Low Carbon Growth Plan for Australia

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Key Principles

The Low Carbon Growth Plan has been built on the following principles:

1. Identify the lowest cost means to reduce GHG emissions utilising current technologies
2. Put opportunities in a cost curve that identifies volume and cost of abatement
3. Examine GHG emissions reduction opportunities from both a societal and business perspective
4. Understand barriers to GHG emissions reduction and develop measures to overcome them

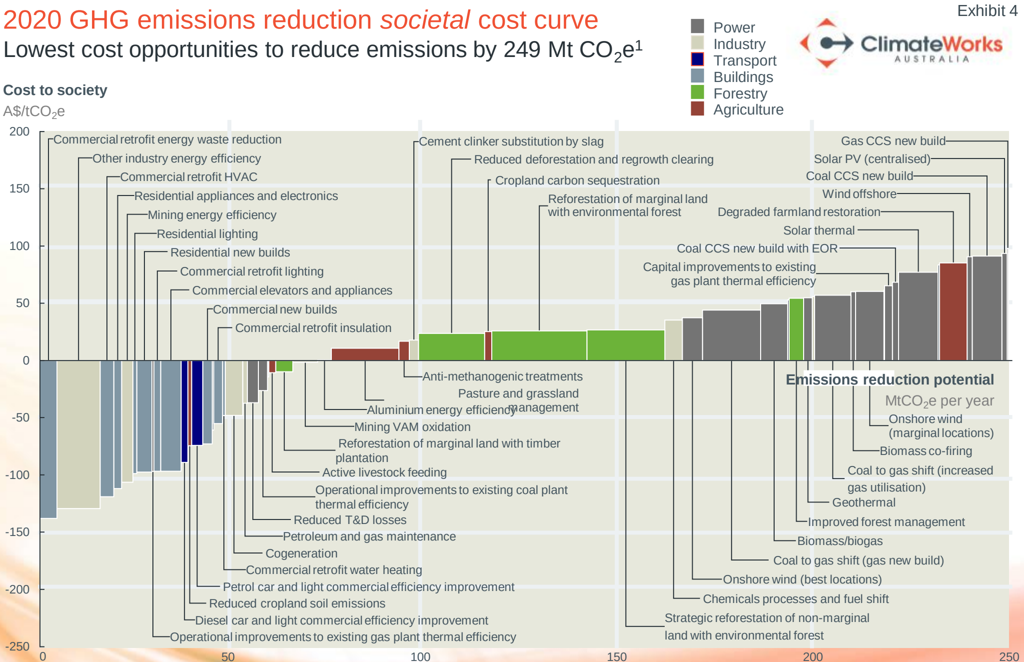
Key Findings

- **Australia has the potential to achieve GHG emissions reductions of 249 MtCO$_2$e (25% below 2000 levels) at a low average cost in the next ten years**
  - The average cost in 2020 is the equivalent of $185 per household
- **Reducing GHG emissions can be profitable for businesses**
  - 22% of the opportunities are profitable to investors today
- **A combination of a carbon price and targeted actions are required to achieve Australia's full potential of low cost emissions reductions**
- **A portfolio of prompt action is required**
  - There are 54 practical actions – no silver bullet!
  - Some are ready to be implemented now, while others will need attention from government and businesses to make sure they are implemented by 2020

Exhibit 4

2020 GHG emissions reduction *societal* cost curve

Lowest cost opportunities to reduce emissions by 249 Mt CO$_2$e[1]



1 Includes only opportunities required to reach emission reduction target of 249 Mtpa (25% reduction on 2000 emissions); excludes opportunities involving a significant lifestyle element or consumption decision, changes in business/activity mix, and opportunities with a high degree of speculation or technological uncertainty

SOURCE: ClimateWorks team analysis (refer to bibliography)

Australian 2020 emissions reduction potential by sector[1]

