



DECARBONISATION
FUTURES



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DECARBONISATION FUTURES

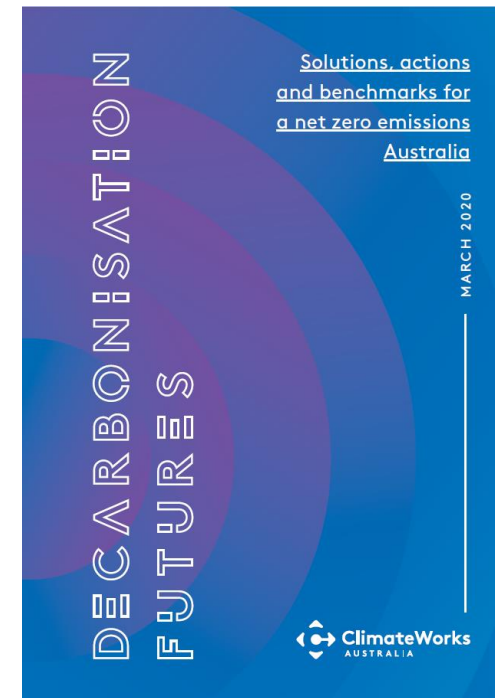
Solutions, actions and benchmarks for a net zero emissions Australia

Webinar: overview of key findings

PROJECT OVERVIEW AND KEY FINDINGS

Decarbonisation Futures shows how the gap between Australia's climate commitment and implementation can be bridged

- + Reviews technologies available to reduce emissions, their progress and maturity
- + Identifies actions that government, businesses and individuals can take to support them
- + Models three scenarios to illustrate possible pathways, with differing mixes of abatement levers
- + Provides benchmarks for the scale of uptake of the technologies to align with the Paris goals



Net zero emissions by 2050 or earlier is fast becoming the norm in support of the Paris climate goals

All 8 Australian states and territories have net zero targets in place

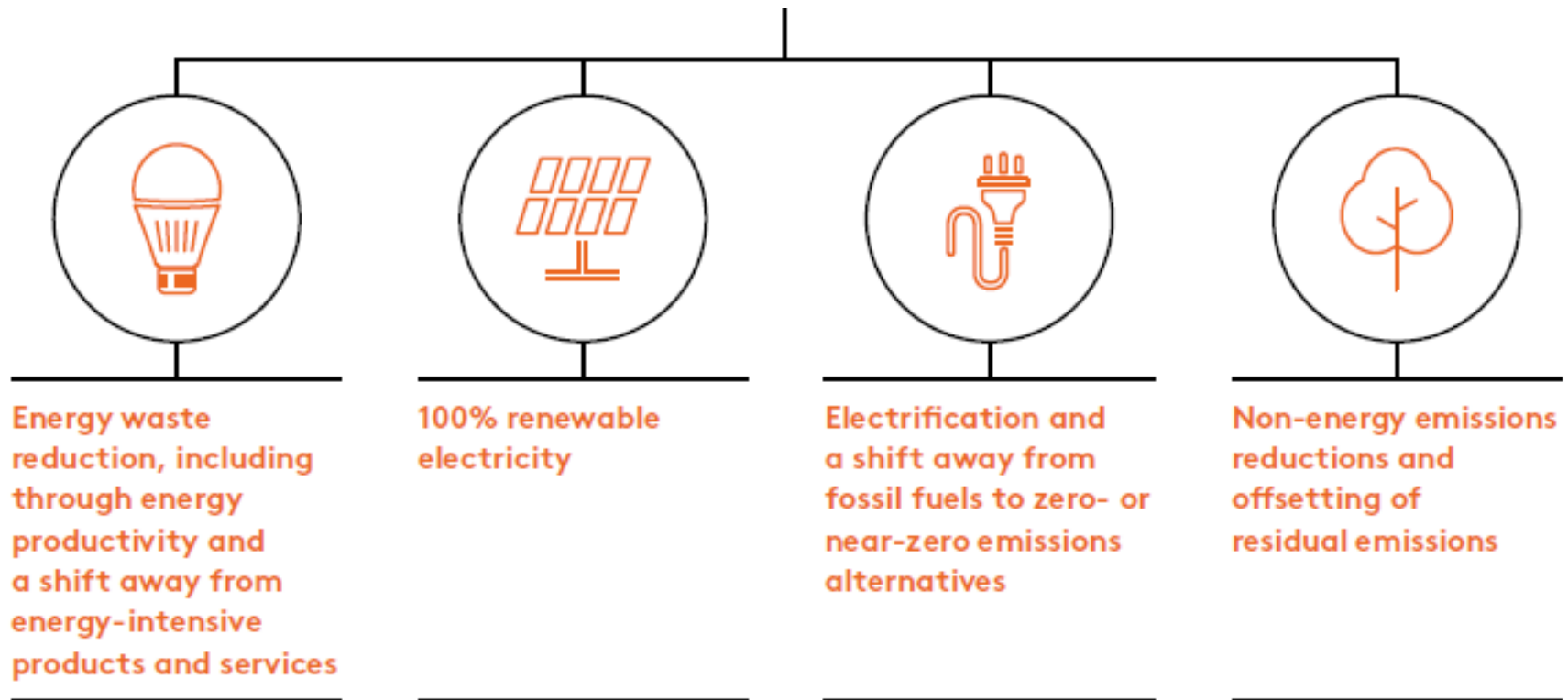


* Aspiration

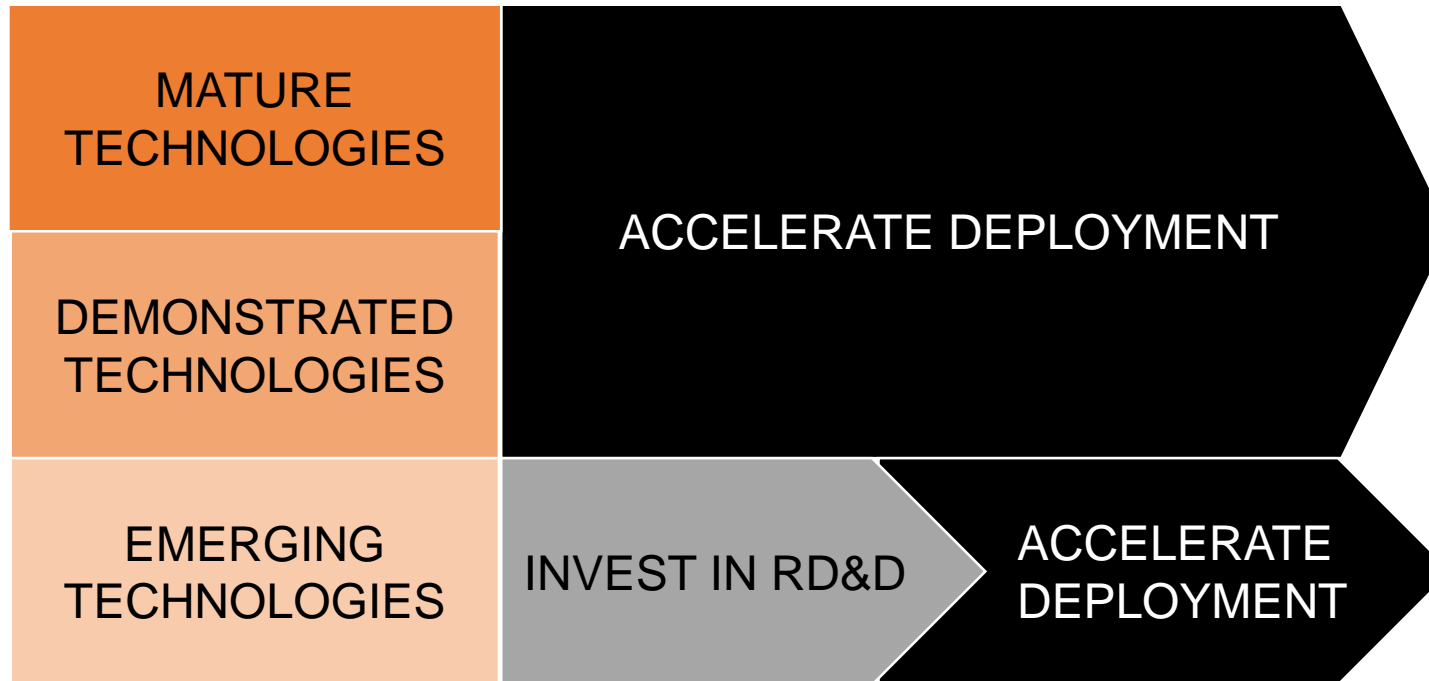
- + 121 countries, covering 25% global emissions
- + Asset owners alliance worth US\$4 trillion
- + Some of Australia's largest companies



