

ClimateWorks
AUSTRALIA

CARBON EMISSIONS: ALL YOU NEED TO KNOW!

LANEWAY LEARNING

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23 September 2013



About ClimateWorks Australia

Non-profit organisation focused on enabling practical projects to deliver emissions reductions in Australia.



THE MYER
FOUNDATION



MONASH University

Affiliations:



ClimateWorks



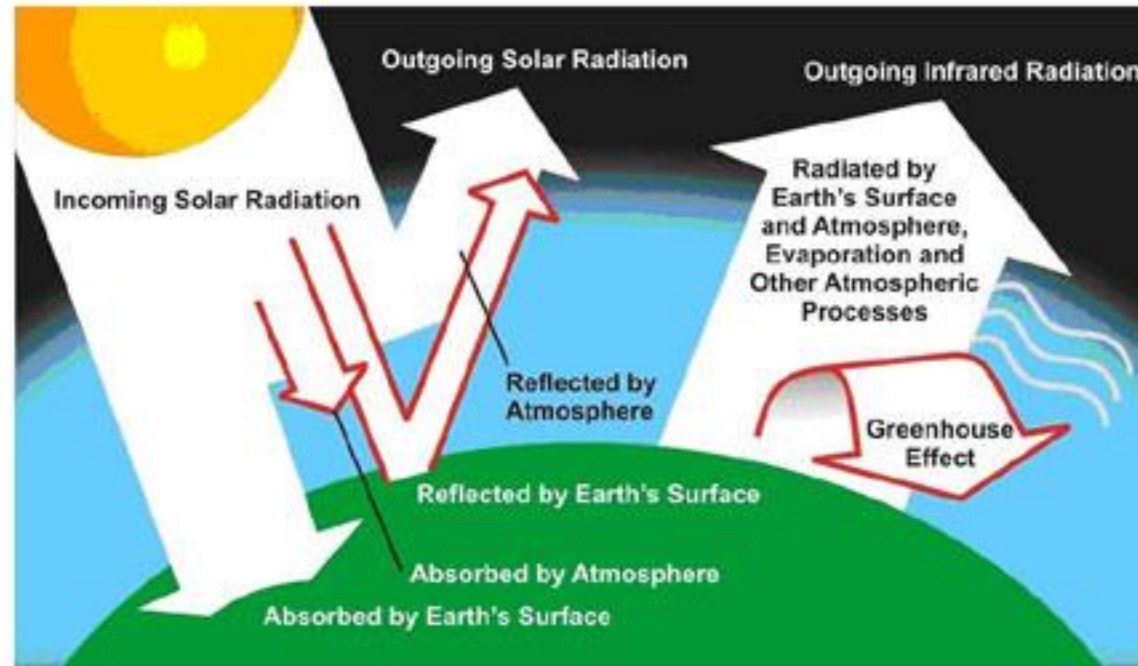
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1. What is the impact of greenhouse gas emissions?
2. Where do Australia's emissions come from?
3. How have emissions changed in the past?
4. How are emissions expected to change in the future?
5. How can emissions be reduced?
6. What's the role of policies?
7. What can you do?



What is the greenhouse effect?

The **greenhouse effect** occurs when certain gases in the atmosphere (the air around the Earth) entrap infrared radiation. This effect makes the planet warmer, in the same way a greenhouse keeps its inside temperature warmer.



The greenhouse effect **is natural**. It is important for life on Earth. Without the greenhouse effect, the Earth's average temperature would be around -18 or -19 degrees Celsius. The problem is that recently, the greenhouse effect **has become stronger**.

What are greenhouse gases?

The greenhouse effect is caused by greenhouse gases.

When there is more greenhouse gas in the air, **the air holds more heat**. This is why more greenhouse gases cause global warming.

Water vapour



-

Methane



25

Carbon dioxide



1

Hydrofluorocarbons

e.g. **HFC-23**

14,800

Nitrous oxide



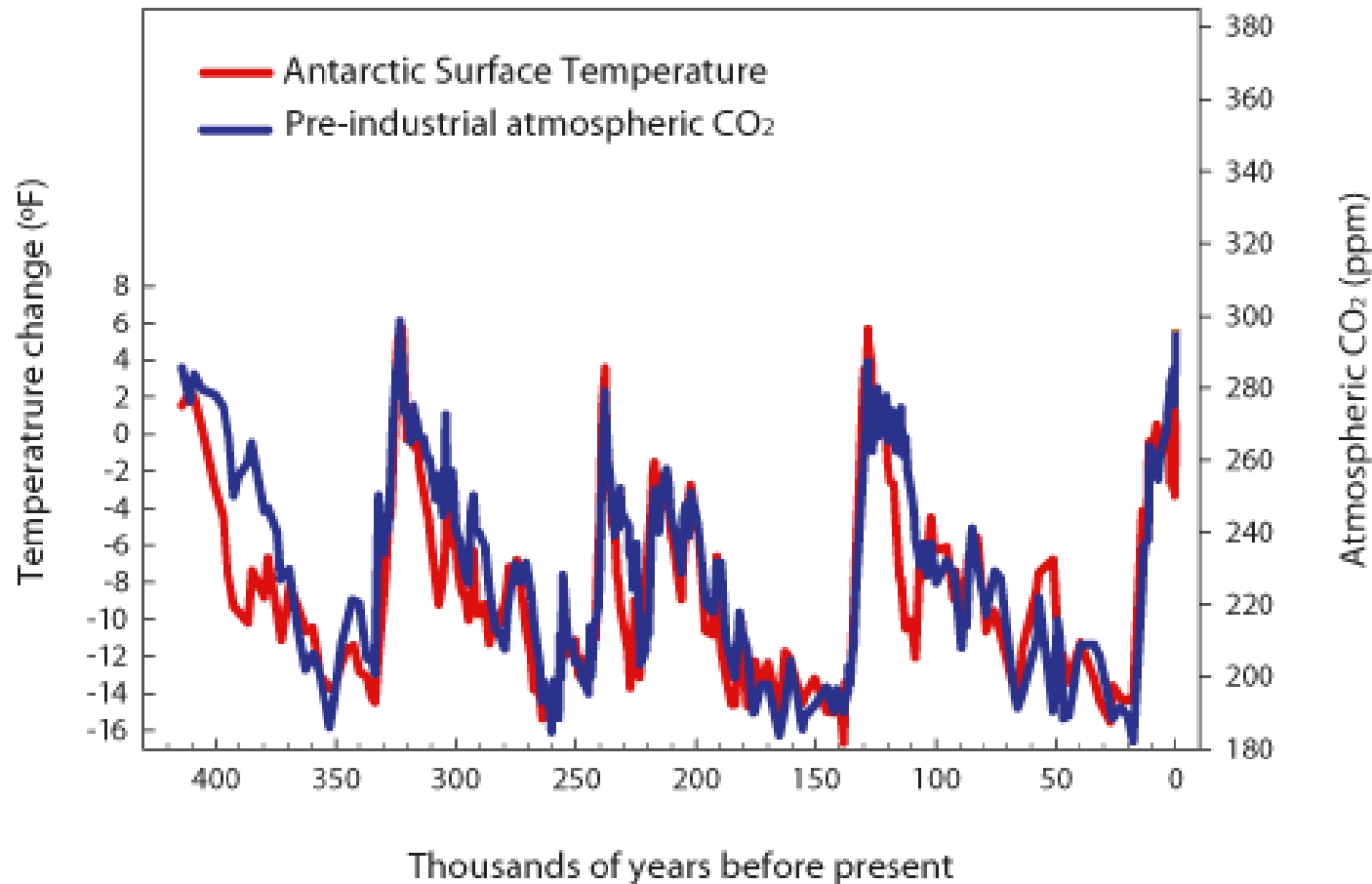
298

100 years Global warming potential (IPCC 2007)