	Volume MtCO$_2$e	Average cost per tonne (Real 2010 A$) Societal	Investor	Example opportunities
Power	77	54	87	Renewables; Coal-to-gas shift
Forestry	70	25	24	Reforestation; Reduced deforestation
Industry	37	-48	-25	Industrial energy efficiency; Ventilation air methane oxidation
Agriculture	32	25	25	Soil carbon; Livestock management
Buildings	28	-99	-90	Commercial retrofits; Residential new builds
Transport	6	-60	-194	Combustion vehicle efficiency; Hybrids
Total	*	7	19	

1 Includes all emission reduction opportunities required to achieve 249Mtpa

SOURCE: ClimateWorks team analysis, derived from 2020 GHG emissions reduction cost curve (exhibit 4)

- **Sector Summaries**
  - Power
  - Forestry
  - Industry
  - Agriculture
  - Buildings
  - Transport
  - Behaviour change

2020 Power GHG emissions reduction

Coal to gas shift - 24 Mt

Additional wind - 12.5 Mt

Solar thermal - 10 Mt

77 MtCO2 at average investor cost $87 t/CO2

- **Sector Summaries**
  - Power
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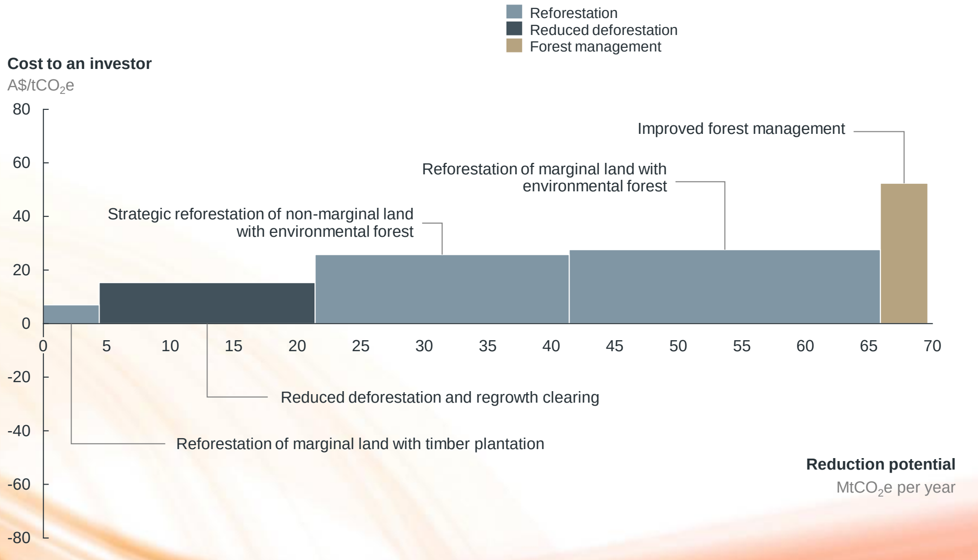
  - Buildings
  - Transport
  - Behaviour change