Achieving net zero emissions relies on 4 pillars



To get there, Australia can and must leapfrog to zero emissions technologies, by accelerating technology deployment and development



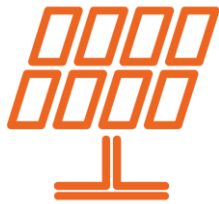
Critically, these actions can support efforts to rebuild from the shock of the Covid-19 pandemic.

- + Accelerate deployment of ready solutions
- + Create jobs in sustainable industries
- + Increase Australia's resilience
- + Set up for future economic growth
- + Decrease energy costs
- + Improve health outcomes

Example of readily deployable solutions include:

- + Upgrades to existing residential and commercial buildings (energy efficiency, electrification, solar PV)
- + Accelerated deployment of large scale renewables and storage
- + Construction of charging stations to support electric vehicles roll-out
- + Nature based solutions including carbon forestry (silvopasture and dedicated)
- + Circular economy – increased recycling and localised supply chains

We have found that technology has achieved significant progress since 2014, often faster than was expected then



New renewables now **cheaper** than new fossil fuel generation



Battery costs per kilowatt-hour **80% cheaper** than in 2010



10-storey office tower built in timber in Brisbane



3 million EVs driven in the world








The share price of **Beyond Meat** grew more than 700% in the 3 months following its release



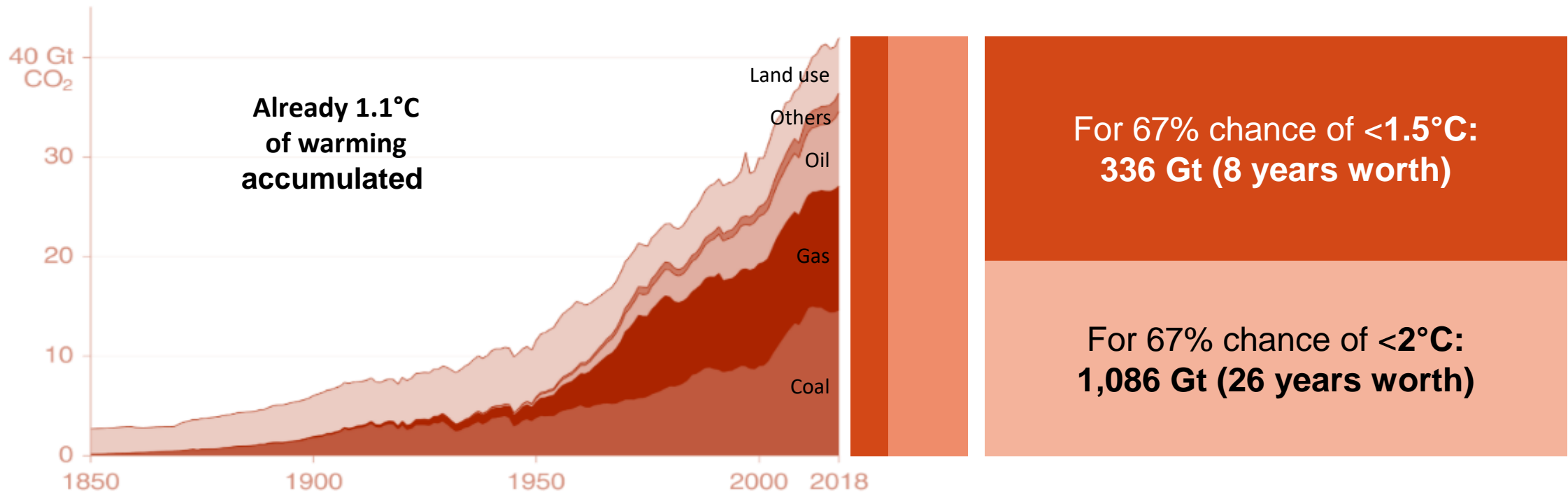
1- and 2-person **electric planes** are beginning to enter the market

Progress in the past five years has closed the technical gap making achieving zero emissions possible in all sectors

		DEMONSTRATED + MATURE SOLUTIONS	EMERGING SOLUTIONS
	ELECTRICITY	100% renewables, storage (including batteries), demand management	<i>There are sufficient demonstrated and mature solutions to decarbonise these sectors. However, emerging solutions could decrease costs and aid deployment at scale.</i>
	BUILDINGS	Deep energy efficiency, electrification	
	TRANSPORT	Electric and fuel-cell vehicles for light road transport	Biofuels, synfuels, electrification, ammonia or hydrogen for other transport
	INDUSTRY	Energy efficiency, circular economy, proven electrification, bioenergy and bio-feedstocks, industrial CCS	Material substitution, high grade heat electrification, solar thermal, hydrogen
	AGRICULTURE + LAND	Sustainable agriculture practices, plant-based substitutes, fertiliser management, carbon forestry	Lab food, enteric fermentation treatments (such as livestock vaccines)

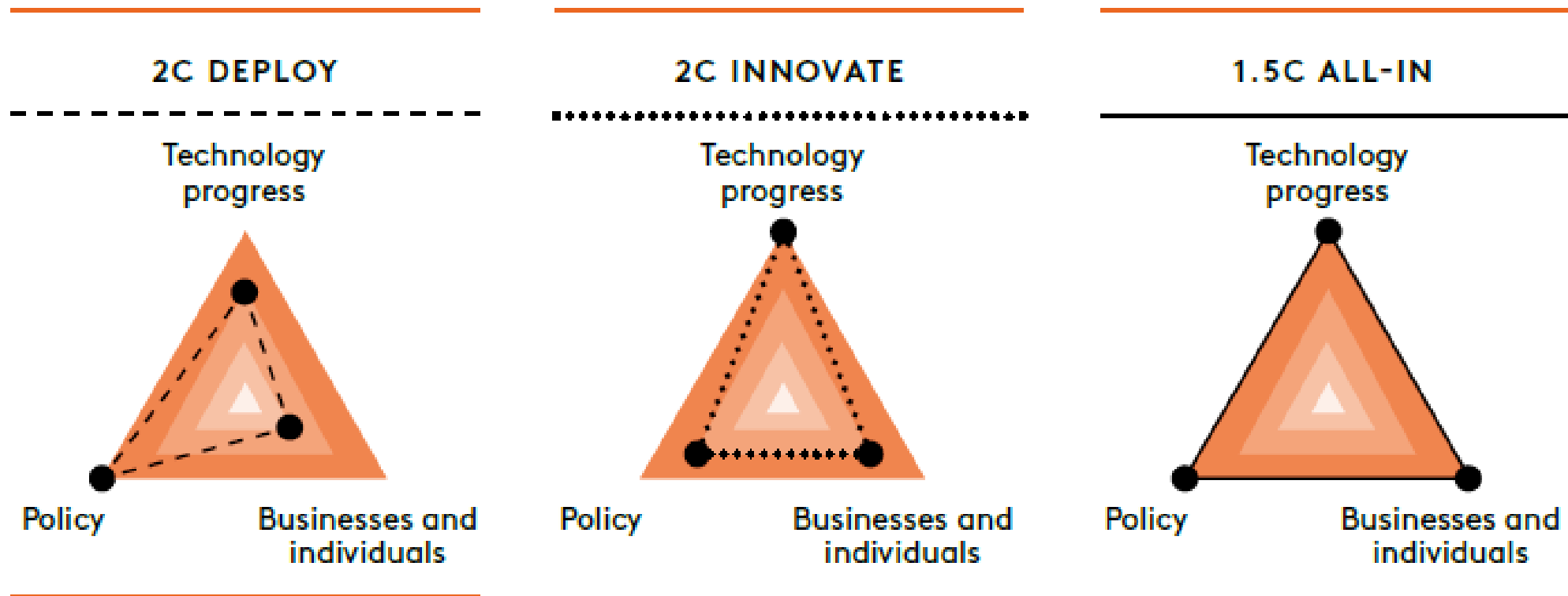
Australia and the world have limited time, but we are now well placed to leapfrog to zero emissions technologies

