, must also be taken into account. The mandatory Renewable Energy Target, introduced in 2001, has been increased several times since then. It successfully stimulated investment in renewable energy until a pause resulting from the recent uncertainty in Government policy.

▣ OPTIONS AVAILABLE TO NATIONAL GOVERNMENTS

Market-based mechanisms such as cap-and-trade emissions trading schemes, baseline and credit schemes, carbon taxes. Regulation such as energy performance. Subsidies. Loans and grants for energy transition and emission reduction. Information tools. Reporting requirements. Support for research, development and commercialisation.

▶ PAST ACTIONS

1988 CSIRO report “Planning for Climate Change”

HAWKE GOVERNMENT:

1990 Australian Greenhouse Emissions Information System introduced.

KEATING GOVERNMENT:

1992 Australia signs United Nations Framework Convention on Climate Change; **National Greenhouse Response Strategy (NGRS)** – Council of Australian Governments endorsed, 20% emissions reduction by 2005, multilateral agreement, nation-wide.

HOWARD GOVERNMENT:

1996 NGRS considered ineffective.

1997 **Kyoto Protocol** adopted. Australian target allowed 8% *increase* in emissions by 2012.

1998 Australian Greenhouse Office (AGO) established; new National Greenhouse Strategy

1999 **Greenhouse Gas Abatement Program**. AGO papers on emissions trading.

2001 **Mandatory Renewable Energy Target Scheme (RET)** – source 10% of electricity from renewables, already about 8%.

2007 **National Greenhouse and Energy Reporting Act 2007** requiring industry to report its emissions, energy consumption and production, National Greenhouse and Energy Reporting (NGER) Scheme

RUDD GOVERNMENT 1

2007 **Australia ratifies Kyoto.**

2008 **Garnaut review; new 2020 emission reduction targets** – 5% below 2000 without any conditions, 15% if substantial global agreement.

2009 **Renewable Energy Target increased** to 20% by 2020. Carbon Pollution Reduction Scheme Bill introduced prior to Copenhagen COP.

2010 **National Carbon Offset Standard (NCOS). Building Energy Efficiency Disclosure Act 2010**

GILLARD GOVERNMENT

2011 Update of Garnaut review; Carbon farming initiative; **Clean Energy Act** passed. Long-term goal to reduce emissions by 80% below 2000 levels by 2050. RET split into Large-scale and Small-scale schemes.

2012 **Clean Energy Finance Corporation; Climate Change Authority; price on carbon at \$23/tonne; Climate Commission. Greenhouse and Energy Minimum Standards Act 2012.** Australia signs on to second commitment period of the Kyoto Protocol, 2013-2020, 0.5% reduction.

RUDD GOVERNMENT 2

ABBOTT GOVERNMENT

2013 **Repeal of parts of the Clean Energy legislation** – Climate Change Authority. Clean Energy Finance Corporation, Australian Renewable Energy Agency retained.

2014 **Renewable Energy Target reviewed.** Committed \$200,000 to the United Nations Green Climate Fund. **Intended Nationally Determined Contribution** (post-2020 emissions reduction target) **submitted to the UN. Emissions Reduction Fund.**

TURNBULL GOVERNMENT

2015 **Endorses the Paris Agreement.**

2016 **Signs the Paris Agreement**

➤ PRESENT

Targets: Emission reduction - (unconditional) 5% below 2000 levels by 2020. 26-28% below 2005 by 2030. Renewable Energy Target – Large-scale generation of 33,000 GWh (23.5%) of electricity will be provided from renewable energy by 2020.

➤ **EMISSIONS REDUCTION FUND TO PURCHASE REDUCTION IN EMISSIONS. Safeguard Mechanism** (starting 1 July 2016) to constrain increase in emissions from existing and new emitters producing greater than 100,000 tonnes CO₂eq each year (140 facilities, 50% of Australia's total emissions.) **Small-scale Renewable Energy Scheme. Clean Energy Finance Corporation. Australian Renewable Energy Agency. Office of the Clean Energy Regulator. Climate Change Authority. Solar Towns Program. Carbon Neutral Program for Businesses. National Carbon Offset Standard. Carbon Farming Initiative. 20 Million Trees.**

National Climate Resilience and Adaptation Strategy (2015). Support for National Climate Change Adaptation Research Facility. Reporting on National and Regional Greenhouse Gas Emissions and Projections. Establishment of International Partnership for Blue Carbon to increase awareness of importance of coastal ecosystems in climate change mitigation.

➤ **AUSTRALIAN DEFENCE FORCE (ADF) SOURCE:**

<https://www.climatecouncil.org.au/securityreport2015>

Climate change is identified as a security threat and is seen as a “threat multiplier”, intensifying existing stresses to water and food security, as well as poverty and economic shocks, making crises worse. *(Are there specific actions/projects of the ADF that we could list?)* Climate change puts the ADF under pressure and while the US and UK militaries are preparing to adapt to climate change threats, the ADF is lagging behind. Reduction in greenhouse gas emissions is essential for limiting the security implications of a changing climate.

➤ **OBLIGATIONS ON SUCCESSIVE AUSTRALIAN NATIONAL GOVERNMENTS RESULTING FROM THE UNITED NATIONS 2015 PARIS CLIMATE AGREEMENT**

The 2015 UN Paris Climate Agreement by all member countries of the United Nations is designed to reduce further rapid changes to the climate and assist countries to respond to unavoidable changes. The Agreement seeks to limit the increase in global temperature above pre-industrial levels to less than 2 degrees centigrade and preferably to less than 1.5 degrees. This will require the net emissions of greenhouse gases to be zero within several decades.

The Agreement requires or encourages national governments to undertake a number of specific actions, as listed below.

Australia's national governments will have the ongoing role of representing the nation at all the Conferences of Parties (COP) and all subsidiary bodies established by the COP as well as those specifically created under the Paris Agreement.