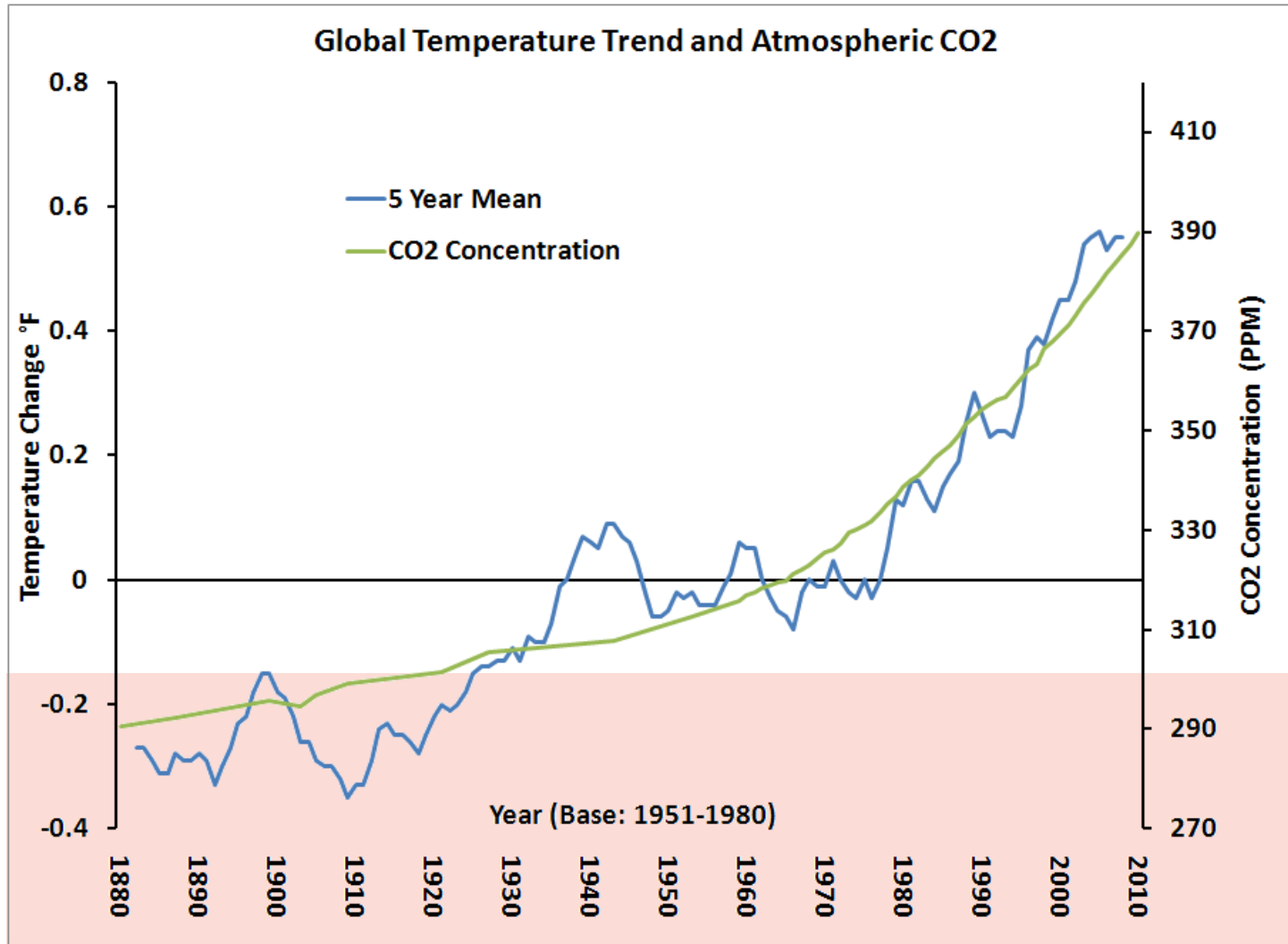
What impact do greenhouse gases have on temperatures?

Trends in Atmospheric CO₂ & Global Surface Temperature

The last 400,000 Years

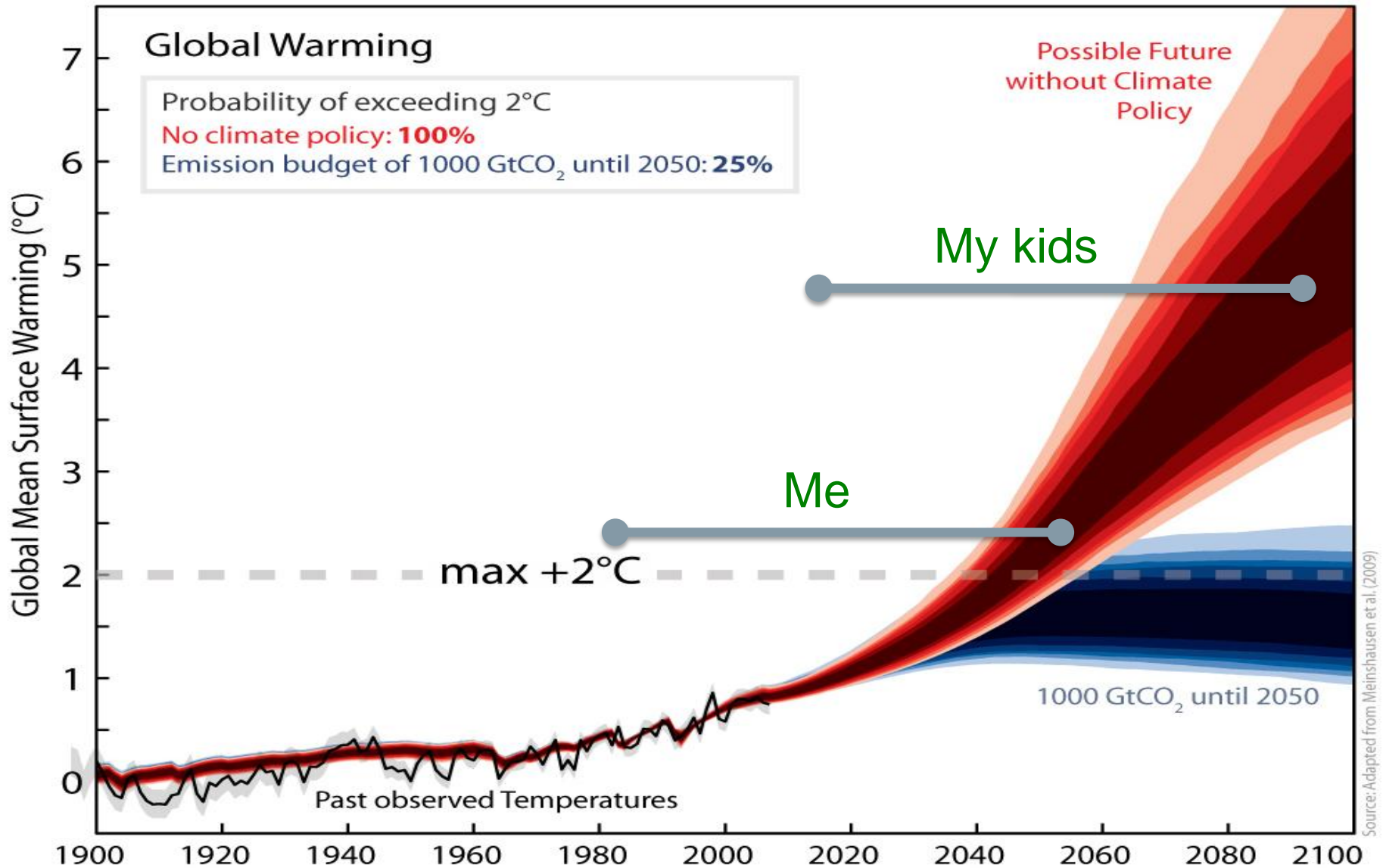


What is the problem today with greenhouse gases?



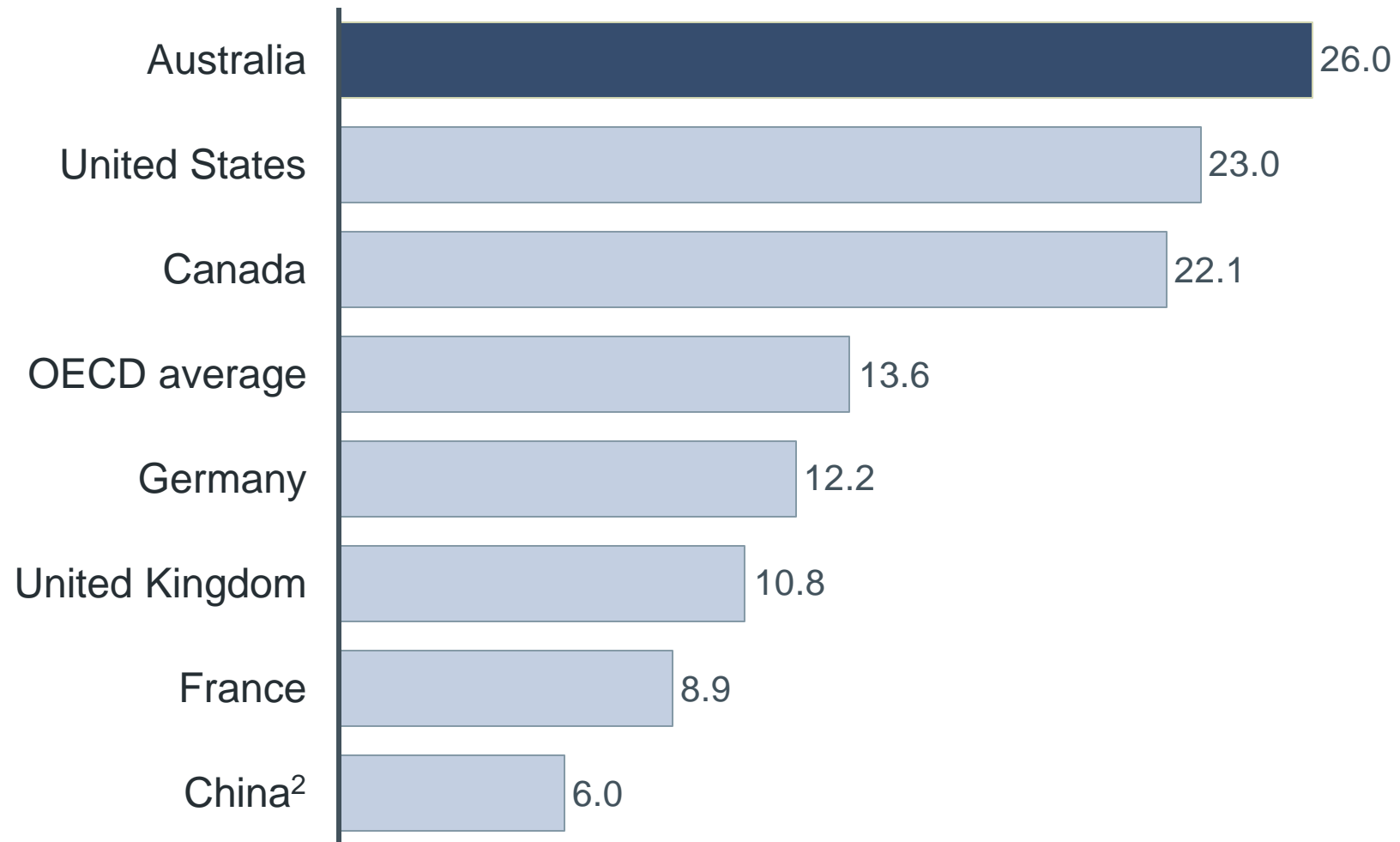
**Historical
range:
180 - 300**

How urgent is the issue?