Global total CO₂ emissions and remaining carbon budget at 01/01/2020



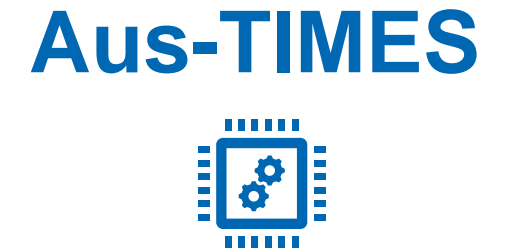
SOURCE: IPCC, Global Warming of 1.5°C; Global Carbon Project (http://folk.uio.no/roberan/img/GCB2019/PNG/s85_2019_Total_Emissions_by_source.png)

Decarbonisation Futures uses scenarios to explore a range of possible low-emissions futures for Australia



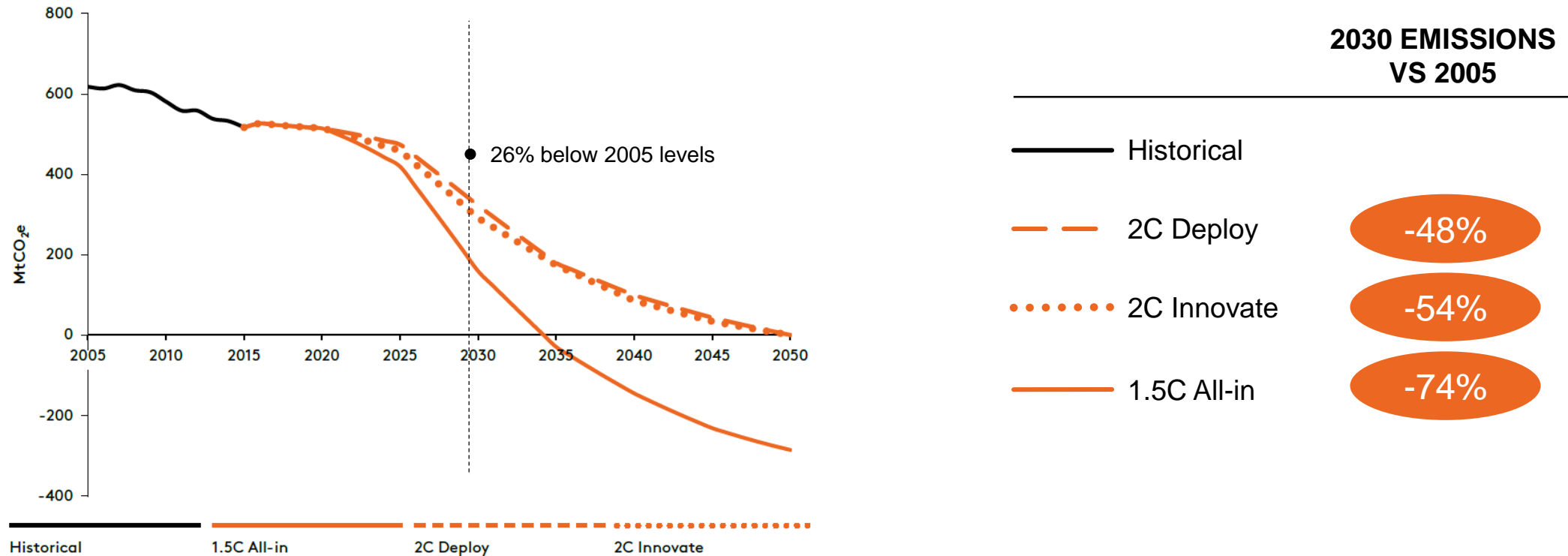
Note: All three scenarios assume typical economic conditions and so do not include possible structural changes to the Australian economy

Decarbonisation Futures used the new 'Aus-TIMES' model



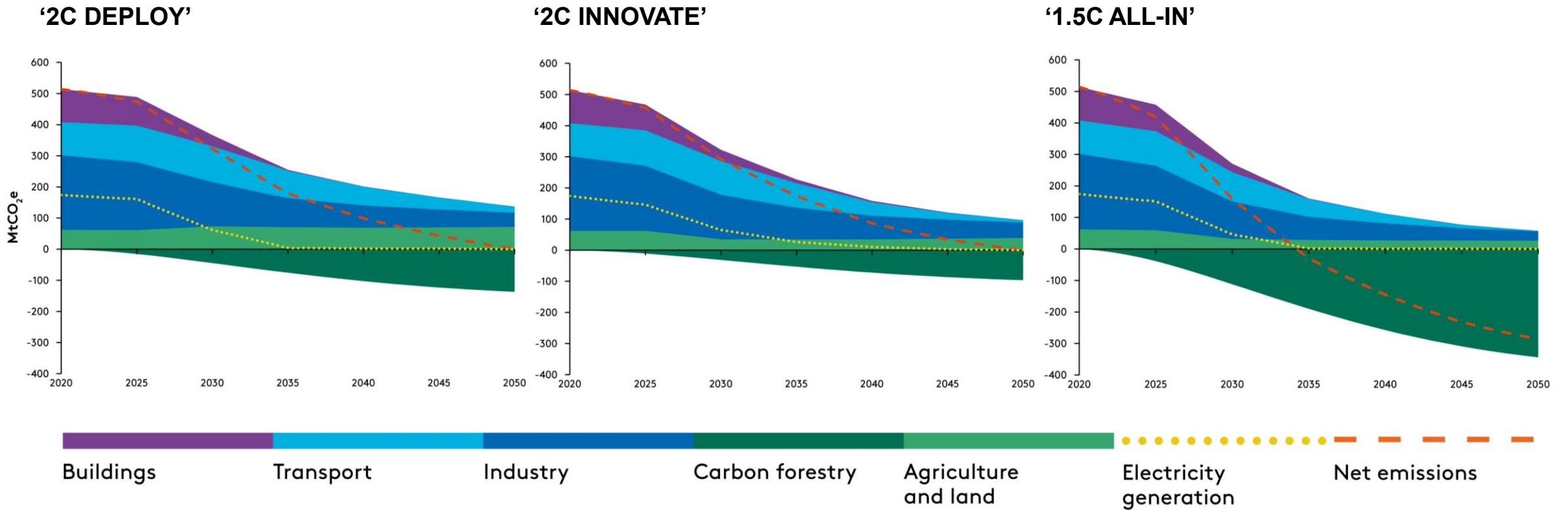
Our scenario analysis shows that Australia can achieve trajectories compatible with the global 1.5°C and 2°C goals