Exhibit 21

2020 Forestry GHG emissions reduction *investor* cost curve

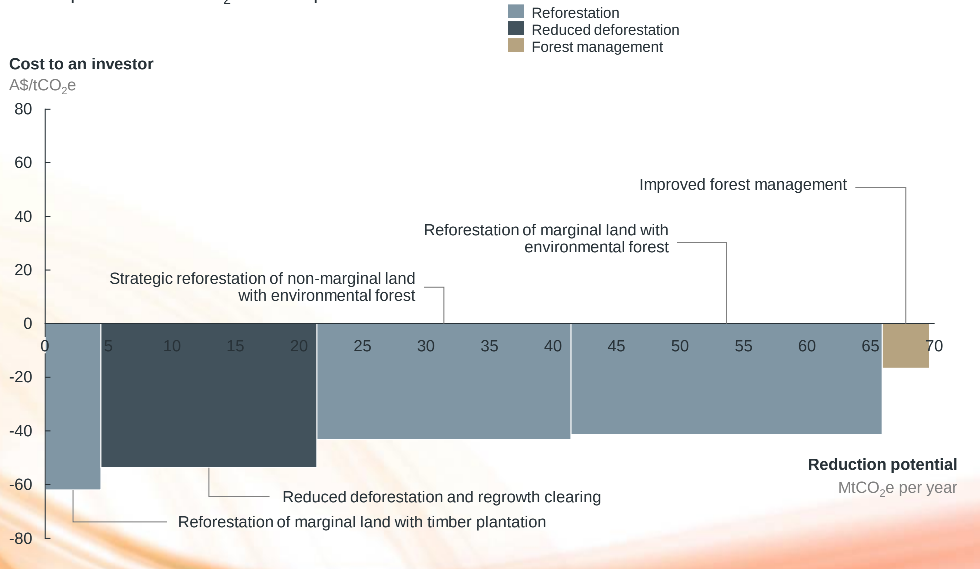


SOURCE: ClimateWorks team analysis, derived from 2020 GHG emissions reduction cost curve (exhibit 5)

Exhibit 22

2020 Forestry GHG emissions reduction *investor* cost curve

With impact of A$69/t$CO_2$e carbon price[1]



1 Carbon price in 2020 of A$69 per tonne based on Treasury Garnaut -25% estimate *(Australia's Low Pollution Future)* converted to 2010 dollars

SOURCE: ClimateWorks team analysis, derived from 2020 GHG emissions reduction cost curve (exhibit 4)

- **Sector Summaries**
  - Power
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2020 Industry GHG emissions reduction

Opportunities – 37 MtCO2

- Energy efficiency - 17 Mt
  - (Motor systems, waste heat recovery etc)
- New technologies - 9 Mt
  - (VAM oxidation, smelting)
- Cogeneration - 5 Mt
- Other opportunities - 6 Mt
  - Cement clinker substitution

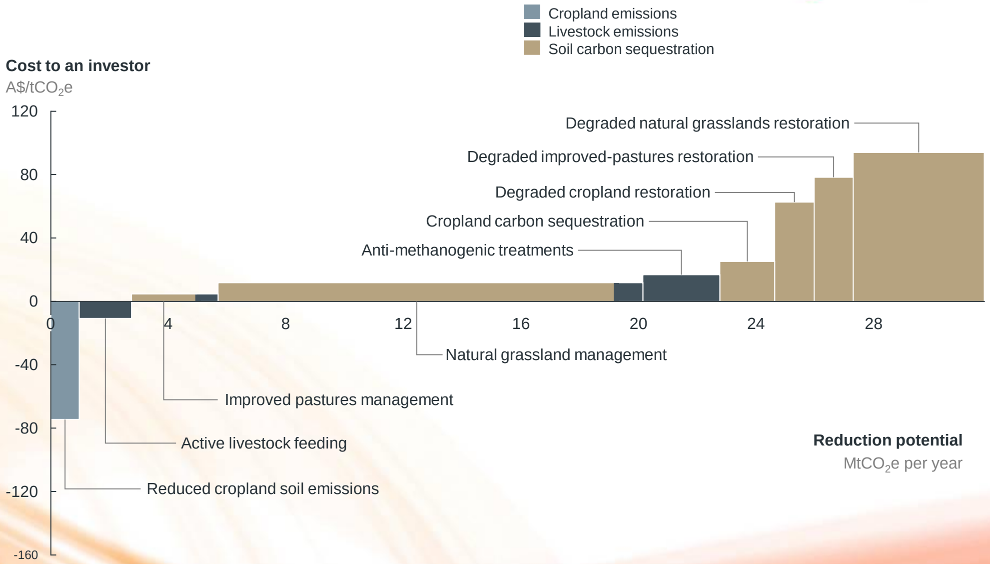
BAU emissions grow 40 % from 2000 - 2020 to 285 MtCO2