These are the:

- > Ad Hoc Working Group on the Paris Agreement
- > Subsidiary Body for Implementation
- > Subsidiary Body for Scientific and Technological Advice
- > Forum on the Impact of the Implementation
- > Adaptation Committee
- > Green Climate Fund
- > Global Environmental Facility
- > Adaptation Fund
- > Standing Committee on Finance
- > Technology Executive Committee
- > Climate Technology Centre and Network
- > Paris Committee on Capacity Building
- > Capacity-building Initiative for Transparency

In addition, there are specific obligations for all countries or just for developed countries, as listed below.



➤ GENERAL

- > Enhance pre-2020 ambition.
- > Take ambitious and early action.
- > Mobilise stronger and more ambitious action by all stakeholders, including civil society, the private sector, financial institutions, cities and other subnational authorities, local communities and indigenous peoples.

➤ MITIGATION

- > Prepare, communicate and maintain successive nationally determined contributions. Each successive contribution will represent a progression beyond the current contribution and reflect the nation's highest possible ambition. Undertake economy-wide absolute emission reduction targets. Account for the nationally determined contributions. (Article 4)
- > Communicate by 2020 a new nationally determined contribution, and do so every five years thereafter. Submit at least nine months before the relevant Conference of Parties. (24,25)
- > These may include the base year, time frames for implementation, scope and coverage, planning processes, assumptions, methodology, how the contribution is fair and ambitious. (27)
- > Communicate, by 2020, long-term, low greenhouse gas emission development strategies (36)
- > Conserve and enhance sinks and reservoirs of greenhouse gases, including forests. (Article 5)

➤ ADAPTATION

- > Strengthen regional cooperation, where appropriate. (45, Article 7)
- > Engage in adaptation planning processes and the implementation of actions. (Article 7)
- > Submit and update periodically an adaptation communication (Article 7)

➤ LOSS AND DAMAGE

- > Enhance understanding, action and support with respect to loss and damage associated with climate change. (Article 8)

➤ FINANCE

- > Provide financial resources to assist developing country Parties with respect to both mitigation and adaptation. Take the lead, together with other developed countries, in mobilising climate finance. Communicate biennially indicative quantitative and qualitative information, including projected levels of public financial resources to be provided to developing countries. (Article 9)
- > Continue to contribute to the global finance mobilisation goal of USD 100 billion per year. (54)

➤ TECHNOLOGY DEVELOPMENT AND TRANSFER

- > Help strengthen cooperative action with other countries on technology development and transfer. (Article 10).

➤ CAPACITY BUILDING

- > Ensure that education, training and public awareness are adequately considered (83). Cooperate with other countries in taking measures to enhance climate change education, training, public awareness, public participation and public access to information. (Article 12)
- > Cooperate with other countries to enhance support for capacity-building actions of developing countries, including through regional, bilateral and multilateral approaches. Regularly communicate on these approaches. (Article 11)

➤ TRANSPARENCY OF ACTION AND SUPPORT

- > Provide, at least every two years, a national inventory report of anthropogenic emissions by sources and removal by sinks of greenhouse gases and information necessary to track progress in implementing and achieving the nationally determined contribution. (Article 13)

➤ ENHANCED ACTION PRIOR TO 2020

- > Ratify and implement the Doha Amendment to the Kyoto Protocol (106a)
- > Participate in the existing measurement, reporting and verification under the Cancun Agreement. (106e)
- > Voluntarily cancel units issued under the Kyoto Protocol, including certified emission reductions that are valid for the second commitment period. (107)
- > Report transparently on internationally transferred mitigation outcomes, including emission units issued under the Kyoto protocol. (108)
- > Engage in strengthening, in the period 2016-2020, the existing technical examination process on mitigation. (110)
- > Scale up the level of financial support. (115)

The numbers in brackets refer to the paragraph number in the Agreement or the Article Number in the Annex to the Agreement.

STATE AND TERRITORY GOVERNMENTS

All Australian state and territory governments have introduced targets, legislation, policies, programs and projects relating to climate management over the last two decades. These are listed below. They include measures to reduce emissions, encourage energy efficiency, support the development of renewable energy and adapt to climate change. With the introduction of the Australian Government's Clean Energy legislation in 2011 some states withdrew their targets and measures to control emissions. Some are now being re-introduced.

OPTIONS AVAILABLE TO STATE AND TERRITORY GOVERNMENTS

Regulation of pollution, land clearing regulation, mining royalties, electricity tariffs, building codes, energy efficiency incentives, grants and subsidies, community awareness, research support.



AUSTRALIAN CAPITAL TERRITORY

PAST: Target 60% of 2000 levels by 2050. Energy efficiency grants program. Energy efficiency ratings for residential buildings. Climate change awareness sponsorship.

PRESENT: Climate change strategy and action plan. *Climate Change and Greenhouse Gas Reduction Act 2010*. Legislated targets of 100% renewable energy by 2020; 40% reduction from 1990 levels in greenhouse gas emissions by 2020; net zero emissions by 2050. Preparing a climate change adaptation strategy, with consultation on the draft having closed in April 2016.



NSW

PAST: Greenhouse Gas Reduction Scheme (2003) – electricity retailers, emissions trading, carbon credits from forest carbon. Greenhouse Plan 2005. Target -return emissions to 2000 levels by 2025 and 60% below 2000 levels by 2050. Renewable energy targets of 10% use by 2010 and 15% by 2020. Climate Change Fund. Schools Energy Efficiency Program. Support for research into soil carbon. Building Sustainability Index.

PRESENT: Target of 20% renewable energy by 2020. Renewable Energy Action Plan (in the second year, half of the 24 actions have been completed and 9 more have progressed.) Energy Efficiency Action Plan. Long Term Transport Master Plan. Climate Change Fund (up to \$200 million invested). Adaptation Research Hub collaborates with the Office of Environment in Adaptive Communities, Biodiversity and Coastal processes and responses. Zero emissions by 2050. Renewable Energy Action Plan 2017-2022. Knowledge Strategy 2013-2017 with Climate Change Impacts and Adaptations as one of the six themes identified.