Australia's role is key, given its high greenhouse gas emissions per capita

tCO₂e per capita; 2006



1 Includes all local emissions, regardless of where goods manufactured or created locally (e.g. cattle or aluminium) are consumed.

2 China data is 2005

SOURCE: UN Statistics Division (2009), US Congressional Research Service (2008)



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What creates greenhouse gas emissions?

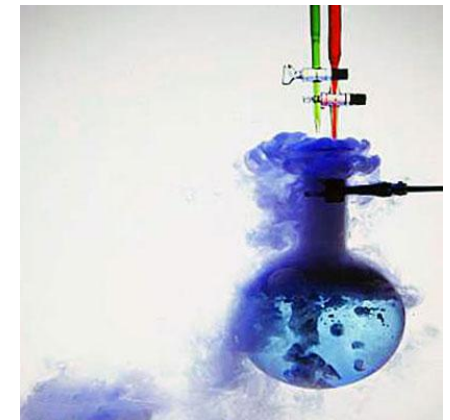
Burning fuel



Fugitive gases



Chemical processes



Cutting trees



Animals digestion



How big are those emissions sources relative to each other?

Coal powered electricity generation

Waste

Home energy use

Aluminium production

Mining and Gas extraction

Residential car fuel use

Domestic flying

Australia's fuel exports

Agricultural soils

Commercial buildings energy use

Cows

Deforestation

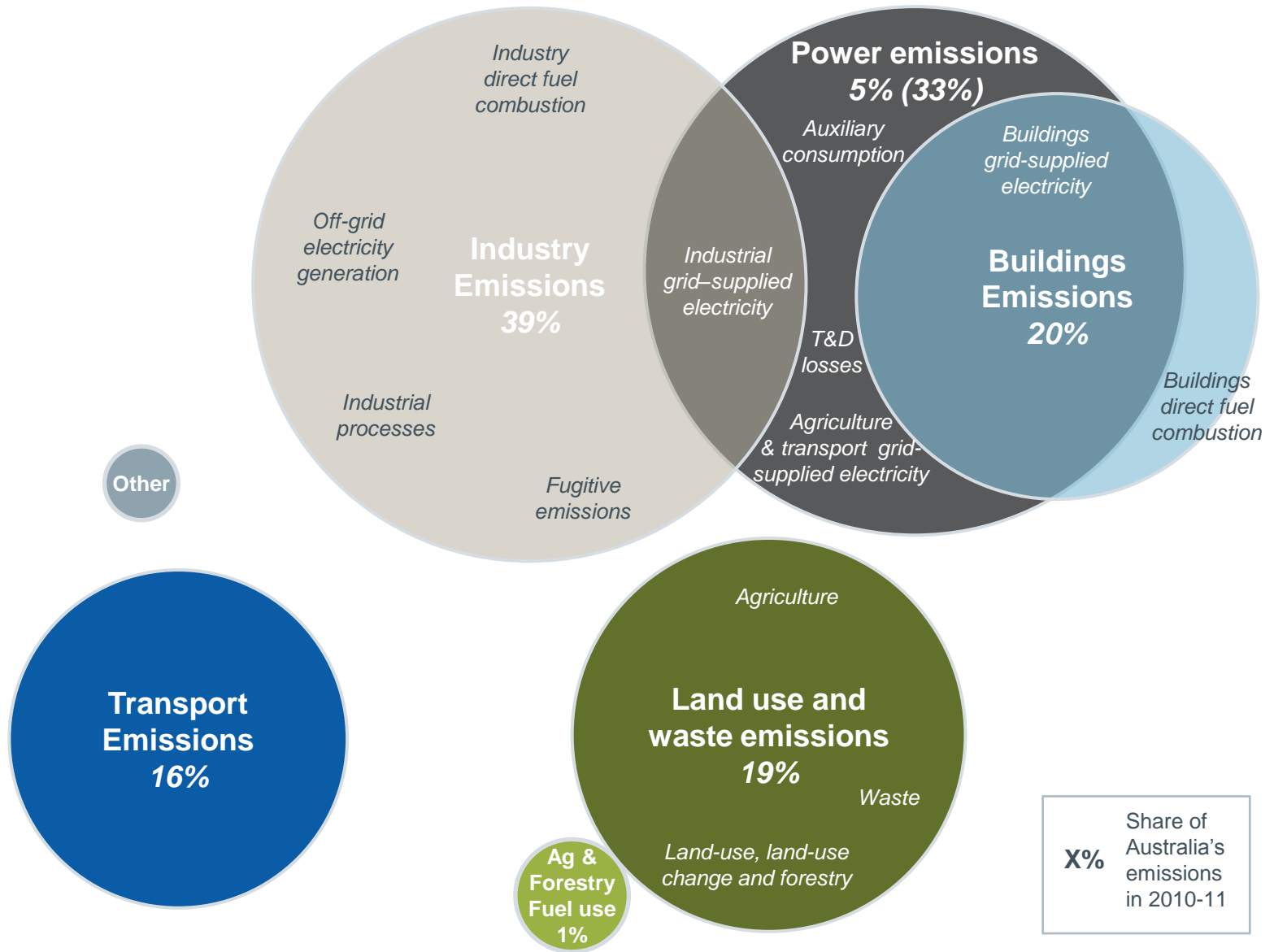


How big are those emissions sources relative to each other?

Rank	Emissions source	MtCO ₂ e
1	Australia's fuel exports	639
2	Coal powered electricity generation	170
3	Mining and Gas extraction	85
4	Home energy use	60
5	Commercial buildings energy use	53
6	Cows	44
7	Residential car fuel use	42
8	Deforestation	38
9	Aluminium production	30
10	Agricultural soils	15
11	Waste	13
12	Domestic flying	7



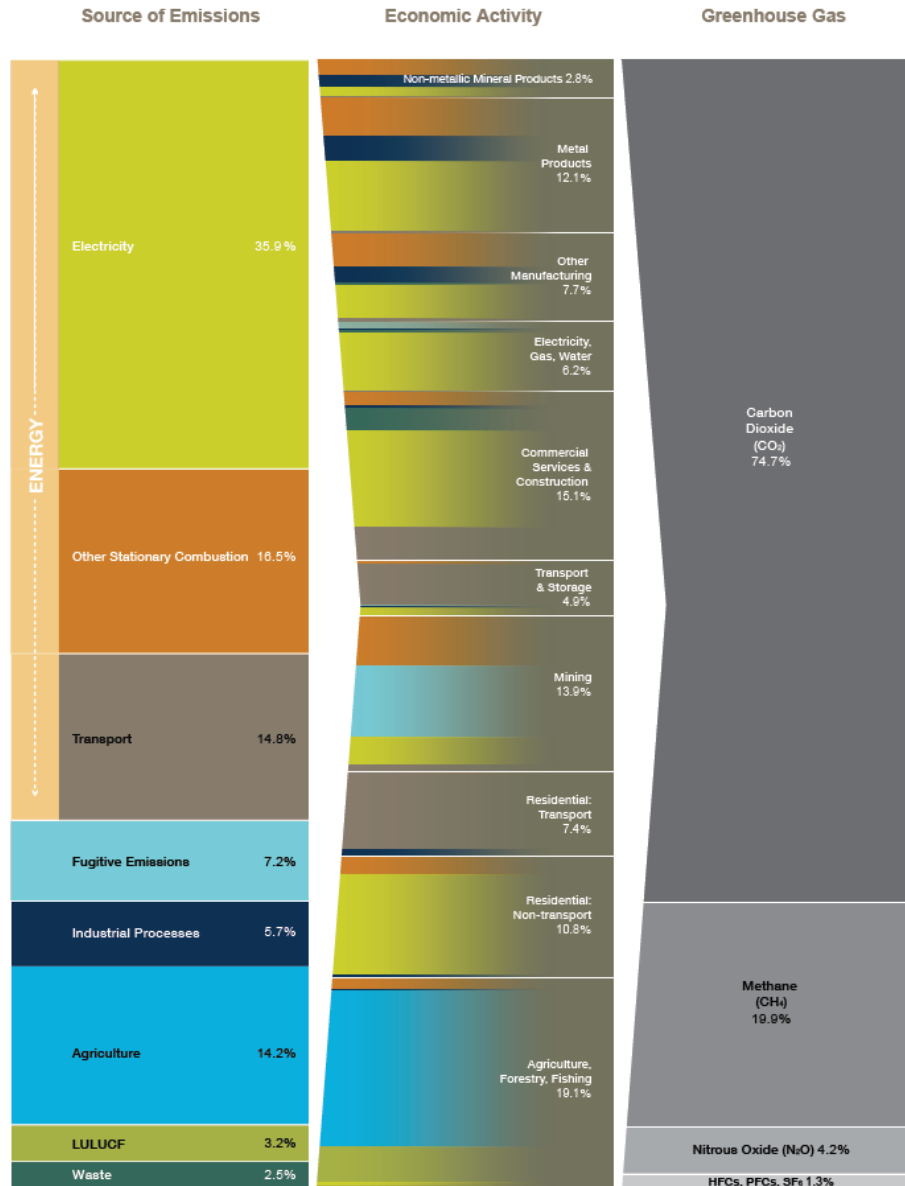
The relative contributions to Australia's domestic emissions



