



DECARBONISATION  
FUTURES

**THE BRIEFING** ROOM





MONASH  
SUSTAINABLE  
DEVELOPMENT  
INSTITUTE



# INTRODUCTION



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**Amandine Denis-Ryan,**  
Head of National  
Programs

**Tom Yankos,** Senior  
Project Manager



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# DECARBONISATION FUTURES

## Solutions, actions and benchmarks for a net zero emissions Australia

Webinar, overview of key findings

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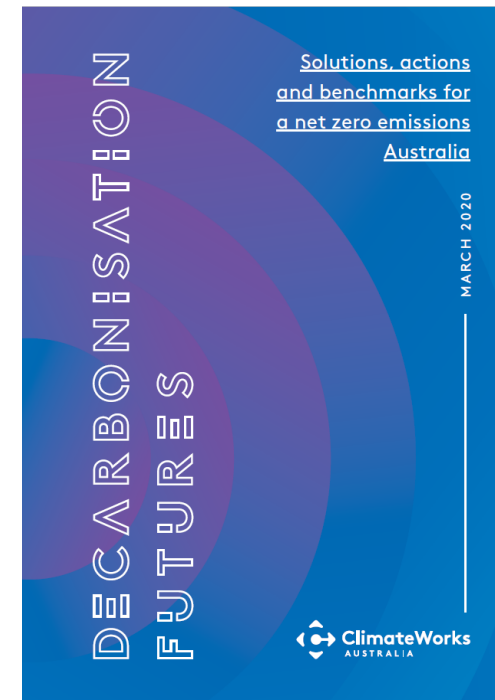
# KEY FINDINGS

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# 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
- + Provides benchmarks for the scale of uptake of the technologies to align with the Paris goals
- + Via modelling three scenarios to illustrate possible pathways, with differing mix of levers



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# 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