SOURCE: <http://www.environment.nsw.gov.au/resources/climatechange/Environmentalfuturefundingpackage/draft-climate-change-fund-strategic-plan-160438.pdf>



NORTHERN TERRITORY

PAST: Strategy for Greenhouse Action 2006. Climate Change Policy 2009 – Targets: reduce emissions by 60% from 2007 levels by 2050, remove four million tonnes of carbon per year from the atmosphere by better land management, become carbon neutral by 2018. Energy Smart Schools Program.

PRESENT: Become a world-leading provider of renewable energy to remote communities. Solar buyback scheme.



QUEENSLAND

PAST: Ban broad scale clearing of native vegetation (2006). Climate Smart 2050- Queensland's Climate Change Strategy (Draft 2007) – Targets: emission reduction of 30% below 1990 levels by 2020, renewable energy of 25% by 2020, stabilise total energy consumption by 2010. Clean Coal Fund. Renewable Energy Fund. Solar Bonus Scheme. Energy efficiency rating for new buildings (2010). Climate Smart Living Education Campaign. Climate Smart Adaptation Plan. Support for agricultural research. Travel Smart Program.

PRESENT: Developing new climate adaptation strategy. Allocating funds to leverage investment in climate adaptation and support coastal hazard planning. New Renewable Energy Target: 50% of electricity from renewables by 2030. One million homes with rooftop solar by 2020 (currently 400,000).

ADAPTATION: Queensland Climate Change Adaptation Strategy (Q-CAS) 2015 was designed to address risks to the economy, environment, infrastructure and communities from current and future climate impacts. Over 3 years, the Queensland State Government is investing \$3 million to implement Q-CAS. Adaptation Planning for Great Barrier Reef is already underway (2012-2017), focusing on the protection of marine ecosystem health, including fisheries resources.



SOUTH AUSTRALIA

PAST: *Forest Property Act 2000* – identification of carbon rights. *Climate Change and Emissions Reduction Act 2007*. Target to reduce emissions to 40% of 1990 levels by 2050. Increase renewable energy to 20% by 2014. Solar feed-in tariff legislation, 2008. Renewable Remote Power Generation program. Climate Change Community Awareness Program. Renewable Energy Centre of Excellence. Climate and drought response research. Urban Forests Million Trees.

PRESENT: Climate Change Strategy 2015-2050 (November 2015). Target to achieve zero net emissions by 2050. 50% renewables by 2025. Energy efficiency targets. Adaptation framework and regional climate change adaptation plans. Premier's Climate Change Council established to provide advice to the Minister for Climate Change. In accordance with signing Under2MOU, South Australia is committing to a 80-95% drop in emissions since 1990.

SOURCE: <http://ysa-v2-katalyst-com-au.s3.amazonaws.com/production/2015/11/30/01/33/39/498ce396-6788-4d4e-b364-1c35a37a7e88/sa-climate-change-strategy-2015-2050-towards-low-carbon-economy.pdf>



TASMANIA

PAST: Framework for Climate Action, 2008. *Climate Change (State Action) Act 2008*. Target of reducing emissions by at least 60% of 1990 levels by 2050. Climate change and coastal risk assessment. Climate Change Community Grants Program. Climate Futures for Tasmania Project (2008-2010). Carbon Footprint Pilot Program for private companies.

PRESENT: Draft climate change action plan 2016-2021 (December, 2015) – to adapt to climate changes, build on current 90% renewable energy, maximise business and liveability advantages. Review of *Climate Change (State Action) Act 2008*.

ADAPTATION: Adapting to Climate Change in Tasmania (October 2012) Due to temperate maritime climate, Tasmania is expected to experience less severe climate change impacts compared to other parts of Australia, effects will be worst felt by socially physically and emotionally vulnerable communities and global supply chains (such as food and oil). Draft Climate Change Action Plan (2016-2021) acknowledges that some climate change is now inevitable, maximizing energy advantage with 90% of electricity capacity coming from renewable sources, maximizing business advantage with the global shift to low carbon and sustainable products and services providing new opportunities and maximizing liveability advantage by embracing natural liveability advantages such as cooler temperatures. The Tasmanian Coastal Adaptation Pathways project integrates the state government with local councils and communities.

SOURCE: http://www.dpac.tas.gov.au/_data/assets/pdf_file/0009/174834/Adapting_to_climate_change_in_Tasmania.pdf



VICTORIA

PAST : Greenhouse Challenge for Energy. Energy Technology Innovation Strategy. Renewable Energy Target requiring 10% of electricity consumption from renewables by 2016 and 20% by 2020. Greenhouse Regional Partnership Program with local governments (2003). Energy efficiency ratings for new buildings (2005). Net feed-in tariff to encourage solar (2008). Energy Efficiency Scheme to reduce household emissions by 10% by 2010. *Climate Change Act 2010*. Greenhouse and Climate Change in Agriculture Partnership. Plantations for Greenhouse. Climate Change and Infrastructure – Planning Ahead.

PRESENT: Climate Adaptation Plans. Review of the *Climate Change Act 2010*. Renewable Energy Roadmap (August 2015). Energy Efficiency Scheme. Renewable Energy Target (June, 2016) of additional 5400MW by 2025. 25% of electricity from renewables by 2020. 40% by 2025 (currently 14%). Emissions target of net zero by 2050. Five-yearly revision of climate change strategy. Emissions pledge program.