Australia's total emissions by scenario, MtCO₂e



All sectors can achieve very significant emissions reduction; residual emissions are 2-4 x lower than in our 2014 pathways

Sector emissions, MtCO₂e, by scenario



Widespread deployment of mature technologies can achieve much of what is needed this decade and can accelerate today

2030 scenario results



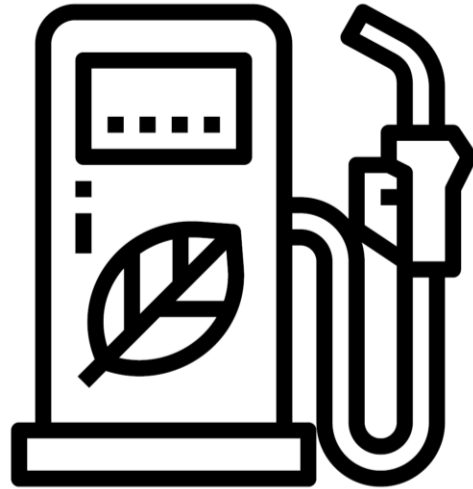
EVs in new car sales



% renewables in electricity generation

	2°C	1.5°C	Government projections
EVs in new car sales	1 in 2	~3 in 4	~1 in 5
% renewables in electricity generation	70-74%	79%	~48%

While substantial investment in research, development and commercialisation can close the gap to zero emissions



The transition will not happen in time without strong action by government, business and individuals

SOLUTION STATUS	ACTIONS		
	GOVERNMENT	BUSINESSES	INDIVIDUALS
MATURE	<ul style="list-style-type: none"> Standards and targets Taxes Financial support and/or market structure amendments Supporting infrastructure Information and accessibility 	<ul style="list-style-type: none"> Targets on scope 1-3 Forward asset replacement Shift products and services New business models Policy advocacy Investors engagement 	<ul style="list-style-type: none"> Shift in consumption Shift in behaviour Home upgrades Shift in investments Advocacy
DEMONSTRATION	<ul style="list-style-type: none"> Incentives Procurement Supporting infrastructure Stimulate private investment 	<ul style="list-style-type: none"> Pay price premium Targeted procurement Accept higher risk 	<ul style="list-style-type: none"> Pay price premium Community investment
EMERGING	<ul style="list-style-type: none"> Investment in RD&D Incentives for private investment 	<ul style="list-style-type: none"> Investment in RD&D Consortium for risk sharing 	