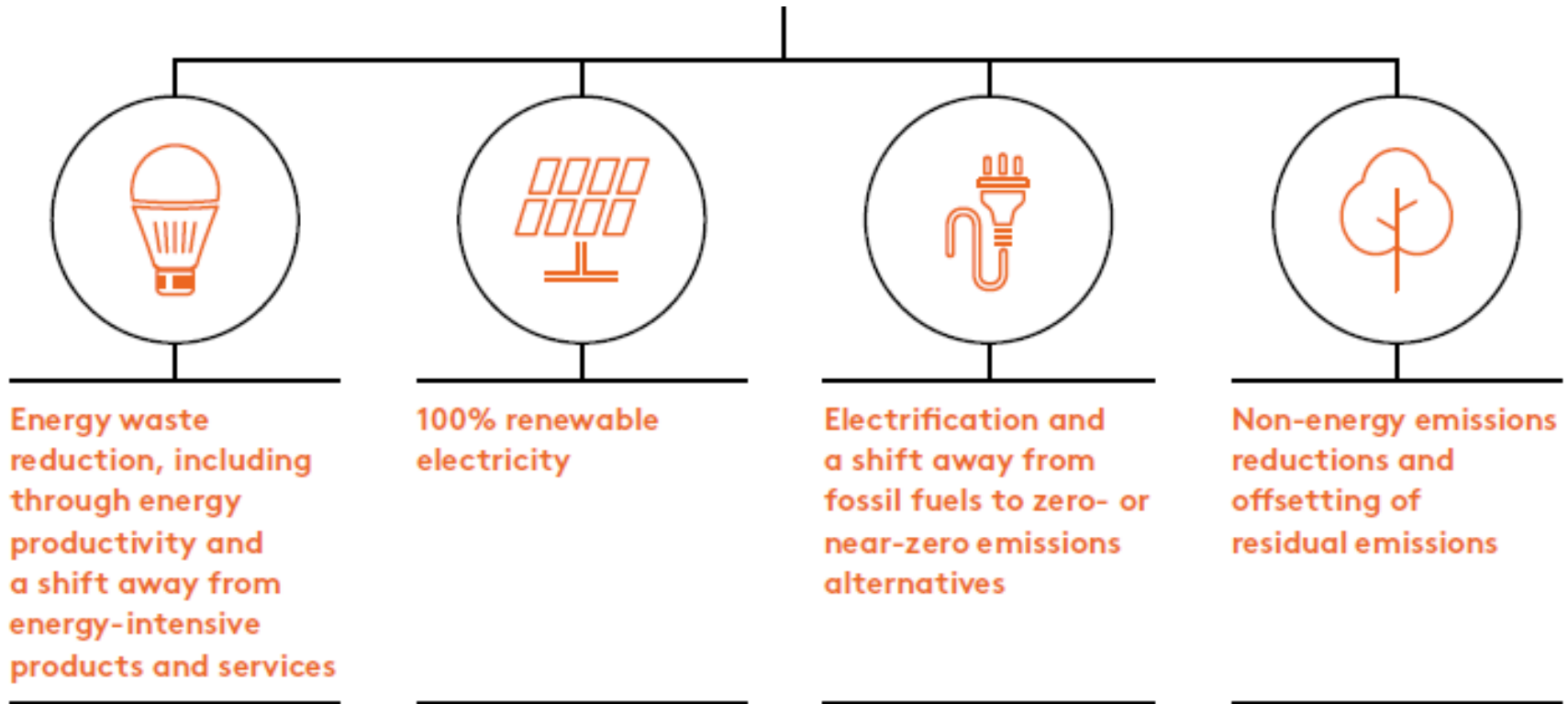
\* Aspiration

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



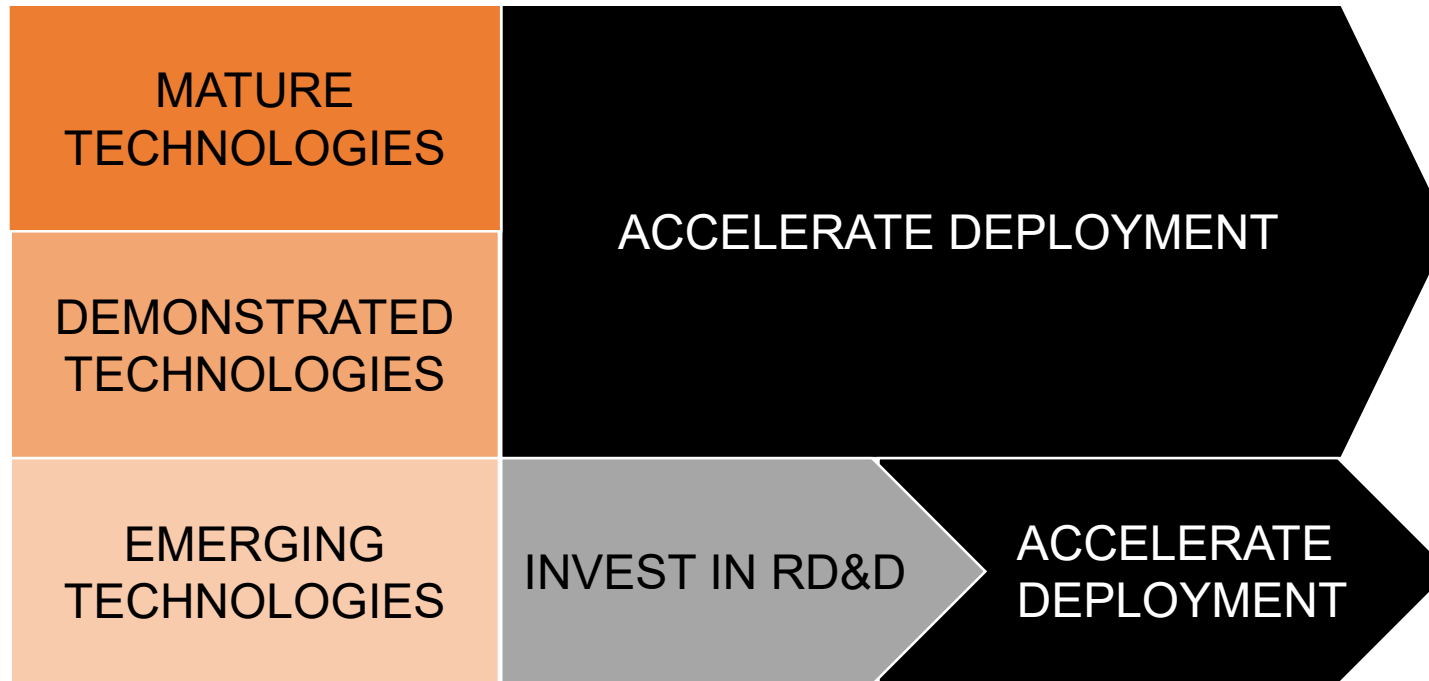
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# Achieving net zero emissions relies on 4 pillars