ADAPTATION:

The Victorian Climate Change Adaptation Plan (March 2013) aims to increase public and private resilience to climate risks, through informed and integrated decision making, community engagement and taking advantage of opportunities. 79 Victorian councils have joined “Victorian Adaptation and Sustainability Partnership-Supporting local climate resilience”, a co-operation between state and local government. The second Victorian Climate Change Adaptation Plan is set to be completed by December 2016 and publicly released in early 2017, building on the first Adaptation Plan, with implementation expected between 2017-2020 <http://haveyoursay.delwp.vic.gov.au/adaptation-plan>

SOURCES: http://www.depi.vic.gov.au/_data/assets/pdf_file/0004/284044/4493_DSE_Climate_Change_Adaptation_Plan_WEB.pdf



WESTERN AUSTRALIA

PAST: 2007 plan to reduce emissions to 60% of 2000 levels by 2050, clean energy of 50% by 2010 and 60% by 2020, and mandatory energy efficiency program. Energy rating for new houses (2006). Climate Change Education Initiative. Adaptation Blueprint.

PRESENT: Low Emissions Energy Development Fund to support innovative technology projects.

ADAPTATION: Adapting to Changing Climate Strategy released in October 2012 to combat issues associated with increasing temperatures and decreasing rainfall. Adaptation will be needed in the following areas; water supplies (in response to reduction in rainfall), agricultural sector (less water availability and longer, warmer, drier conditions), buildings and transport infrastructure, health, social and emergency management service systems, industries (adjust to more intense tropical cyclones), communities (lifestyle changes), management of our natural environment (reduce impacts and maximize resilience of ecosystems).

SOURCE: <https://www.der.wa.gov.au/your-environment/climate-change>



LOCAL GOVERNMENTS

Many of Australia's 571 local governments have addressed ways of adapting to climate change and some have successful programs to reduce emissions and support renewable energy. All capital cities have climate programs and some have goals that are more ambitious than those at the national and state level. However there has been only limited interaction between these initiatives and those of the other levels of government. An overview of climate-related initiatives of local governments is given below.

OPTIONS AVAILABLE TO LOCAL GOVERNMENTS

Land use planning, property rating, traffic management, building controls, waste management, localised energy supply, open space, street vegetation, awareness raising, community engagement, council operations.

CAPITAL CITIES

ADELAIDE:

TARGETS: Carbon neutral city by 2025; reduce emissions by 35% from 2006 levels by 2020; City Council to have zero net emissions by 2020. "Carbon Neutral Strategy 2015-2020". Climate Change Adaptation Plan, 2013-2015. Support for research by CRC for Low Carbon Living.

MELBOURNE:

TARGETS: Zero net emissions from the CBD by 2020; 25% of electricity from renewables by 2018. Increase building energy ratings. "Zero Net Emissions by 2020 Strategy" (2003, updated 2014). Council operations are carbon neutral. Urban Forest Strategy (2012-2032 increase canopy cover, increase diversity of tree species, improve vegetation health, improve soil moisture and biodiversity, inform and consult with the community, mitigating the urban heat island effect, creating a water sensitive city, engagement and involvement of the local community.) LED lighting for streets. Adaptation Strategy. Heatwave Plan for Victoria outlining health risks, actions and systems in place for support during a heat wave. The most recent publication is the Knowledge City Strategy 2014-2018 produced by the City of Melbourne council outlining how to create an eco city. Host City for ICLEI (Local Governments for Sustainability) Oceania office.

SYDNEY:

Council operations became carbon neutral in 2008.

TARGETS: Reduce city emissions by 70%. Meet 100% of electricity generation from local generation by 2030 - 70% from gas-based trigeneration and 30% from renewables. Energy Efficiency Master Plan 2015-2020. LED lighting for streets. Adaptation Strategy. Infrastructure with specific focus on Sydney's water, balancing supply and demand over the long term.

SOURCE: <http://climatechange.environment.nsw.gov.au/Adapting-to-climate-change/Infrastructure>

BRISBANE:

TARGETS: By 2031 Council operations will be carbon neutral; average household emissions will be less than 6 tonnes per year; 40% of region will be natural habitat. "Plan for Action on Climate Change and Energy" (2007, updated 2014)

DARWIN:

"Climate Change Policy" 2009. "Climate Change Action Plan 2011-2020".

TARGET: Actions and qualitative targets set for mitigation and adaptation, water, land, biodiversity, waste and energy. Climate Change and Environment Community Grants. Support for renewable energy projects. Darwin is particularly vulnerable to riverine flooding and more intense cyclonic activity.

SOURCE: <https://www.environment.gov.au/climate-change/climate-science/impacts/nt>

PERTH:

"Towards an Energy Resilient City" 2014.

TARGET: Reduction in city-wide emissions of 32% by 2031; reduction of 20% of 2011 emissions from Council operations by 2020. Vehicle Emissions Offset Program (2007). LED street lighting. City Switch Green Office Program. Environment Grants and Sponsorship. Community pledges to reduce greenhouse emissions through EcoHub Perth. Water Corporation's Water Forever strategy (50 year plan, produced in October 2009) ensuring climate resilience and sufficient and sustainable water supplies for WA, investment provided by Water Corporation to upgrade existing infrastructure and develop new water sources.

SOURCE: <https://www.der.wa.gov.au/your-environment/climate-change/254-adapting-to-climate-change?showall=&start=2>

CANBERRA:

See Australian Capital Territory above.

HOBART:

"Hobart's Climate Change Strategies 2008-2013" - actions relating to advocacy, abatement, awareness, adaptation and accounting.

TARGET: 30% reduction in emissions from Council activities by 2020 relative to 2009. Solar Hot Water and Insulation Rebate Scheme. Energy Efficiency Guidelines. Energy Efficiency Rebate.

OTHER

GreenClimateCities (previously Cities for Climate Protection Australia) was established by the International Council for Local Environmental Initiatives (ICLEI) in 1997 with funding from the Australian Government. In 2009 there were 238 participating councils representing 84% of Australia's population and reporting over 2000 actions. It was the largest local government greenhouse action program in the world. Today the support provided to local governments includes tools with which to analyse the sources of greenhouse gases and to select cost effective projects and a risk management framework for climate adaptation.