Sector Summaries

- Power
- Forestry
- Industry
- Agriculture
- Buildings
- Transport
- Behaviour change

Exhibit 28

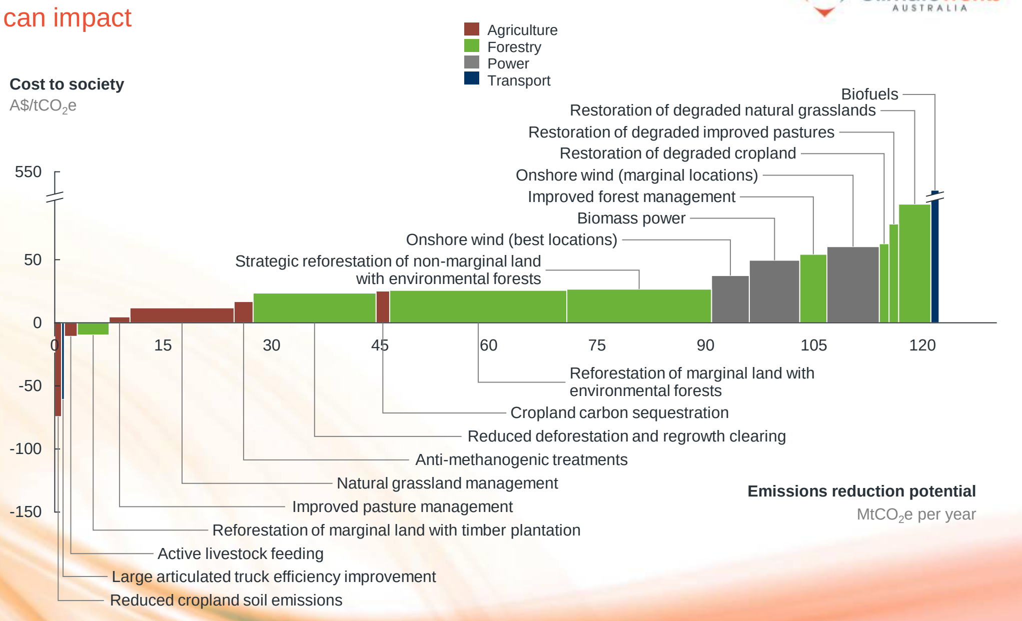
2020 Agriculture GHG emissions reduction *investor* cost curve



SOURCE: ClimateWorks team analysis, derived from 2020 GHG emissions reduction cost curve (exhibit 4)

Exhibit 30

2020 GHG emissions reduction opportunities that farmers can impact



SOURCE: ClimateWorks team analysis, derived from 2020 GHG emissions reduction cost curve (exhibit 4)

- **Sector Summaries**
  - Power
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Buildings a profitable opportunity

Commercial buildings
More efficient **new buildings** – 2 Mt
Retrofit **existing buildings** – 18 Mt