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





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

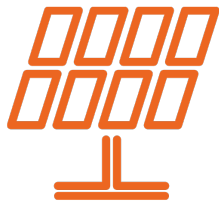
- + Accelerate deployment of ready solutions
- + Create jobs in sustainable industries
- + Increase Australia's resilience
- + Set up for future economic growth
- + Decrease energy costs
- + Improve health outcomes

## 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

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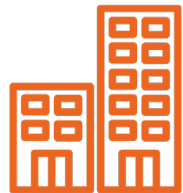
# We have found that technology has achieved significant progress since 2014, often faster than was expected then



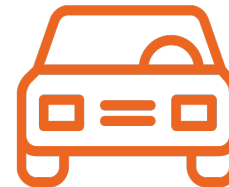
New renewables now **cheaper** than new fossil fuel generation



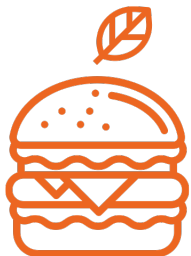
Battery costs per kilowatt-hour **80% cheaper** than in 2010



**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



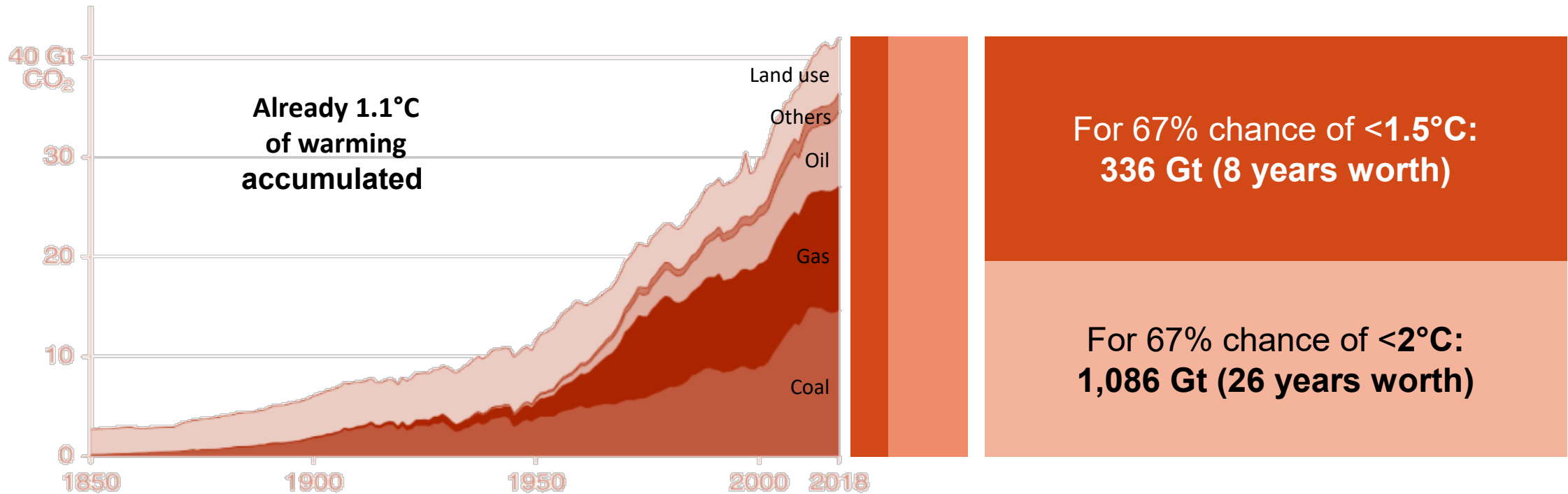
1- and 2-person **electric planes** are beginning to enter the market