Australia's fuel exports have also a big impact on international emissions



The relative contributions to Australia's emissions



I've got
prints for
the number
lovers

SOURCE: National Greenhouse Gas Inventory

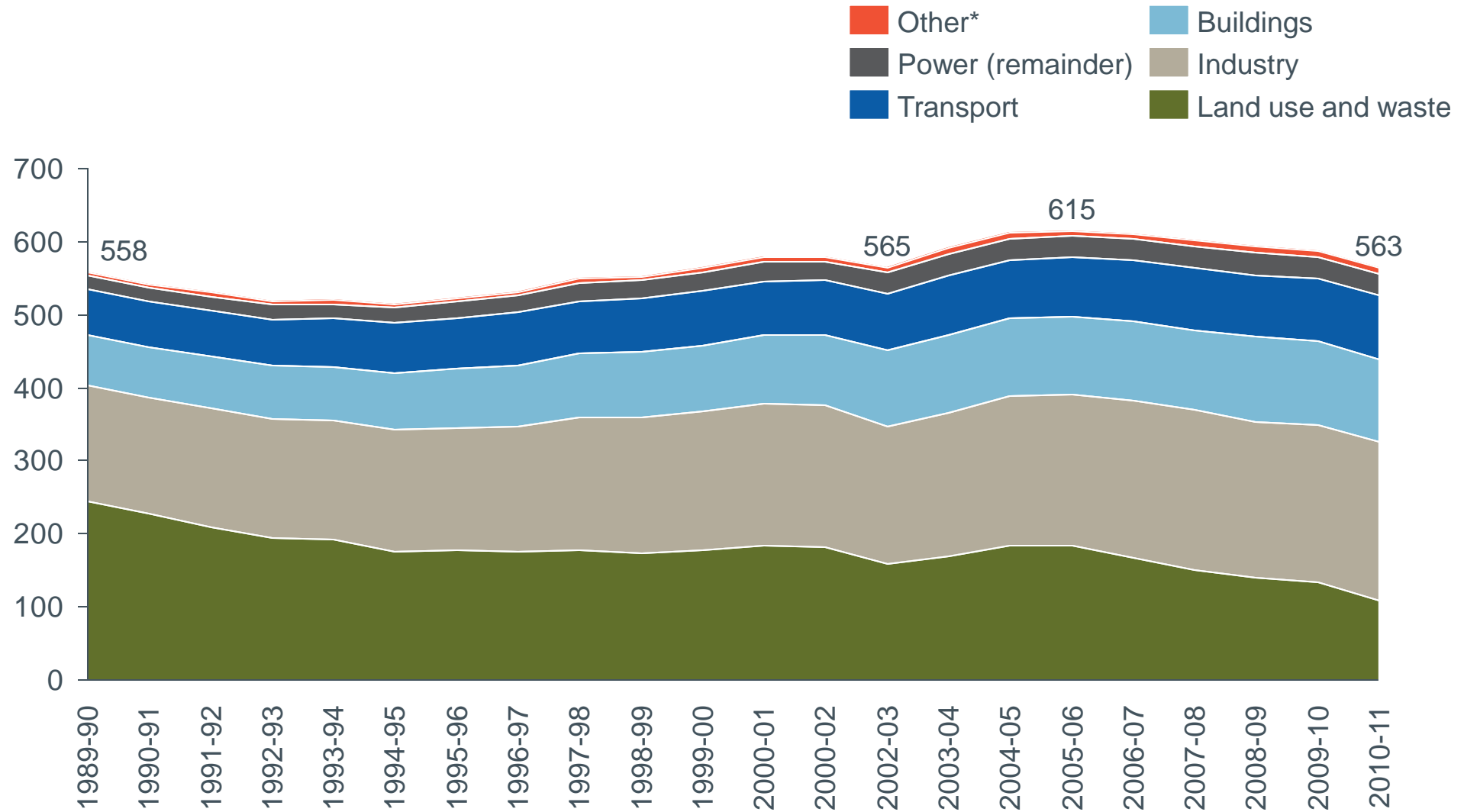


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Changes in Australia's emissions between 1989-90 and 2002-03



*Other includes emissions from stationary fuel combustion in the Agriculture and Forestry sector, as well as in other sectors
 SOURCE: National Greenhouse Gas Inventory

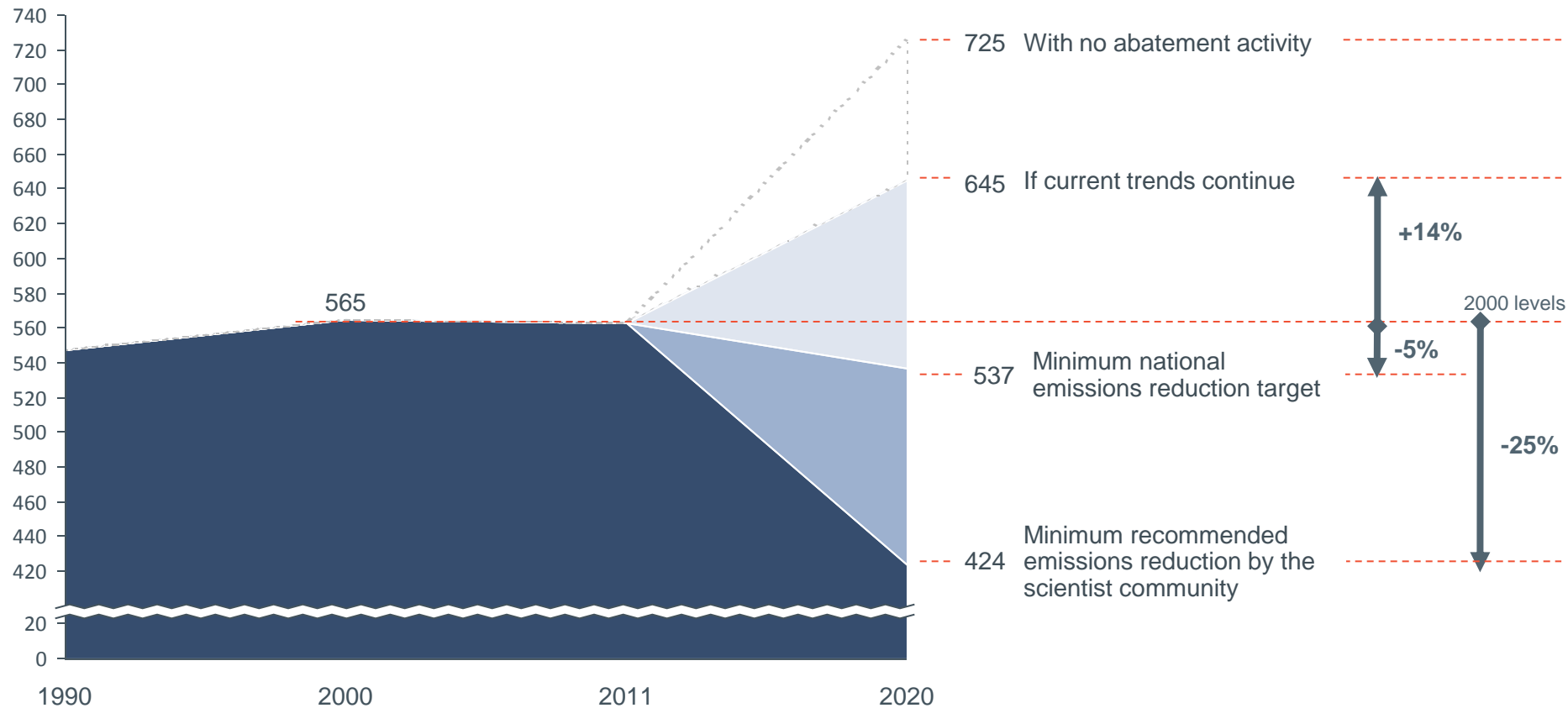
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Without further action, Australia's emissions are expected to rise by about 14% above 2000 levels by 2020

Australian emissions of greenhouse gases, Mt CO₂e



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There are many opportunities to reduce carbon emissions using existing technologies available domestically