Most councils have had policies and projects in relation to climate action, or are part of a collection of councils committed to climate change adaptation or mitigation in their areas. Some of these are part of state government programs, for example:

- > The Western Australian Government funded the W.A. Local Government Association to assist local governments prepare to adapt to climate change.
- > The Victorian Government's Greenhouse Regional Partnership Program, starting in 2003, and the Victorian Adaptation and Sustainability Partnership working with local councils
- > South Australia's Regional Adaptation Plan partnered with the Premier's Climate Change Council and all 12 local council regions of South Australia.
- > The Queensland Government's Climate Adaptation Strategy and Coastal Hazards Adaptation Program partnered with the Local Government Association of Queensland to assist local governments adaptation strategies.

A recent study conducted by Beyond Zero Emissions concluded that almost half of the 152 Australian councils surveyed have set their own emissions reduction or renewable energy targets. In most cases these targets cover council operations but one in five councils are also including community emissions in their targets. Some ambitious individual council targets include:

- > Zero emissions in Byron Shire (NSW) by 2025
- > Net zero emissions in the City of Darebin, City of Yarra and Queenscliffe Borough (VIC) by 2020
- > Net zero emissions in the City of Moreland by 2045
- > 100% renewable energy in Coffs Harbour by 2030
- > 100% renewable energy in the town of Tyalgum in Tweed Shire by 2020

One focus of many councils is energy efficiency. Street lighting is being changed to the more efficient LED by 72 out of 79 councils in Victoria.

The Compact of Mayors is an initiative founded by C40 Cities Climate Leadership Group (C40), Local Governments for Sustainability (ICLEI) and the United Cities and Local Governments (UCLG) and aims to create a platform on which cities/councils can transparently record and publish emissions and emission reduction efforts. Australian councils involved include Adelaide, ACT, Byron Shire, Hobart, Joondalup, Marundah, Melbourne, Moreland, Mornington Peninsula Shire, Penrith, Perth, Port Phillip and Sydney. The Compact of Mayors has recently joined with the European Covenant of Mayors to form the Global Covenant of Mayors for Climate and Energy, a collection of over 7100 cities across the globe.



REGIONAL ORGANISATIONS

Regional organisations of relevance to climate management include the regional, natural resources management (NRM) organisations, regional Greenhouse Alliances and community energy groups.

The 56 regional NRM organisations covering all Australia periodically prepare plans for the sustainable management of their natural resources. From 2012 to 2015, with financial support from the Australian Government, this planning has taken into account both the potential impacts of climate change and opportunities in each region for carbon sequestration.

In Victoria ten Greenhouse Alliances have been operating for over ten years. Covering 72 municipal councils and much of the State they bring together the member councils, community organisations and private partners in mitigation, adaptation and sequestration activities. They have been resourced by the member councils, State government programs, private partners and in-kind support.

There are currently 33 community projects Australia-wide that are generating renewable energy, with approximately 70 more projects in development. Groups such as Coalition for Community Energy (C4CE) and Embark are supporting communities in increasing the production of renewable energy. Some community project examples include:

HEPBURN WIND PROJECT:

one of the first community-run renewable energy projects, with two wind turbines generating a total of 4.1MW energy able to power over 2000 homes.

DENMARK COMMUNITY WINDFARM –

Two wind turbines generating 1.6MW and providing 50% of the local community's energy needs. Preventing the release of approximately 6000 tonnes of greenhouse gases each year.

BLUE MOUNTAINS RENEWABLE ENERGY CO-OP

Currently planning to develop a commercial solar PV plant.

SUSTAIN NORTHERN RIVERS ENERGY WORKING GROUP

Committed to increasing the proportion of renewable energy sources to 20% by 2020

YARRA COMMUNITY SOLAR

Committed to establishing a medium-scale power station producing around 100kW energy through 400 solar PV panels.

BUSINESSES

The essential involvement of the private sector has been constrained by the uncertainty associated with the policies and programs of governments. As well as responding to mandatory requirements, such as reporting on emissions of greenhouse gases, many organisations and groups of organisations have voluntarily participated in government incentive schemes and established climate policies and targets relating to emissions and to the transition to renewable energy. Examples are outlined below.

1

BUSINESS LEADERSHIP

An increasing number of businesses are forming targets and programs related to climate management. Examples include:

- > Bank Australia – became carbon neutral in 2010 and has reduced carbon emissions by 18.1% since then.
- > GE – aims to reduce overall emissions by 20% from 2011 levels by 2020.
- > IKEA – aims to produce as much renewable energy as the total energy their buildings consume by 2020
- > BMW – will source two thirds of its energy use from renewables by 2020
- > ING – aims to power its operations by 100% renewable energy by 2020
- > Microsoft – has been powered by 100% renewable energy since 2014
- > South Pole Group – has abated 80 Mt CO₂-e since foundation
- > Brambles – reduce carbon emissions by 20% per delivered unit by 2020

2

THE CARBON MARKET

The Kyoto Protocol requires each country with an emission reduction target to track and record Kyoto emissions units which, in Australia, are issued under the *Australian National Registry of Emissions Units Act 2011* and *Carbon Credits Act 2011*.

Any businesses within Australia that wishes to purchase, hold or trade emission units in Australia are required to be registered with the Australian National Registry of Emission Units (ANREU) which is administered by the Clean Energy Regulator. There are several types of emissions units available each with specific requirements and characteristics:

- > Australian Carbon Credit Units (ACCUs) are issued for greenhouse gas abatement activities under the Emission Reduction Fund. They represent the equivalent of one tonne of carbon dioxide and are issued for emissions reduction or carbon sequestration projects.
- > Certified Emission Reduction Units (CERs) are issued for greenhouse gas abatement activities under the Clean Development Mechanism (CDM) which operates in developing nations. CERs can be used in Australia to meet emissions commitments.
- > Emission Reduction Units (ERUs) are issued for greenhouse gas abatement activities under the Joint Implementation (JI) scheme defined in the Kyoto Protocol, where Annex B (developed) countries can perform emission reduction projects in other Annex B countries. These ERUs can be used in Australia to meet emission commitments.
- > Removal Units (RMUs) are issued for emissions stored or avoided through land use, land use change and forestry (LULUCF) activities.