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

		DEMONSTRATED + MATURE SOLUTIONS	EMERGING SOLUTIONS
	<b>ELECTRICITY</b>	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>
	<b>BUILDINGS</b>	Deep energy efficiency, electrification	
	<b>TRANSPORT</b>	Electric and fuel-cell vehicles for light road transport	Biofuels, synfuels, electrification, ammonia or hydrogen for other transport
	<b>INDUSTRY</b>	Energy efficiency, circular economy, proven electrification, bioenergy and bio-feedstocks, industrial CCS	Material substitution, high grade heat electrification, solar thermal, hydrogen
	<b>AGRICULTURE + LAND</b>	Sustainable agriculture practices, plant-based substitutes, fertiliser management, carbon forestry	Lab food, enteric fermentation treatments (such as livestock vaccines)

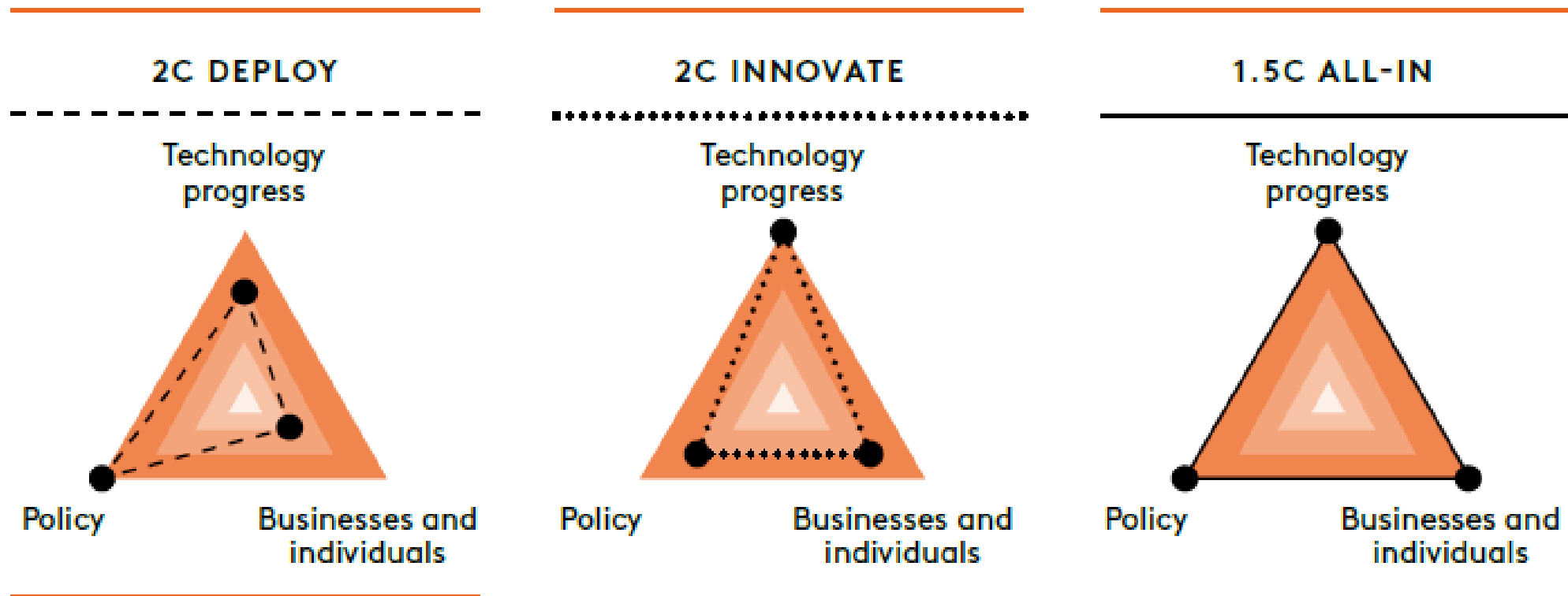
# Australia and the world have limited time, but we are now well placed to leapfrog to zero emissions technologies