energy efficiency



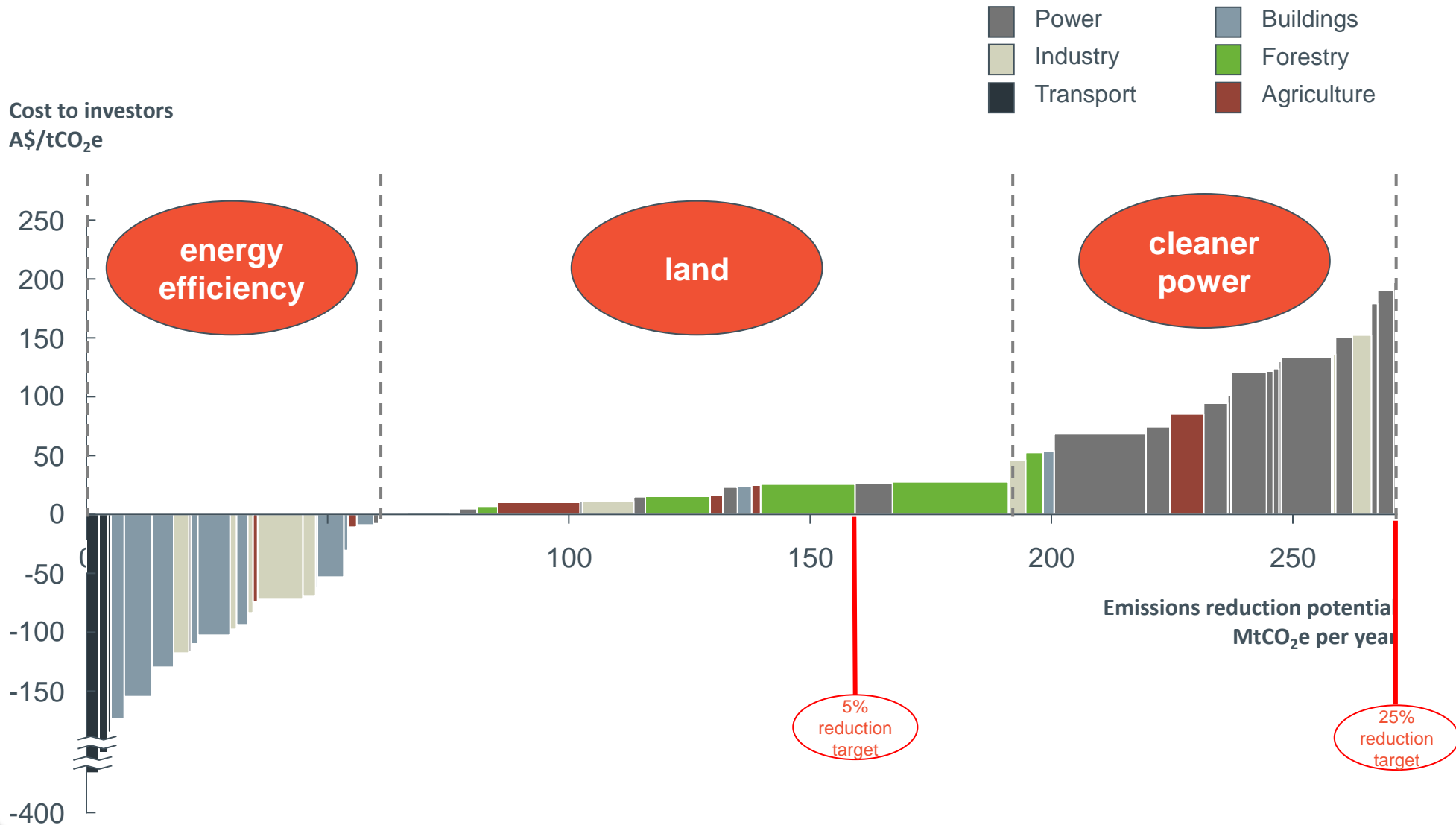
land



cleaner power

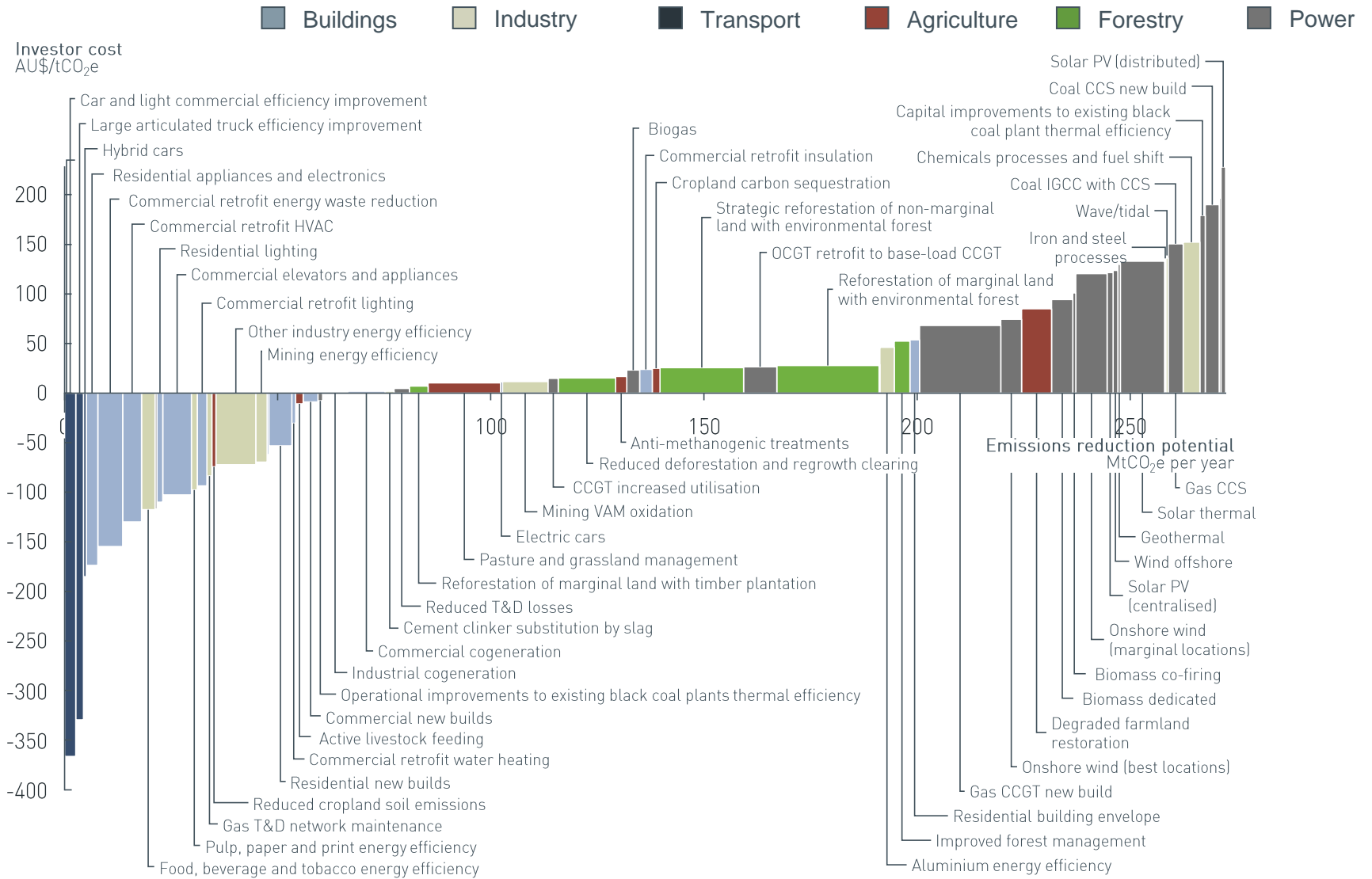


Using technologies available today, we could reach a 25% reduction on 2000 levels by 2020 in Australia



There is no silver bullet, strong reductions in emissions require action in all sectors of the economy

2020 Australia GHG emissions reduction investor cost curve (from Jan. 2012 on)



1 Assuming that no significant action is taken in 2011, and that 2011 projections for business-as-usual emissions in 2020 will stay stable in 2012

Some examples of activities that have already been done in Australia



 12%

Large-scale renewables now produce 12% of Australia's energy, up from 7% in 2003-04



 800,000

Over the last 4 years, large industrial companies saved as much energy as around 800,000 households use in a year



6 

Most states improved residential energy efficiency standards from 5 to 6 stars in 2010



 200,000

Increased capture of methane from landfills and wastewater treatment plants, now used to generate enough electricity to power over 200,000 homes

 +1,000,000

Over 1 million homes now have solar panels installed, more than any other country

 52%

Annual area deforested halved since 2003, and area of plantation forests increased by 21%



How much electricity could be saved across Australia through energy efficiency?

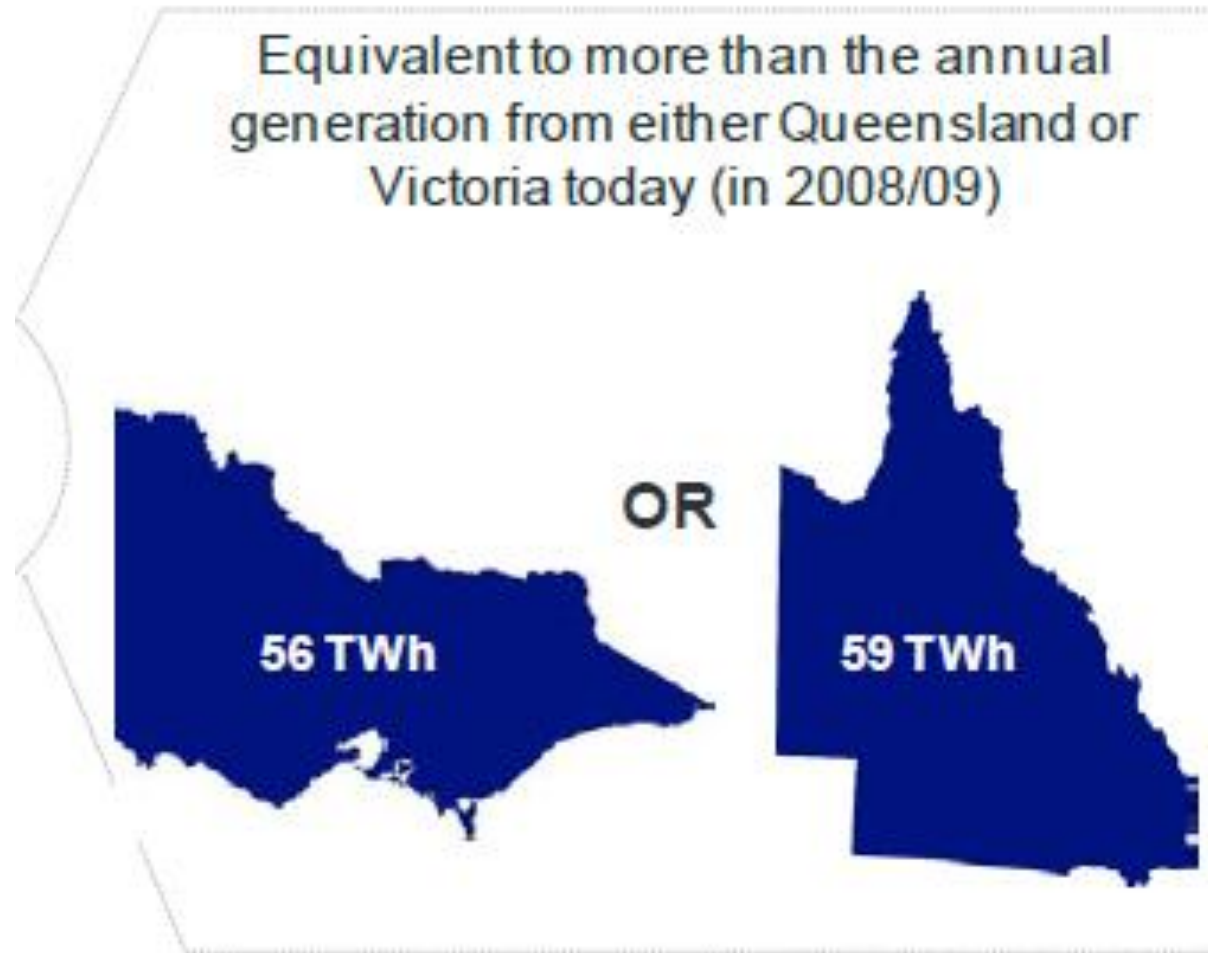
Equivalent to:

- A. Electricity consumption of Brisbane
- B. Electricity consumption of Tasmania
- C. Electricity consumption of Victoria



What does the energy efficiency opportunity represent?