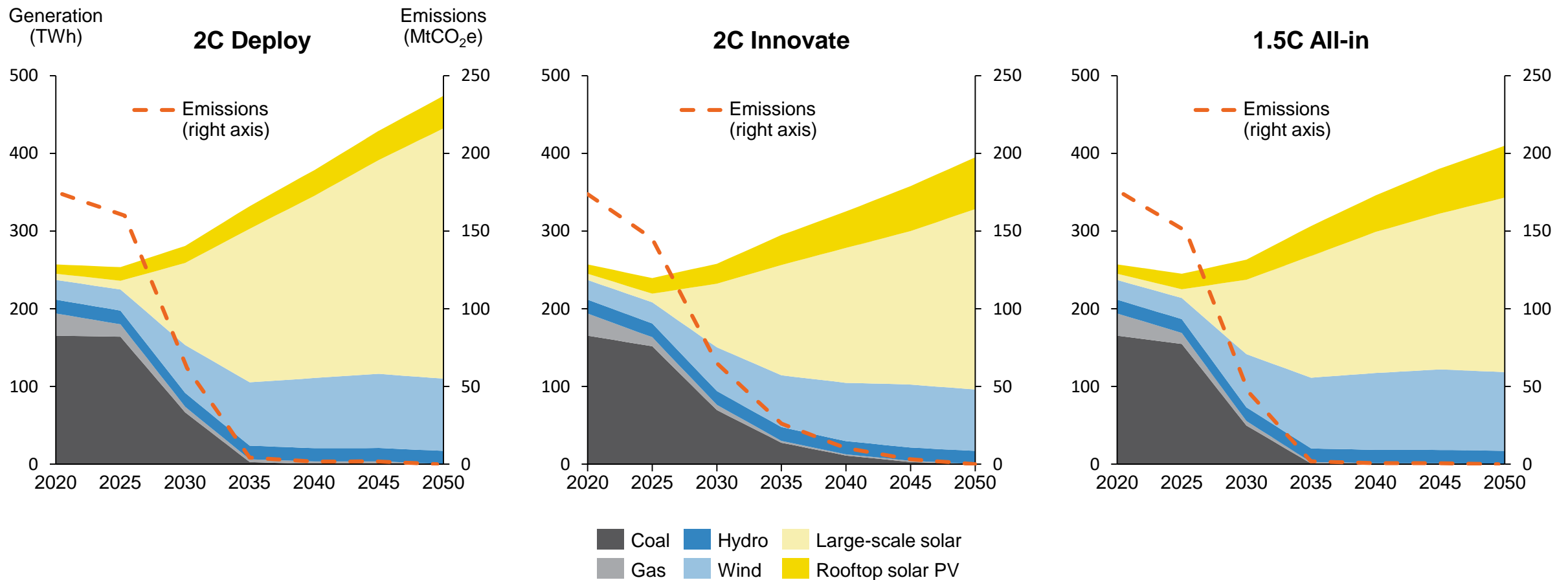
This is the transformational decade

**Research shows that the years before 2030 offer
a window for action that will not stay open.**



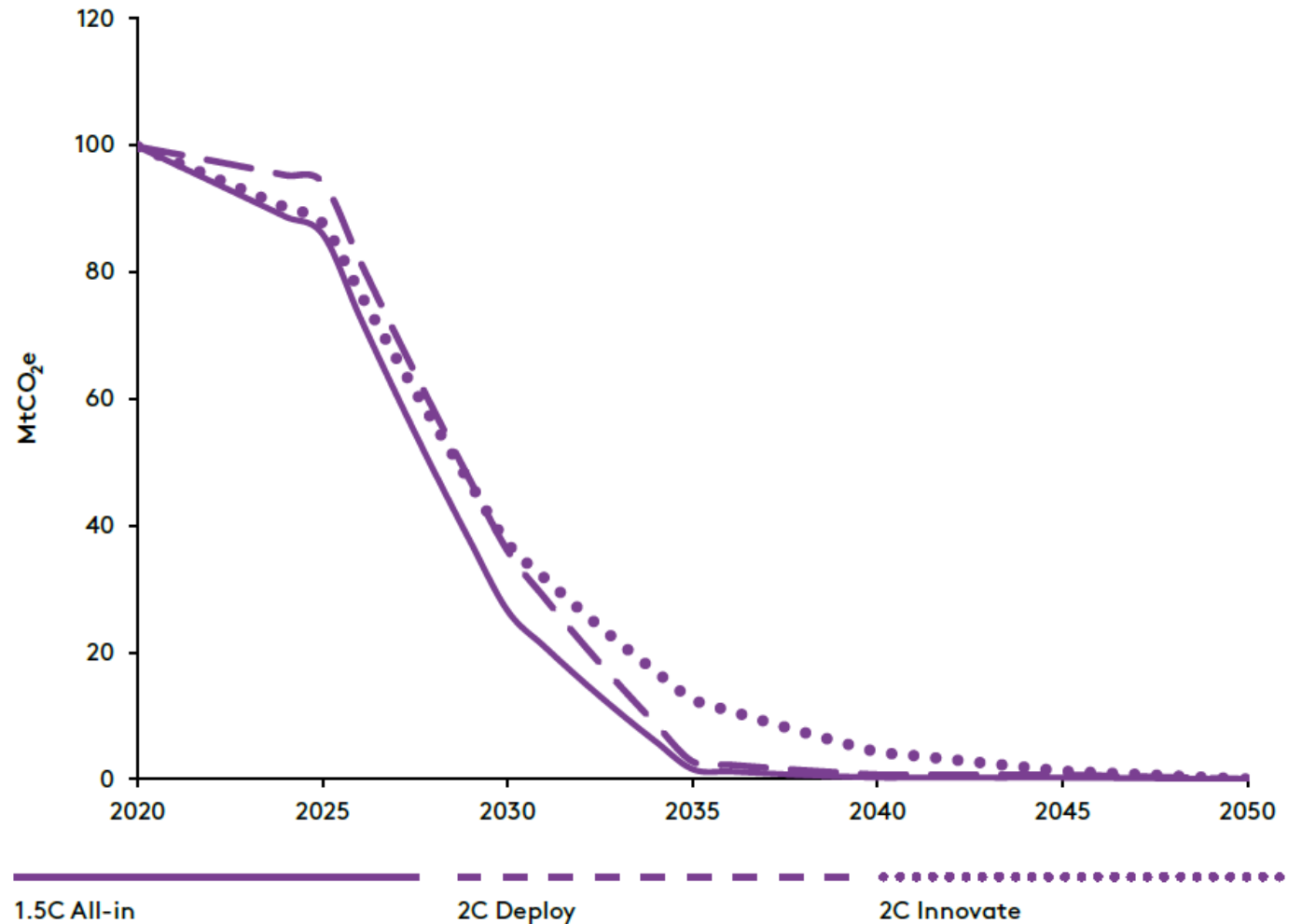