Global total CO<sub>2</sub> 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](http://folk.uio.no/roberan/img/GCB2019/PNG/s85_2019_Total_Emissions_by_source.png))

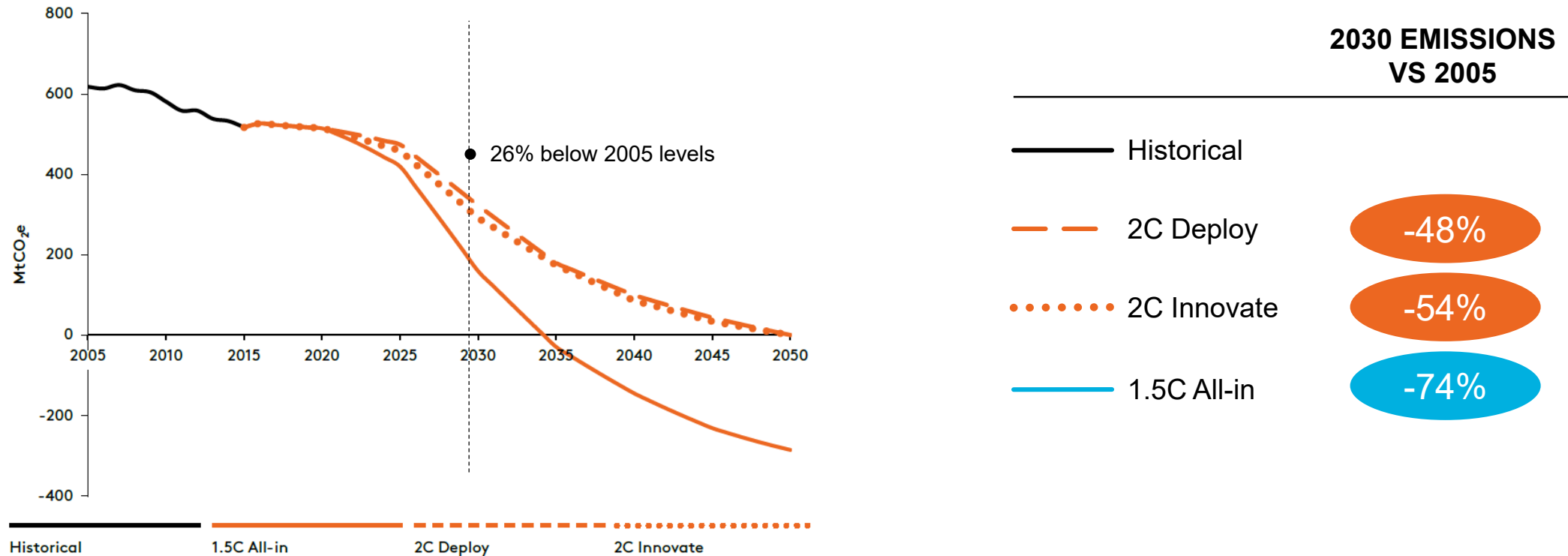
# Decarbonisation Futures uses scenarios to explore a range of possible low-emissions futures for Australia