Electricity consumption could be reduced by **20%** compared to business-as-usual levels by 2020



On how much of Australia's agricultural land would we need to plant trees to reach the Low Carbon Growth Plan?

A. 1.5%

B. 6%

C. 12.5%



What does the land use opportunity represent?

2020, hectares

- Total Australian farmland
- Reforestation opportunity



What portion of electricity would be generated by renewables if we completed the Low Carbon Growth Plan?

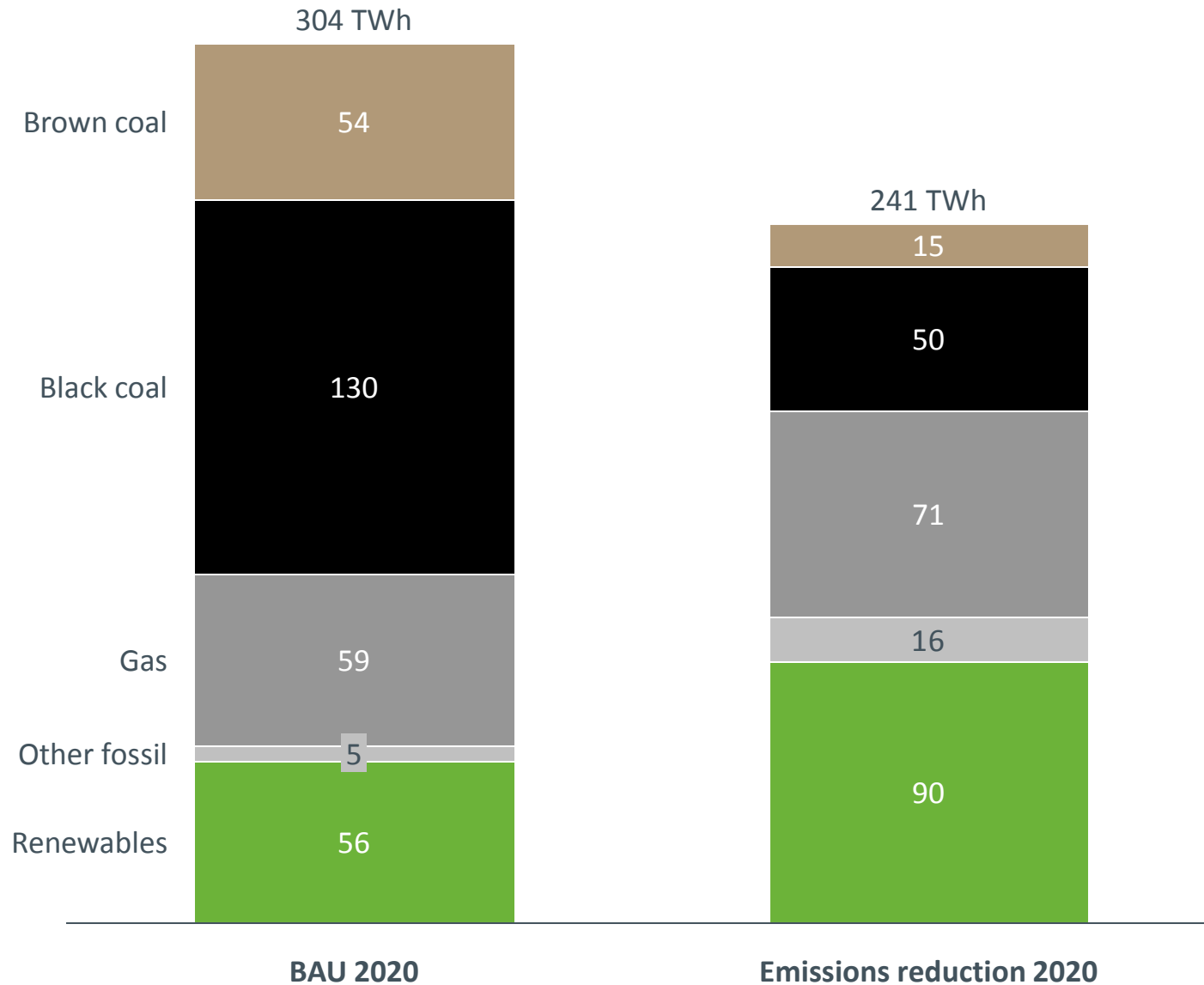
A. 20%

B. 35%

C. 50%



What does the cleaner power opportunity represent?



SOURCE: ClimateWorks team analysis, derived from 2020 GHG emissions reduction cost curve (exhibit 5)



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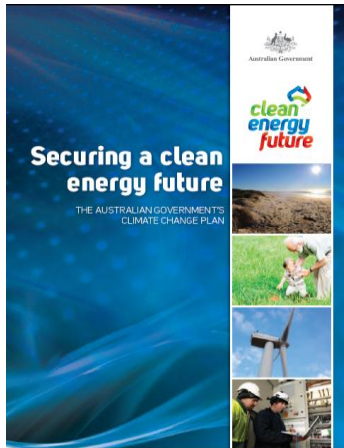


All of the opportunities in the *low carbon growth plan* are prevented from happening in business-as-usual by a range of barriers


Barrier type	Example barriers
Investor profitability	<ul style="list-style-type: none">▪ Is the opportunity profitable?
Capital constraints & investment priorities	<ul style="list-style-type: none">▪ How hard is it to access the capital needed?<ul style="list-style-type: none">– Internally and externally
Information gaps and decision process	<ul style="list-style-type: none">▪ Is the opportunity well understood?▪ Do businesses have the right skills to implement measures?
Market structure/supply	<ul style="list-style-type: none">▪ Does the structure of the market prevent the opportunity from being captured?<ul style="list-style-type: none">– Split incentives, transaction costs, non-market pricing▪ How hard is it to access the necessary equipment/inputs?





Labour policies included a carbon price and a number of complementary measures that work with the carbon price to overcome key barriers




Elements

 **A carbon price**

 **Direct financial support**

 **Information and skills**

 **Governance and regulations**

Impact

- Emissions Trading Scheme
 - *Impacts on:* profitability, investment priority
-
- Grants, loans, equity investments or loan guarantees
 - *Impacts on:* profitability, access to capital
-
- Information dissemination, R&D support or up-skilling programs
 - *Impacts on:* information and skills constraints, transaction costs
-
- New regulations or revisions of existing ones
 - *Impacts on:* removes perverse incentives; provides certainty



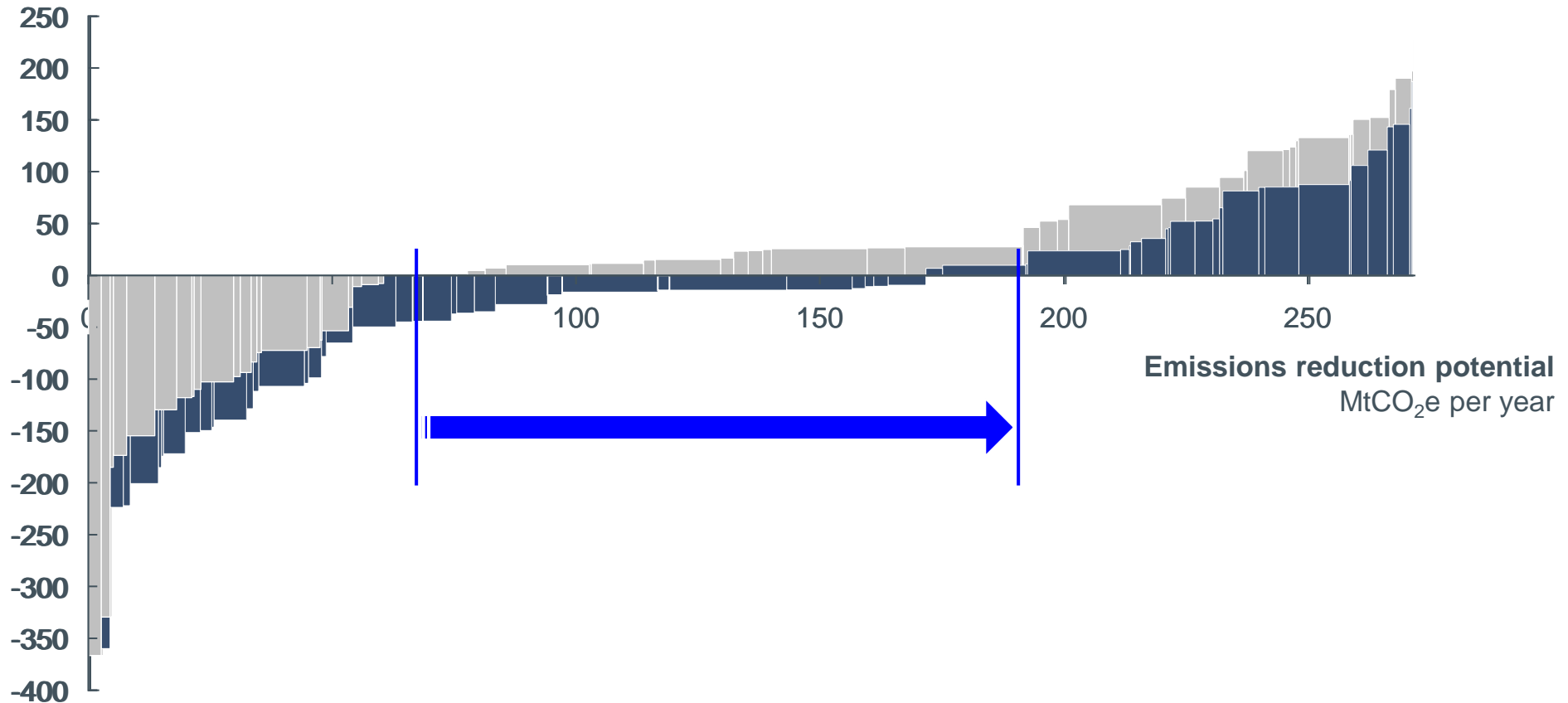
A price on carbon improves the financial attractiveness of emissions reduction activities