SECTORAL FINDINGS

Electricity: All scenarios reach about 75% renewable electricity generation by 2030, and 100% by 2050

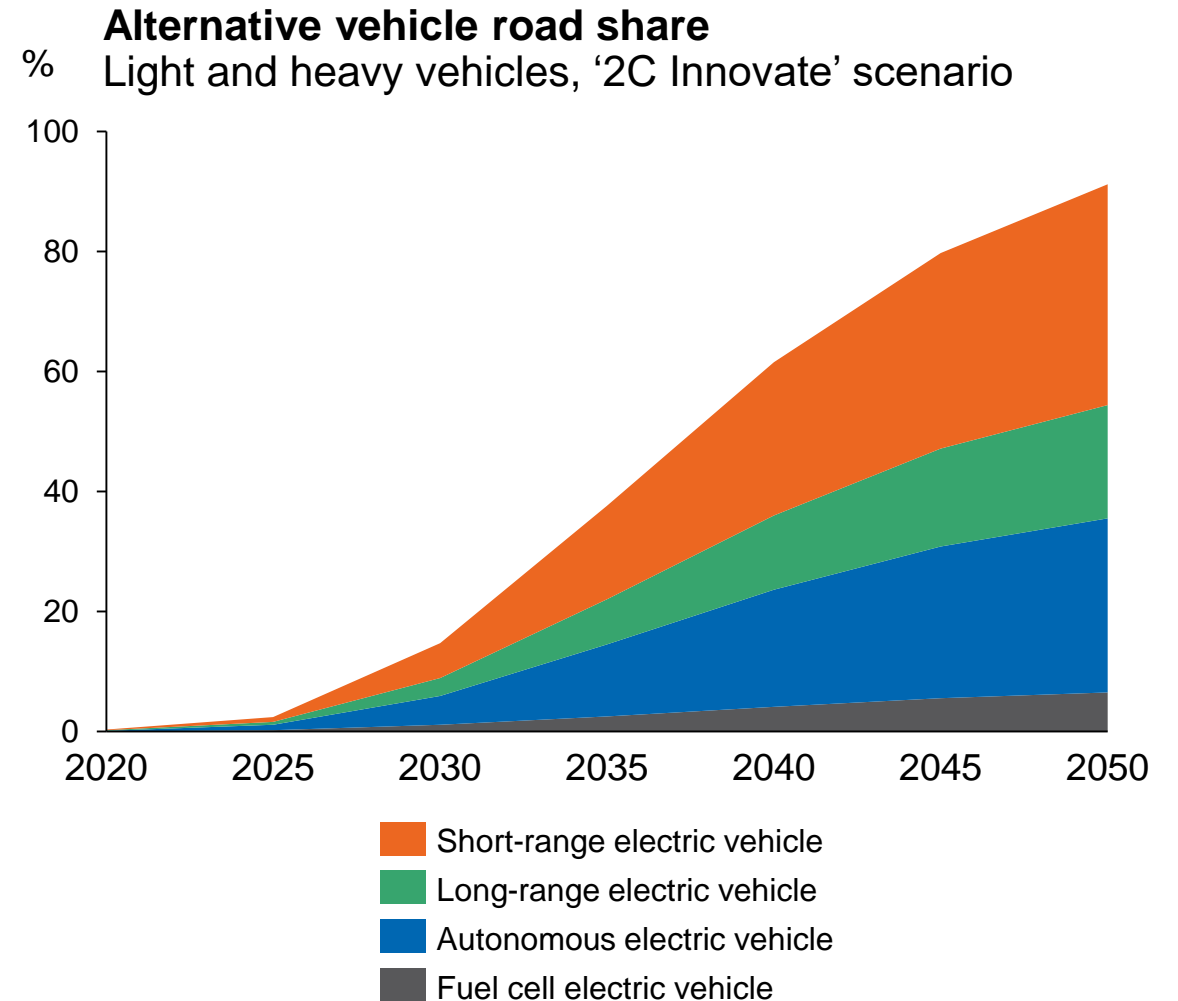
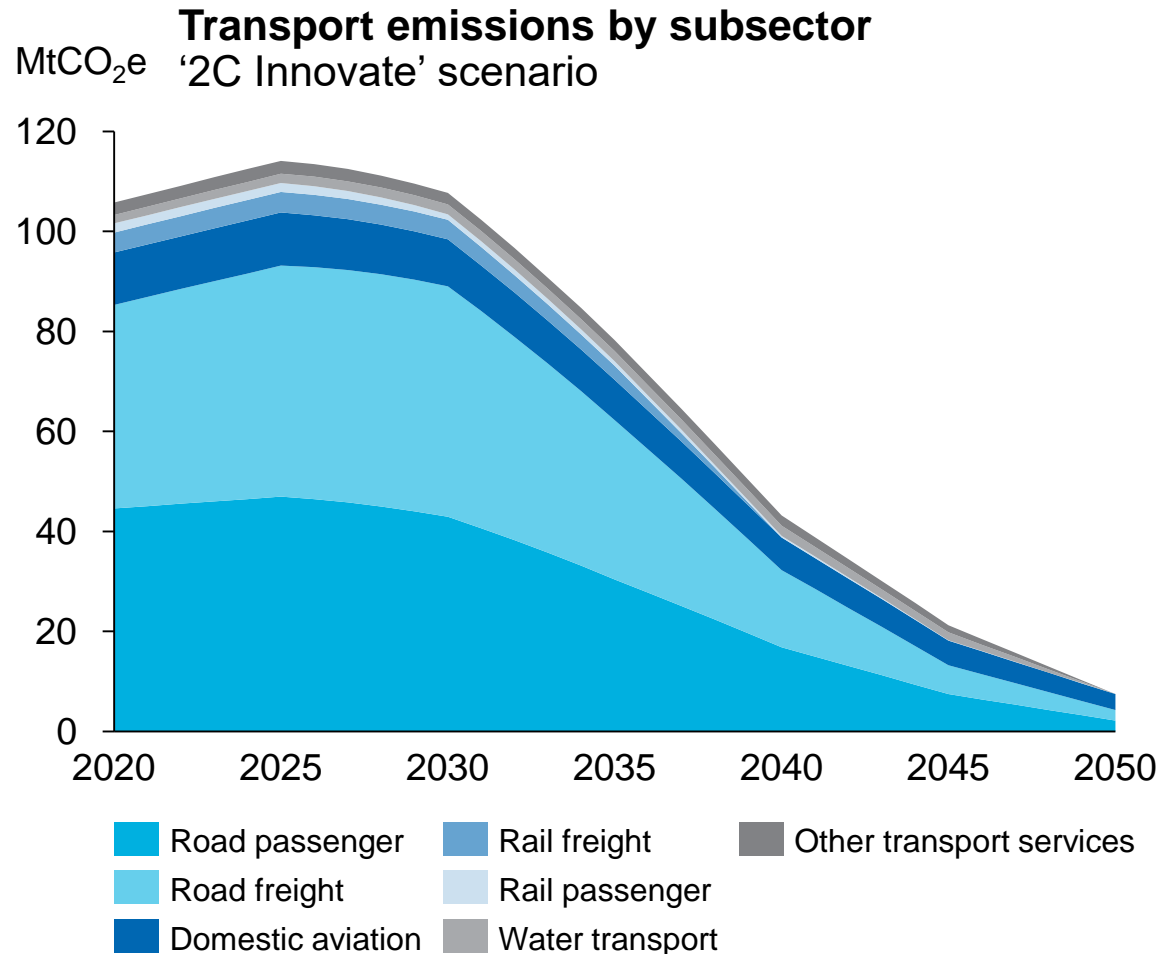