The Emissions Reduction Fund (ERF) was established in 2014 and aims to expand the scope of the Carbon Farming Initiative to cover a greater range of sectors. Under the ERF, administered by the Clean Energy Regulator, businesses are incentivised to voluntarily participate in emission reduction projects across a range of areas through reverse auctions (the third auction occurred in April 2016 and the final auction is expected to occur late 2016). As of the most recent auction, a total of 143 Mt CO₂-e in emissions reductions (over the various contract lengths) have been purchased by the federal government. Some projects include, but are not limited to:

- > **Vegetation** – reduction of land clearing, planting of new vegetation, native forest revegetation, etc. There are currently 344 active projects Australia wide. One example is the Carbon Conscious Carbon Capture Project in Western Australia aiming to reforest over 17,600ha across a range of areas. Carbon farming projects received the most funding at the most recent ERF auction.
- > **Waste** – reduction in landfill waste, landfill methane capture to use as fuel, wastewater treatment, etc. There are currently 125 active projects across Australia, one of which is the MRL LFG Abatement Project in Victoria that is extracting methane from regional landfills to use as fuel.
- > **Savanna burning** – managing vegetated areas through controlled burns to minimise risk of high-intensity fires with optional use of the Savanna Burning Abatement Tool (SavBAT) provided by the Department of Environment. For example, the Fish River Fire Project reduced the area burnt from late season fires from 36% down to 1%.
- > **Energy efficiency** – reducing commercial and industrial energy use through energy-efficient appliances, boosting small household energy efficiency, etc.

> **CARBON OFFSETTING:** There is a variety of privately operated schemes by which organisations and individuals can purchase a reduction in emissions by others.

There is also opportunity for businesses to contribute to a reduction in carbon emissions without applying through the ERF. Carbon Neutral from Western Australia organises and deploys reforestation projects across ten thousand hectares of farmland and has earned the Gold Standard Certification (initiated by World Wildlife Fund) for its efforts. These reforestation projects are transferred to carbon credits and sold to other companies to offset their emissions.

3

THE RENEWABLE ENERGY MARKET

The Renewable Energy Target (RET) was reviewed in July 2015. Application of the RET is divided into two schemes:

- > The Large-scale Renewable Energy Target which aims to increase the investment in large scale renewable power plants to reach 33,000 GWh of renewable energy by 2020 (15,200 GWh was generated in 2015). This is achieved through the establishment of Large-scale Generation Certificates (LGCs) that are used by all liable entities. There are currently 482 large scale renewable energy plants active in Australia, with an increase of 70% in accredited solar power stations since 2011 (albeit small solar stations).
- > The Small-scale Renewable Energy Scheme which aims to encourage the uptake of household solar PV and solar hot water systems. This is achieved through the establishment of small-scale technology certificates (STCs). In June 2016, 5293 small scale systems were installed nationally generating a total of 22,661 kW of renewable energy.

All certificates are created and traded via the Renewable Energy Certificate (REC) registry managed by the Clean Energy Regulator.

4

REPORTING

Under the *National Greenhouse and Energy Reporting (NGER) Act 2007* companies emitting more than a designated amount of greenhouse gases must measure and report on their emissions annually to the Clean Energy Regulator, with the general measurement requirements being emissions, energy consumption and energy production.

Carbon Disclosure Project(CDP): Through this international, not-for-profit organisation companies and cities can voluntarily report on their greenhouse gas emissions. The information is publicly available. There are about 6000 participants worldwide. CDP has also launched the Carbon Action Initiative to encourage companies to produce, implement and disclose their emission reduction targets.



5

CERTIFICATION AND RATING

Businesses can take part in the Carbon Neutral Program managed by the Department of Environment.

This certifies products, business operation or events as carbon neutral using the National Carbon Offset Standard (NCOS). Carbon neutrality can be achieved through a reduction in emissions and from purchasing carbon offset units. There are 26 organisations in Australia that have all or part of their business operations certified carbon neutral by this program. The Carbon Market Institute has recently been appointed to manage the program. Certification is also undertaken by the Carbon Reduction Institute.

▶ THE CLEAN ENERGY COUNCIL CERTIFIES INSTALLERS OF SOLAR SYSTEMS.

Businesses can also participate in building rating systems, such as the National Australian Built Environment Rating System (NABERS) run by the Office of Environment and Heritage or the Green Star rating system administered by the Green Building Council Australia (GBCA). These ratings systems allow businesses to assess the environmental performance of their buildings with measures such as energy efficiency, emissions, water usage, waste management etc. Businesses can then decide where and what improvements they would like to make to existing buildings or what additions they would like to incorporate into new buildings.

6

REGULATION

Businesses are required to comply with a range of government regulations. The following examples apply to energy efficiency regulations of the Australian Government:

- > Any appliance, lighting or electrical equipment manufacturer is required to adhere to the Minimum Energy Performance Standards (MEPS) as stipulated in the Greenhouse and Energy Minimum Standards (GEMS) Act 2012 which sets out the minimum level of energy performance for a range of products. This results in the Energy Rating Label (ERL) that aims to guide the consumer.
- > Application of building codes - The National Construction Code (NCC) sets out the energy efficiency (thermal performance) requirements for new buildings under the Australian Building Codes Board. The Nationwide House Energy Rating Scheme (NatHERS) is a star rating system run by the Department of Industry, Innovation and Science that measures a property's energy efficiency.
- > Government buildings however are covered under the Energy Efficiency in Government Operations (EEGO) Policy which aims to set a minimum standard of energy efficiency for Commonwealth government buildings.
- > Any future lessors or sellers of commercial space must adhere to the Commercial Building Disclosure (CBD) Program under the Building Energy Efficiency Disclosure Act 2010 and provide energy efficiency details to prospective renters and buyers.