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

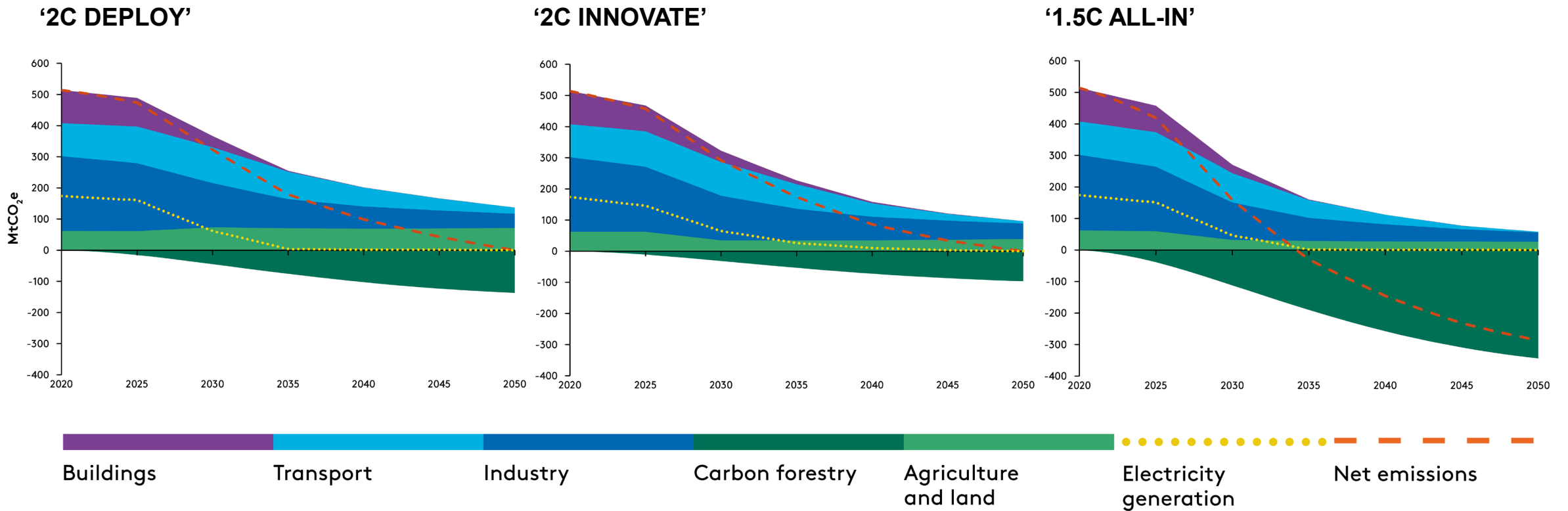
# Our scenario analysis shows that Australia can achieve trajectories compatible with the global 1.5°C and 2°C goals

## Australia's total emissions by scenario, MtCO<sub>2</sub>e



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

Sector emissions, MtCO<sub>2</sub>e, 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**



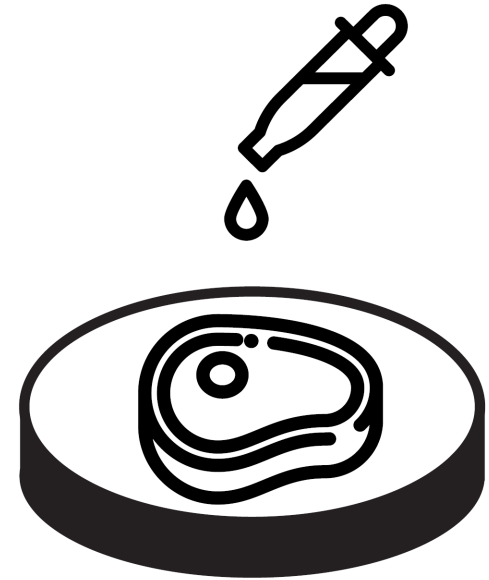
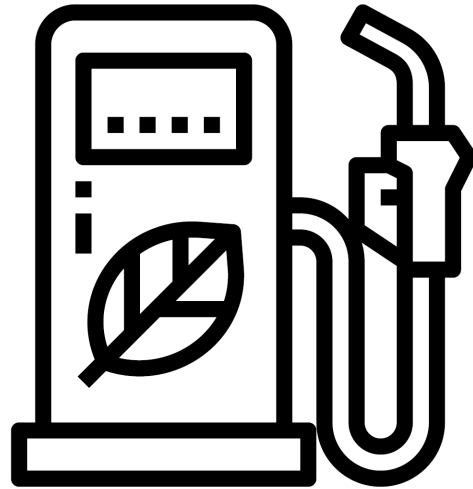
**% renewables in electricity generation**