**Buildings:
The emissions
trajectory of the
building sector is
strongly linked to
the transition to
renewable
electricity
generation**

Overall buildings emissions in the modelled scenarios (2020-2050)

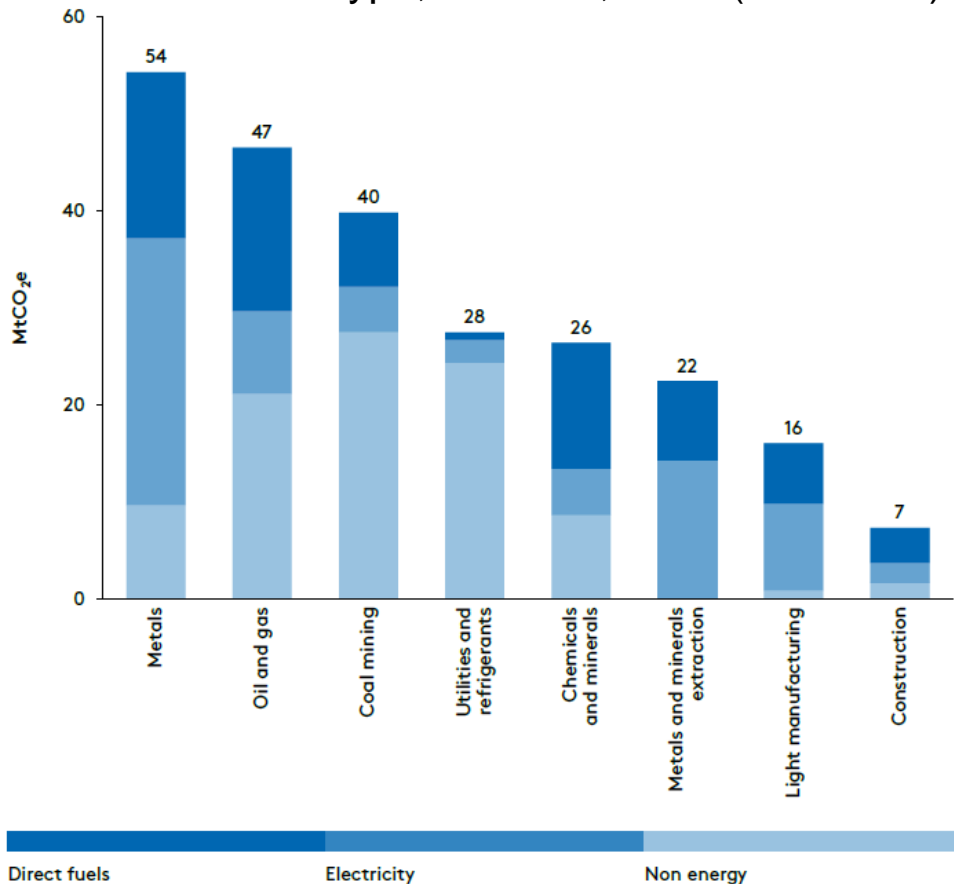


Transport: It is possible to achieve near zero emissions by 2050

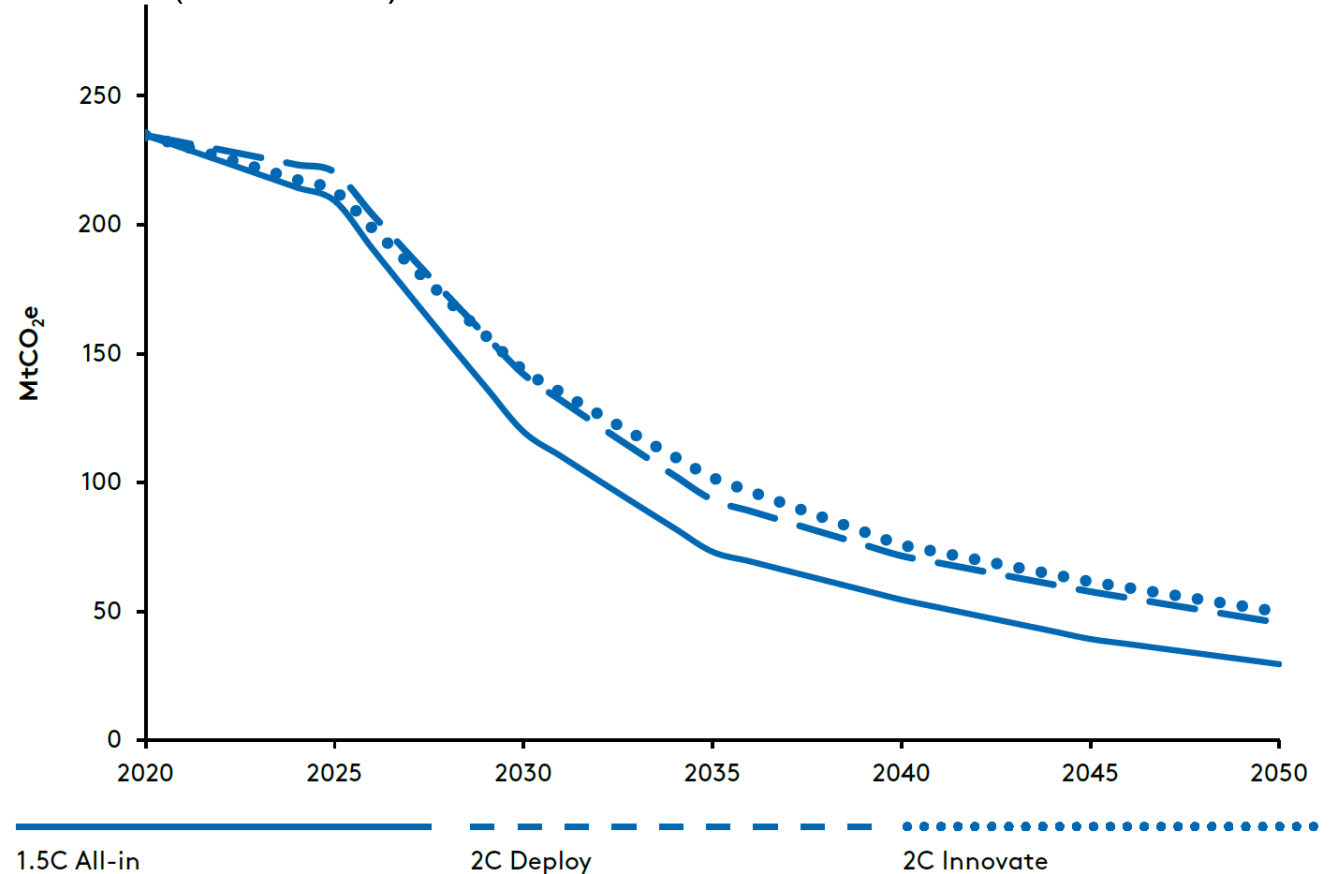


Industry: Industry produces nearly half of Australia's emissions, with a significant proportion from non-energy sources

Industrial emissions by subsector and emissions type, MtCO₂e, 2018 (estimated)

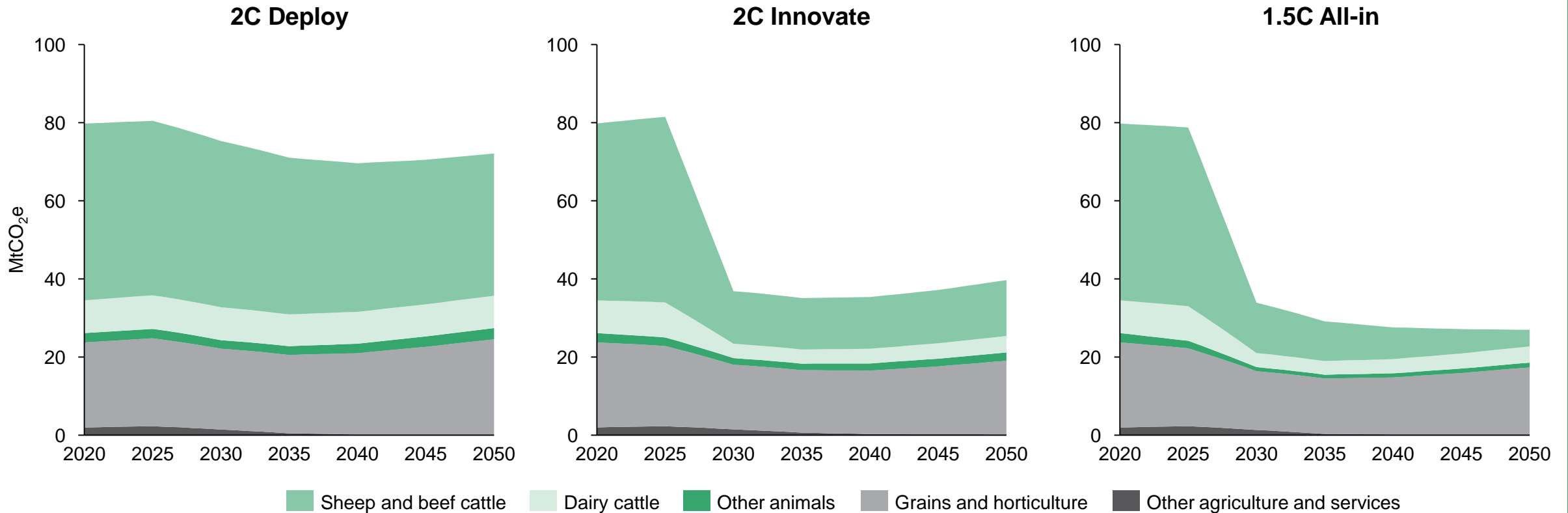


Overall Industry emissions in the modelled scenarios (2020-2050)



Agriculture: Significant abatement could be achieved, but residual emissions remain

Agriculture emissions by sector in the modelled scenarios (Scope 1 & 2)



The main report details benchmarks for technology uptake...

TECHNOLOGY				
BENCHMARK	2°C PATHWAYS		1.5°C PATHWAY	
	2030	CHANGE versus 2020	2030	CHANGE versus 2020
Emissions intensity	220-252 tCO ₂ e/GWh	63-67% decrease	177 tCO ₂ e/GWh	74% decrease
Share of renewable electricity generation	70-74%	2020 = 25%	79%	2020 = 25%
Additional renewable capacity between 2020 and 2030		24-28 GW added		29 GW added
Additional storage capacity between 2020 and 2030		44-66 GWh added		56 GWh added
Rooftop solar electricity generation	22-26 TWh	85-116% increase	26 TWh	116% increase
Electric cars (battery electric vehicles and fuel cell electric vehicles)	50% of new car sales, 15% of total fleet	2020 = <1% of sales and total fleet	76% of new car sales, 28% of total fleet	2020 = <1% of sales and total fleet
Electric trucks (battery electric vehicles and fuel cell electric vehicles)	25-39% of new truck sales, 8-13% of total fleet	2020 = <1% of sales and total fleet	59% of new truck sales, 24% of total fleet	2020 = <1% of sales and total fleet
Volume of zero emissions fuels (bioenergy and hydrogen)	83-111 PJ	171-265% increase	134 PJ	338% increase
Share of electricity in energy used for steel production	16-20%	2020 = 11%	27%	2020 = 11%
% clinker in cement	45-75%	2020 = 75%	15%	2020 = 75%
Share of new large buildings built using timber	7%-20%	2020 = negligible	20%	2020 = negligible
Carbon forestry	~ 5 Mha plantings		~ 8 Mha plantings	