7

THE FINANCE SERVICES SECTOR

Investment in climate related activities is increasing according to the annual report “Bonds and Climate Change: The State of the Market in 2016” compiled by HSBC. Australian issuance of unlabelled climate-aligned bonds is about \$2.5 billion and dominated by the rail operator, Aurizon.

- > Lending by the big four banks to renewable energy projects has dropped so far this year. Since 2008 \$6.014 billion has been lent.
- > The latest report by the Responsible Investment Association Australasia found that in 2015 responsible investment, including those relating to climate change, constituted \$633 billion of assets under management.
- > Investor Group on Climate Change is a collaboration of Australian and New Zealand investors with over \$1 trillion of funds under management focussed on the impact of climate change on the financial markets.
- > Banks – ANZ Green Bonds.
- > In July this year Victoria became the first state to issue Green Bonds, raising \$300 million to finance energy efficiency, renewable energy generation, low-carbon public transport and water treatment. The London-based Climate Bonds Initiative certified the bond.
- > Carbon Advocacy Fund (Australian Ethical Investment): one of the first of its kind in the world, this fund aims to use its part-ownership of a carbon-intensive business to influence its decisions and to advocate for better climate change management within the company.
- > Clean Energy Finance Corporation – invests in commercial projects focused on renewable energy (50%) and energy efficiency/low emissions technologies (50%), with approximately \$1.2 billion invested.
- > The insurance industry is increasingly taking into account the risks associated with future changes in the climate.

8

OTHER

Carbon pricing: Some companies integrate a carbon price into their business plan.
Divestment of investments
Supply chain management

> CLIMATE AND ENERGY SPECIFIC

- > Climate Group – international NGO that aims to facilitate climate action through supporting governments and leading businesses.
- > Clean Energy Council – peak body for the clean energy industry in Australia. Advocates for the acceleration of the transformation of Australia’s energy sector.
- > Carbon Markets Institute – peak body for carbon market participants in Australia. Acts as a conduit between government and industry.
- > We Mean Business – twelve major companies, including banks and energy suppliers, committed to action on climate change. Currently comprises 611 companies and investors.
- > Sustainable Business Australia – peak body for low carbon and environmental goods and services sector in Australia. Works to provide information on the solutions that industry can provide to environmental challenges.
- > Australian Business Roundtable on Climate Change (2004) – six largest businesses produced “The Business Case for Early Action” with target of 60% reduction in emissions of 2000 by 2050. Advocated a long-term goal, short-term target, carbon pricing, no indemnity against future carbon risk, energy efficiency, transparent reporting, innovation, national strategy for resilience.

SOURCE: http://www.dpi.nsw.gov.au/_data/assets/pdf_file/0018/126171/anna-gero-iag-namoi-climate-change-forums.pdf

> THE AUSTRALIAN BUSINESS ROUNDTABLE ON CLIMATE CHANGE;

- > Alliance of businesses and NGOs, BP Australia, Insurance Australia Group, Origin Energy, Swiss Re, Visy Industries, Westpac, Australian Conservation Foundation (ACF): range of views represented but all aiming to reduce business risk and embrace opportunities associated with climate change.
- > Gold Standard – certification body established by World Wildlife Fund that ensures development projects meet emission reductions and renewable energy standards.
- > Science Based Targets – partnership between CDP, UN Global Compact, WRI and WWF to increase corporate climate action by advising on amount of emissions that need to be cut in order to stay below 2°C global warming. Currently recorded 172 companies that have signed up.

- > Climate Friendly – provides advice, support and solutions to businesses internationally and is also a carbon offset provider. Aims to abate 50 Mt CO₂-e by 2020.
- > Green Building Council Australia – award Green Star certification, advocate for political change with the Election 2016 Platform plan for buildings, communities and cities, provide education through courses
- > The Carbon Reduction Institute (CRI) –encouraging businesses to reduce their carbon footprint, providing certification for carbon neutral businesses, carbon footprint analysis, consultancy, calculation and offset of carbon emissions

> CLIMATE INVESTORS GROUP -

- > Global Call for Climate Action (GCCA) – network of more than 450 non profit organisations across 70 countries
- > Energy Efficiency Council –non-profit organisation based on membership, representing over 70 members from business and government, providing energy efficiency advice, manufacture, install or service energy efficiency products or technologies
- > Australian Alliance for Energy Productivity - non profit collation of business, government and environmental leaders, unique organisation as it focuses on collaborations across different sectors
- > Sustainable Businesses Australia- supporting low carbon and environmental goods and services sector, think tank for “new markets, industries and jobs”, examples of Australian members include AGL, Australian Ethical Investment and Superannuation Ltd, Greening Australia, LJ Hooker, ClimateWorks Australia, David Jones



OTHER AUSTRALIAN

Insurance industry

SOURCE: The Impact of Climate Change on Insurance against Catastrophes, Tony Coleman http://stephenschneider.stanford.edu/Publications/PDF_Papers/IAG-Climate_Change_Paper.pdf

- > Premiums increase with increased exposure to natural hazards and increased impact of catastrophes (such as extreme weather events, heatwaves etc). A less predictable climate reduces the ability for insurance companies to calculate price and spread the weather-related risk. In Australia, losses from tropical cyclones and in more recent times hailstorms, bushfires and floods. Current trends indicate that worldwide economic losses from catastrophes are doubling every 10 years.