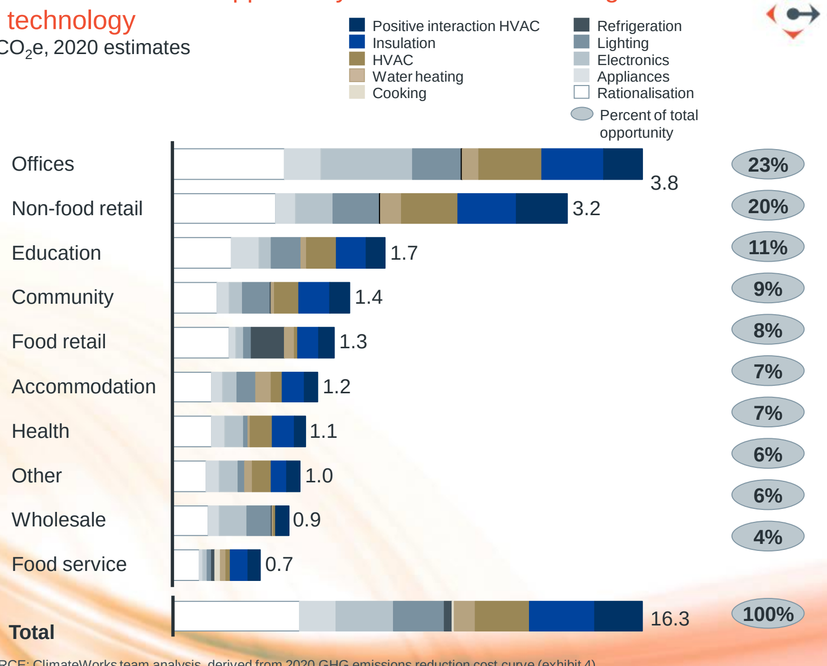
Residential
New buildings to 7.2 star – 4 Mt
Retrofit – 5 Mt

Most opportunities have net return
Average -$90 t/CO2

Exhibit 36

Emissions reduction opportunity in commercial buildings retrofits by technology

$MtCO_2e$, 2020 estimates



SOURCE: ClimateWorks team analysis, derived from 2020 GHG emissions reduction cost curve (exhibit 4)

- **Sector Summaries**
  - Power
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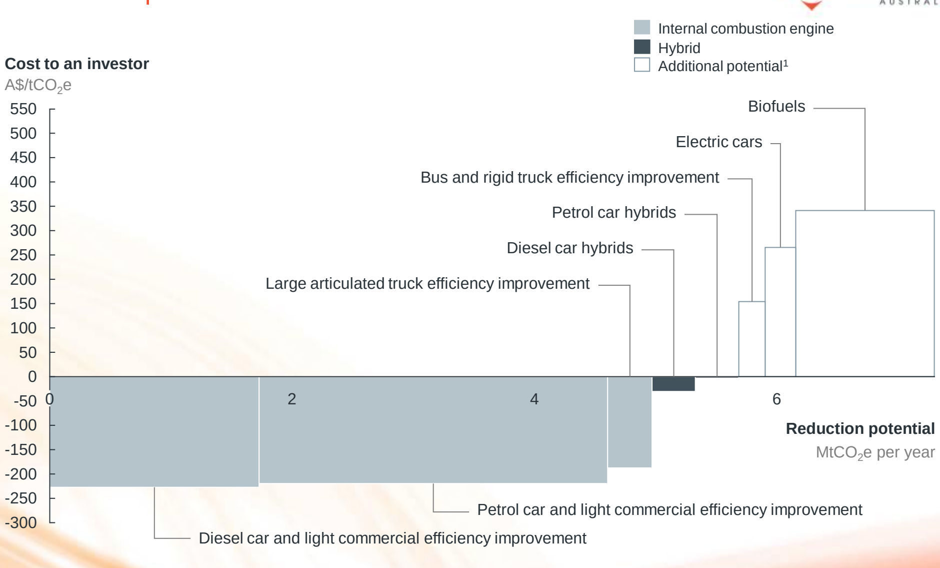
  - Transport
  - Behaviour change

Exhibit 39

2020 Transport GHG emissions reduction *investor* cost curve



1 Higher cost opportunities not required to meet target emissions of 25% below 2000 levels

SOURCE: ClimateWorks team analysis, derived from 2020 GHG emissions reduction cost curve (exhibit 4)

- **Sector Summaries**
  - Power
  - Forestry
  - Industry
  - Agriculture
  - Buildings
  - Transport
  - Behaviour change

Exhibit 7

Example opportunities to reduce emissions through lifestyle and behaviour change

Categories	% of personal carbon footprint	Example opportunities	2020 emissions reduction potential: Volume $MtCO_2e$	2020 emissions reduction potential: Net savings $A\$/tCO_2e$
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