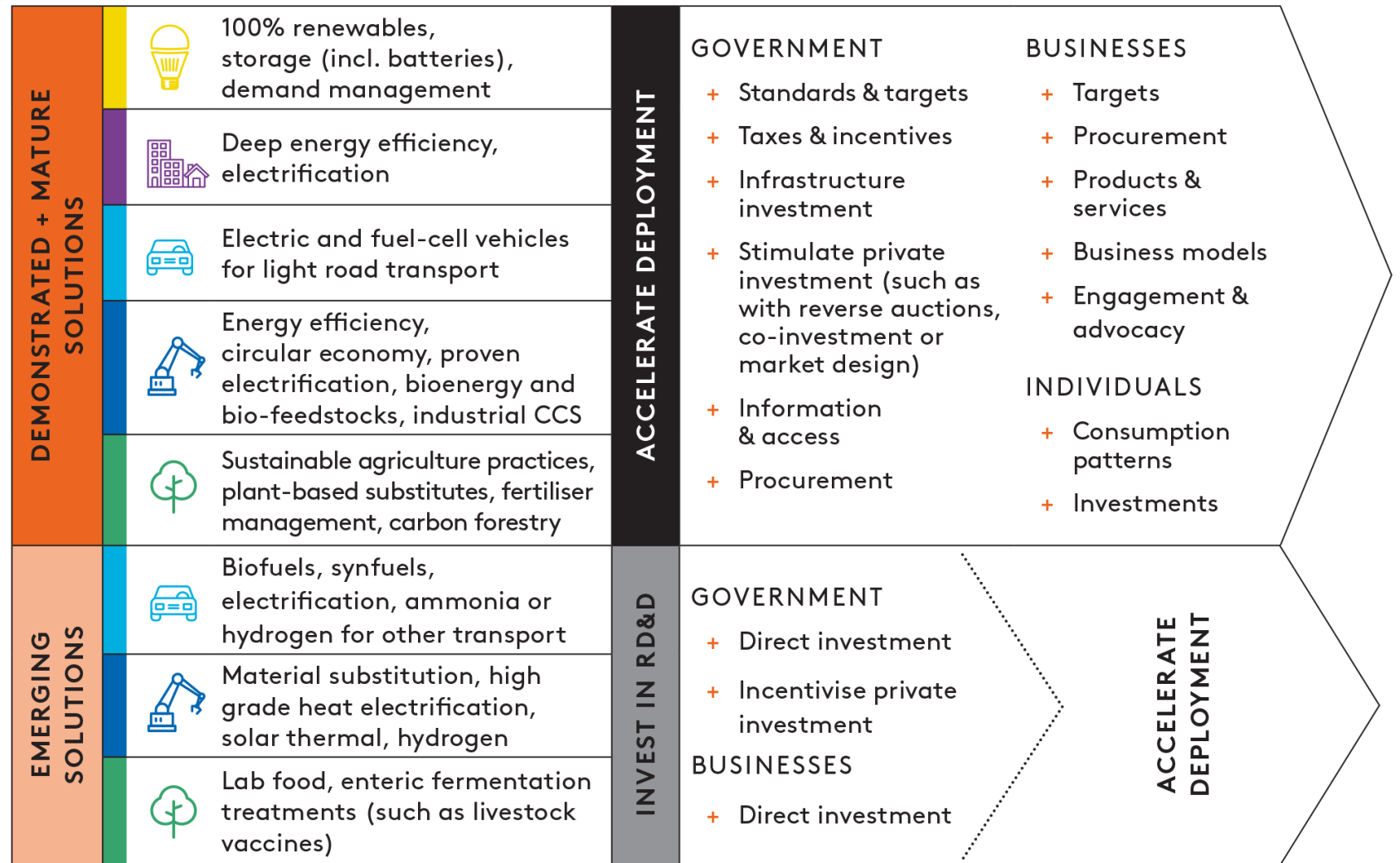
... as well as energy and emissions measures

ENERGY				
BENCHMARK	2°C PATHWAYS		1.5°C PATHWAY	
	2030	CHANGE versus 2020	2030	CHANGE versus 2020
Total final energy use		3-8% decrease		16% decrease
Share of electricity and zero-emissions fuels in final energy use	31-32%	2020 = 23%	35%	2020 = 23%
Share of electricity in total energy	24%	2020 = 20%	27%	2020 = 20%
Residential building energy intensity ⁵		44-48% decrease (improvement)		49% decrease (improvement)
Commercial building energy intensity ⁶		16-25% decrease (improvement)		28% decrease (improvement)
Share of electricity in residential buildings	76-78%	2020 = 49%	75% ⁷	2020 = 49%
Share of electricity and zero-emissions fuels in transport energy	9-11%	2020 = 3%	16%	2020 = 3%
Share of electricity and zero-emissions fuels in road energy use	5-9%	2020 = 2%	17%	2020 = 2%
Fossil fuel use in non-road transport	226-233 PJ	5-8% decrease	203 PJ	17% decrease
Total energy use	1684-1785 PJ	4-10% decrease	1580 PJ	15% decrease
Share of electricity and zero-emissions fuels in total energy use	30-32%	2020 = 25%	33%	2020 = 25%

EMISSIONS				
BENCHMARK	2°C PATHWAYS		1.5°C PATHWAY	
	2030	CHANGE versus 2020	2030	CHANGE versus 2020
Net annual emissions	291-322 MtCO ₂ e	37-43% decrease ¹	159 MtCO ₂ e	69% decrease ²
Electricity emissions	62-65 MtCO ₂ e	63-64% decrease	46 MtCO ₂ e	73% decrease
Buildings emissions	36-37 MtCO ₂ e	63-64% decrease	27 MtCO ₂ e	73% decrease
Total transport emissions	108-115 MtCO ₂ e	2-9% increase ³	93 MtCO ₂ e	12% decrease
+ Road transport emissions	89-95 MtCO ₂ e	5-12% increase ⁴	76 MtCO ₂ e	11% decrease
+ Other transport emissions	18.8-19.5 MtCO ₂ e	5-8% decrease	17 MtCO ₂ e	16% decrease
Total industry emissions	141 MtCO ₂ e	40% decrease	120 MtCO ₂ e	49% decrease
+ Extractive sectors emissions	67-71 MtCO ₂ e	36-39% decrease	56 MtCO ₂ e	49% decrease
+ Manufacturing and other sectors emissions	70-74 MtCO ₂ e	40-43% decrease	63 MtCO ₂ e	49% decrease
Agriculture and land emissions	37-75 MtCO ₂ e	6-54% decrease	34 MtCO ₂ e	57% decrease
+ Livestock emissions	19-53 MtCO ₂ e	5-66% decrease	18 MtCO ₂ e	69% decrease
+ Other agriculture emissions	18-22 MtCO ₂ e	7-24% decrease	16 MtCO ₂ e	31% decrease
+ Carbon forestry sequestration	31-45 MtCO ₂ e sequestration		112 MtCO ₂ e sequestration	

This is the transformational decade

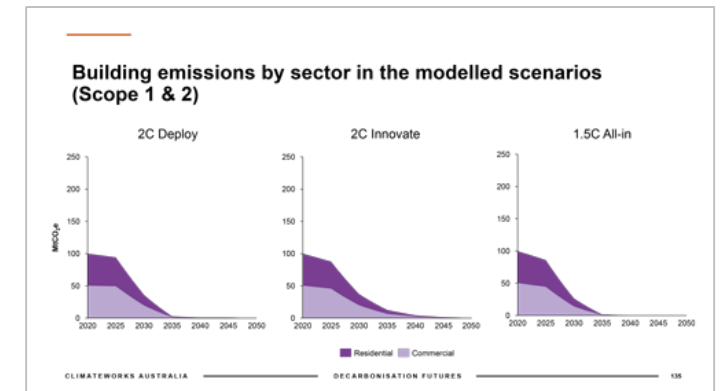
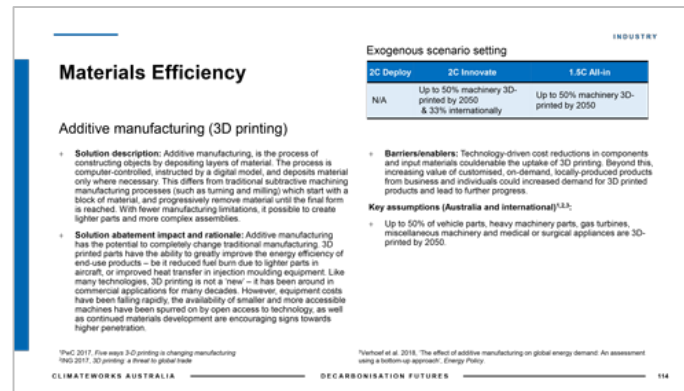
Research shows that the years before 2030 offer a window for action that will not stay open.



The Technical Report is now available!

Decarbonisation Futures Technical Report

A look inside:



Download here:

<https://www.climateworksaustralia.org/resource/decarbonisation-futures-solutions-actions-and-benchmarks-for-a-net-zero-emissions-australia/>

QUESTIONS



Thank you. Please contact us for more information.

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