SOURCE: http://awsassets.wwf.org.au/downloads/cl047_insurance_and_climate_change_disclosure_in_australia_02nov15.pdf

- > Insurance industry has expertise in risk management, weather-related impacts and a significant position in the business community, making it a key player and accountable for reducing risks and costs for consumers. Disclosure by Australian insurers still appears to be on a voluntary/recommended basis (unlike mandates/requirements in the US)
- > Business Council of Australia – advocates energy and climate change policies.
- > Dairy Industry Council – target to reduce emissions intensity by 30% below 2010 emissions by 2020.



INTERNATIONAL

International Air Transport Association – target – halve 2005 emission levels by 2050.

RESEARCH, EDUCATION AND CONSULTING ORGANISATIONS

Since the 1980s a wide range of monitoring, data analysis, research and education programs relating to climate management has been established in Australia. Examples are listed below.

- > CSIRO – atmospheric monitoring and modelling; state of the climate; climate resilience.
- > Centre for Excellence in Climate Science, Australian Research Council (started 2011)- consortium of five Australian universities and others.
- > National Climate Change Adaptation Research Facility (Griffith University)
- > Bureau of Meteorology
- > Australian Museum

> UNIVERSITIES

Research and teaching relevant to climate change and renewable energy are undertaken at all 43 universities. Examples include:

- > the Climate Change Institute and Master of Climate Change at the Australian National University;
- > the Melbourne Energy Institute and the Australian-German College of Climate and Energy at the University of Melbourne;
- > Climate Works at Monash University;
- > Climate Change Research Centre at the University of NSW;
- > Global Change Institute at the University of Queensland;
- > Environment Institute at the University of South Australia, and
- > Centre for Climate Change and Animal Behaviour at Flinders University.
- > There is an Australian Universities Climate Consortium.

> CO-OPERATIVE RESEARCH CENTRES

- > Former – Renewable Energy CRC (1996-2004); Greenhouse Accounting CRC (1999-2006); Greenhouse Gas Technologies (2003-2014).
- > Current – Antarctic Climate and Ecosystem CRC; Low Carbon Living CRC; CO2CRC

> CONSULTANTS/EXPERT GROUPS

- > The Climate Institute
- > The Climate Council
- > Beyond Zero Emissions
- > There are many consultancies with expertise in climate management and renewable energy. They include multinationals such as PWC, Ernst and Young and KPMG, major Australia-based companies and niche consultancies in each state and territory targeted specifically at climate and energy management.

> RESEARCH AND INNOVATION FUNDING

- > ARENA – The Australian Renewable Energy Agency provides financial support to renewable energy research and development projects throughout Australia (including scholarships and fellowships). They are currently funding 232 projects (solar projects account for 64%) and have approximately \$2.5 billion in legislated funding until 2022.
- > CEFC – The Clean Energy Finance Corporation co-finances and invests in clean energy technologies, encouraging investment from the private sector.

ACTION BY INDIVIDUALS

Responsibility for managing the climate also rests with individual citizens. Individuals can respond to government schemes for energy efficiency and the use of renewable energy. They can also modify their lifestyle, consumption patterns and investments.

Programs like the Australian Greenhouse Calculator administered by the Environment Protection Authority of Victoria or the Carbon Calculator by Carbon Footprint allows individuals to calculate their total emissions generated by their lifestyle. This is done using a variety of measures including transport use, heating and cooling, air travel, refrigeration etc.

People and organisations can participate in pledging schemes such as the one recently established by the Victorian Government, helping to keep the temperature rise under two degrees Celsius and encouraging actions such as avoiding purchasing products with excess packaging.

Participation in government schemes, e.g. retarding energy demand by replacing incandescent lighting with LED's.

Installation of solar panels on domestic rooftops – feed-in tariff schemes specific to each state government encourage households to install solar PV cells. Installation of rooftop panels with less than 100-kilowatt capacity in households and small businesses peaked in 2011 and is now at a seven-year low. Within the next decade, solar penetration in some parts of South Australia and Queensland will reach saturation point, where every suitable rooftop is covered in PV cells. On average 15% of Australian household have installed PV (compared to only 1% of rental properties), with Australia currently having the highest proportion of households with solar PV cells in the world. However, 85% of those PV cells are small systems with less the 10kW power. Australia is currently 6th in the world in regards to PV capacity per capita.

Smart meters - Advanced Metering Infrastructure (AMI) – allow users to track energy use and measure the peak consumption.

OTHER MEASURES INCLUDE:

REDUCING EMISSIONS CAUSED BY FOOD

Reducing the consumption of red meat by individuals can lead to comparative reductions in carbon dioxide and methane emissions. Individuals who preferentially purchase locally-produced fresh food help to reduce the demand for energy-intensive foods or those products with high 'food miles'.

INDIVIDUALS CAN USE THE GREEN VEHICLE GUIDE

(GVG) produced by the Department of Infrastructure to compare the environmental performance of certain vehicles. Reduction in car use, or switches to more fuel efficient forms of transport such as public transport, electric cars or bicycles has also aided in reducing emissions. Even small changes such as proper tyre inflation can reduce overall emissions from vehicles.

HOUSEHOLDS CONTRIBUTE ALMOST ONE FIFTH OF AUSTRALIA'S GREENHOUSE GAS EMISSIONS.

New house design and retrofitting can significantly reduce heating costs and effective emissions. Insulation has been shown to save up to 40% energy usage and significantly reduce greenhouse emissions. The National Construction Code (NCC) sets out the energy efficiency (thermal performance) requirements for new houses and apartments. The Nationwide House Energy Rating Scheme (NatHERS) is a star rating system run by the Department of Industry, Innovation and Science that measures a property's energy efficiency.

SWITCHING BANK AND SUPER

Organisations such as Responsible Investment Association Australasia and Market Forces attempt to educate and advise individuals on switching to ethical investment schemes like Future Super that support a sustainable environment.



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