SOURCE: BITRE/CSIRO (2008); Australian Institute of Petroleum (2009); Ovum (2008); ABS (2009 and 2010); DEWHA (2008); Hackett et al (2009); Australasian Bottled Water Institute (2009); Econometrica (2009); ClimateWorks team analysis

The Barriers

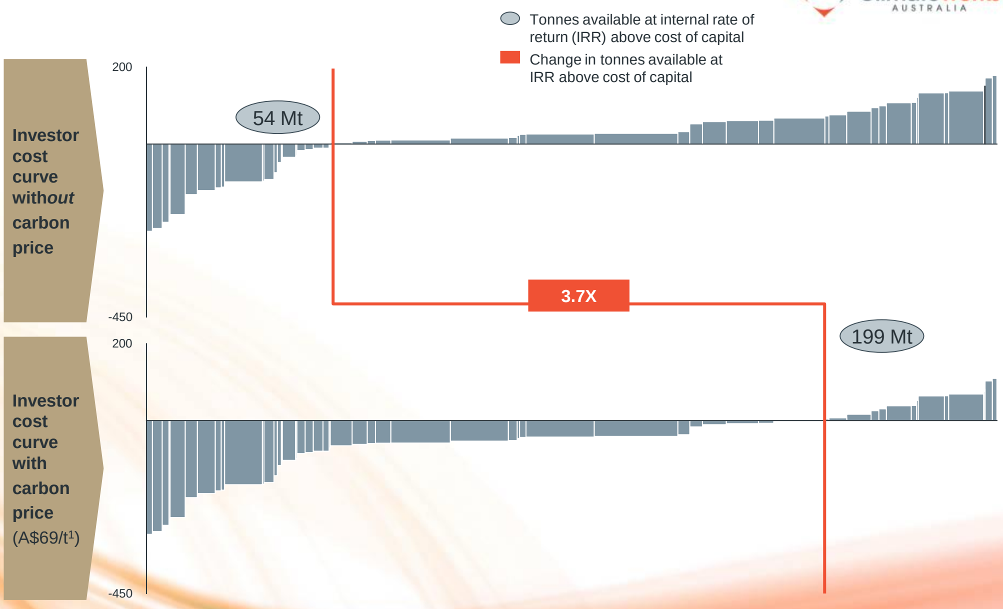
A range of barriers currently hinder the capture of emission reduction opportunities

	Specific barriers
Investor profitability	Positive cost Non-market pricing (fixed fees, negotiated rates) Scientific or technical uncertainty
Capital availability/ priorities	Finite access to capital Payback periods Investment hurdle rate > cost of capital
Informed decision process	Access to information Lack of awareness or understanding Low business priority Lack of statistical experience to prove benefits Lack of long term view on carbon/energy price
Market structure and supply	Split administrative structures or budget allocation process Split incentives (owner/tenant, current/future) Lack of project scale (increased transaction costs, fragmented decision-makers) Sufficient availability of or access to equipment, infrastructure and skilled labour Policy uncertainty

SOURCE: Team analysis

Exhibit 11

Impact of carbon price on investor economics



1 Carbon price in 2020 of A$69 per tonne based on Treasury Garnaut -25% estimate (*Australia's Low Pollution Future)* converted to 2010 dollars

SOURCE: ClimateWorks team analysis, derived from 2020 GHG emissions reduction cost curve (exhibit 4)

Some solutions to barriers

	Solutions
Investor profitability	Carbon price Tax concessions and subsidies
Capital availability/ priorities	Third party funding Energy performance contracts Aggregation
Informed decision process	Awareness campaigns Mandatory labelling and performance disclosure Peer based information Skills development
Market structure and supply	'Green' leases Energy service contracting and leasing contracts Energy regulation (including pricing) reform Policy certainty

SOURCE: Team analysis

ClimateWorks AUSTRALIA

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www.climateworksaustralia.org