2020 Australia GHG emissions reduction investor cost curve (from 2012 on)

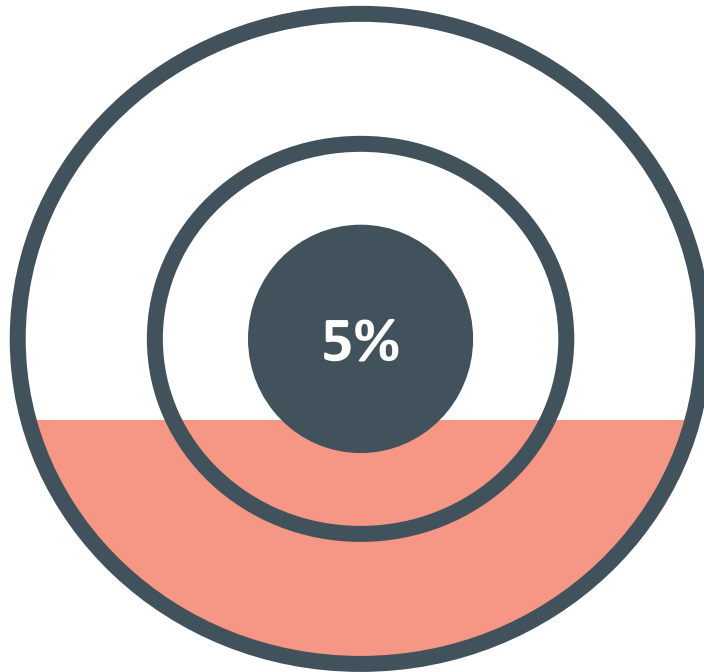
Cost to investors of emissions reduction with carbon price

A\$/tCO₂e

- Before price on carbon
- After price on carbon



We recently did an analysis which found that if current trends continue to 2020, abatement activity would achieve over 40% of what's needed to reach the minimum bipartisan 5% target

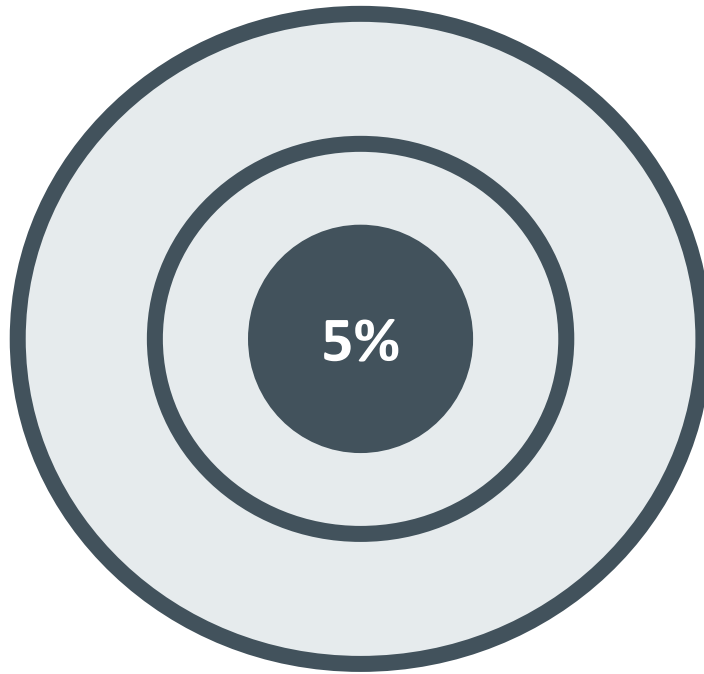


The remaining emissions reductions could be sourced from:

- **additional policies** or
- **international offsets**



The new government wants to repeal the carbon price mechanism, which means that all of the emissions reductions need to happen in Australia



Emissions reductions will come from:

- **Direct Action Fund**
- **?? Additional policies ??**

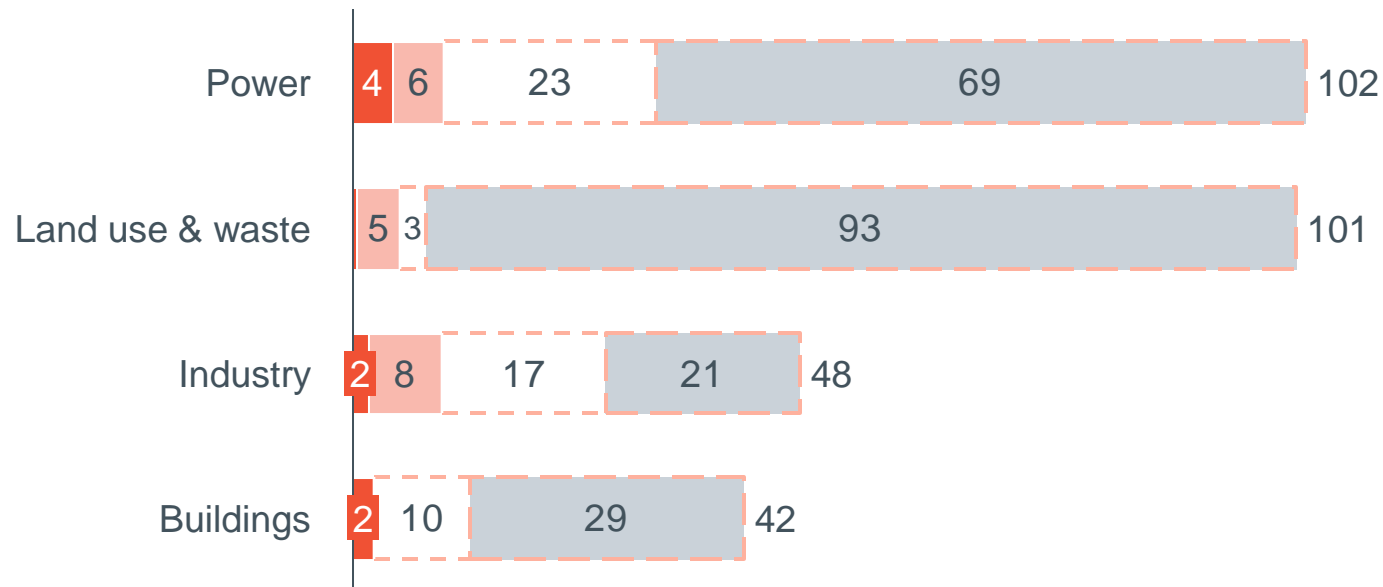
The Direct Action Fund has a **limited budget** which several studies estimate will be insufficient to reach the 5% target



There are high volumes of uncaptured abatement potential in all sectors, which could be used to reach the 5% target in Australia

Emissions reduction potential by sector*,
MtCO₂e

■ Abatement from existing projects Abatement if current trends continue
 Abatement from projects in the pipeline Uncaptured potential (LCGP)



* Abatement corresponding to demand reduction in the buildings and industry sectors were attributed to those chapters, not the Power sector, however resulting changes to the emissions intensity of power generation were attributed to the Power sector

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The price is right!



If you live in a small house

3 bedrooms and 1 living area

How much can you save if you change all your light bulbs to efficient ones?



\$ 78 a year



The price is right!



If you live in a small house

3 bedrooms and 1 living area

How much can you save if you change your shower head to an efficient one?



\$ 84 a year
with gas hot water system

\$ 219 a year
with electric hot water system



The price is right!



If you live in a small house

3 bedrooms and 1 living area

How much can you save if you install a 1.5 kW solar panel?












\$ 200 a year



Simple actions such as changing light bulbs and turning appliances off at the wall can save households \$196 to \$437 a year

VIC example
















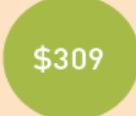



SIMPLE ACTIONS TO SAVE YOU MONEY *				
1. Replace light bulbs and shower heads 2. Cut down stand-by power 3. Reduce clothes dryer use	TOTAL SAVINGS (\$ per annum)	EMISSIONS REDUCTION (% of total emissions)	Equivalent number of cars off the road	Equivalent number of trees planted
 If you live in an APARTMENT	\$173	12%	 0.17	 2
 If you live in a SMALL HOUSE	\$268	10%	 0.26	 4
 If you live in a LARGE HOUSE	\$380	9%	 0.36	 5



It is possible to achieve zero emissions and still save money by combining energy efficiency with green energy options

VIC example

HOW TO ACHIEVE NET ZERO EMISSIONS *

1. Replace light bulbs and shower heads 2. Cut down stand-by power 3. Reduce clothes dryer use 4. Upgrade to energy efficient TV 5. Purchase 100% green power	TOTAL SAVINGS (\$ per annum) 	EMISSIONS REDUCTION (% of total emissions) 	Equivalent number of cars off the road 	Equivalent number of trees planted 
 If you live in an APARTMENT	 \$129	 100%	 1.45	 21
 If you live in a SMALL HOUSE	 \$220	 100%	 2.48	 36
 If you live in a LARGE HOUSE	 \$309	 100%	 3.85	 56

The impact for a large house is equivalent to taking **more than 3 cars off the road** each year.



Just one or two key actions such as installing solar panels can deliver large savings on energy bills and emissions

VIC example – small house

Top 5 Things to Do – VIC / electricity & gas

If you live in a **SMALL HOUSE**



TOP 5 ACTIONS – Saving money



TOP 5 ACTIONS – Saving CO₂e



ACTIONS

NET COST
(\$ per annum)



EMISSIONS REDUCTION
(% of total emissions)



Equivalent number of cars off the road



Equivalent number of trees planted



- Upgrade to an efficient pool pump
- Install solar power 1.5 kW system
- Upgrade to an efficient heater
- Install solar power 2.0 kW system
- Upgrade to an efficient TV (main TV)

-\$316
-\$199
-\$198
-\$133
-\$98

-15%
-28%
-7%
-37%
-4%

0.37
0.69
0.18
0.91
0.10

5
10
3
13
1

- Install solar power 4.5 kW system
- Install solar power 3.0 kW system
- Buy GreenPower 100%
- Buy GreenGas
- Install solar power 2.0 kW system

\$157
-\$21
\$121
\$52
-\$133

-83%
-55%
-55%
-45%
-37%

2.06
1.37
1.37
1.12
0.91

30
20
20
16
13



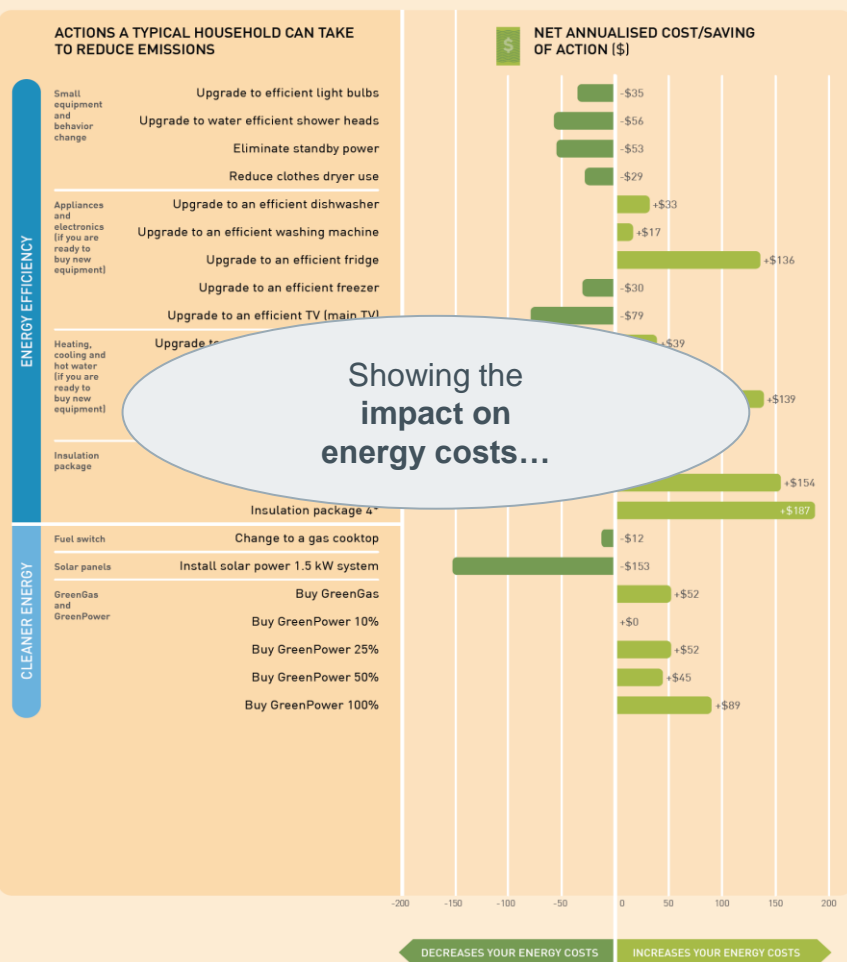
Our research identifies about 30 different actions householders can take to reduce their energy use or switch to cleaner energy

Case 1 – I live in an APARTMENT / VIC / electricity & gas

Catalogue of actions

Annual energy cost of a typical apartment \$1,836

This graph illustrates the net financial costs or savings that a typical household can achieve annually by implementing each action. The net financial costs or savings is calculated as the annual energy savings minus the annualised upfront cost of implementing the action.



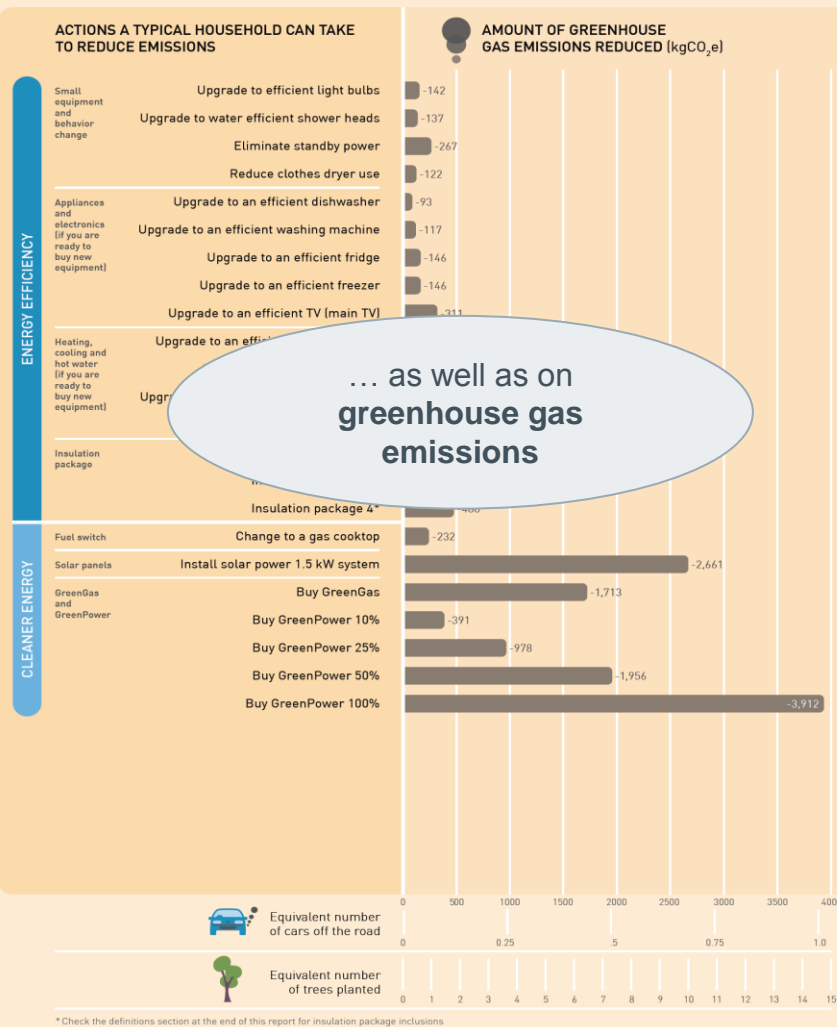
* Check the definitions section at the end of this report for insulation package inclusions

Case 1 – I live in an APARTMENT / VIC / electricity & gas

Catalogue of actions

Annual emissions of a typical apartment 5,626 kgCO₂e

The amounts shown in this graphic represent the amount of annual greenhouse gases emissions (in carbon dioxide equivalent) a typical household could reduce by implementing each action independent of one another.



* Check the definitions section at the end of this report for insulation package inclusions

It is also possible to reduce your emissions further through lifestyle and behaviour change

Categories	% of personal carbon footprint	Example opportunities	2020 emissions reduction potential	
			Volume MtCO ₂ e	Net savings A\$/tCO ₂ e
Passenger transport	44%	▶ Avoid 25% of business flights on high traffic routes through increased videoconferencing	0.4	200
		▶ Switch 15% of total urban car trips under 3 km to walking or cycling	1.1	6
		▶ Reduce total urban car travel by 5% through increased use of public transport	1.6	6
		▶ Shifting car occupancy rates from 1.4 to 1.6 persons per car	2.8	150
Building and household energy	36%	▶ Reduce required home temperature by 2 C	1.1	56
		▶ Reduce required commercial temperature change by 2 C	1.6	92
		▶ Switch key home appliances from standby to off when not in use	0.2	56
Consumables	20%	▶ Switch 50% of bottled water drunk in Australia to tap water	0.1	200

Questions ?





For further information, visit:
www.climateworksaustralia.org