	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%



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

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# **This is the transformational decade**

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



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# SECTORAL FINDINGS

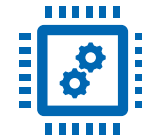
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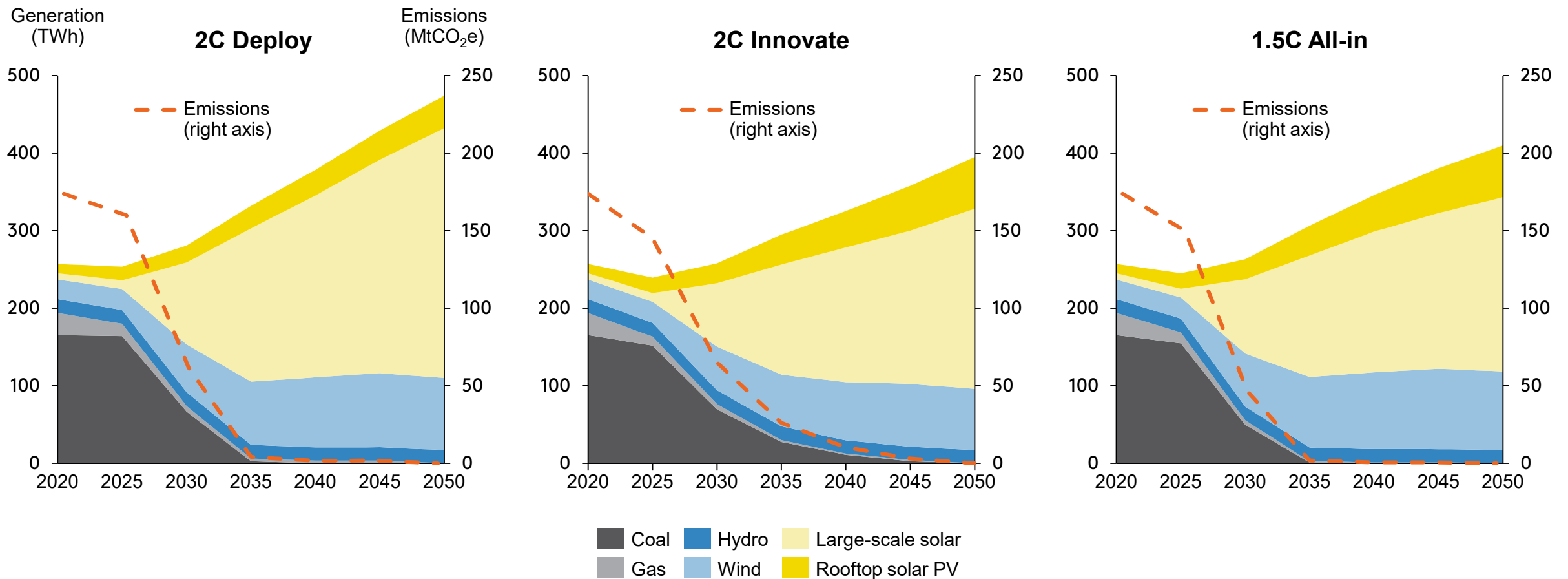
# Decarbonisation Futures used the new 'Aus-TIMES' model



**Aus-TIMES**

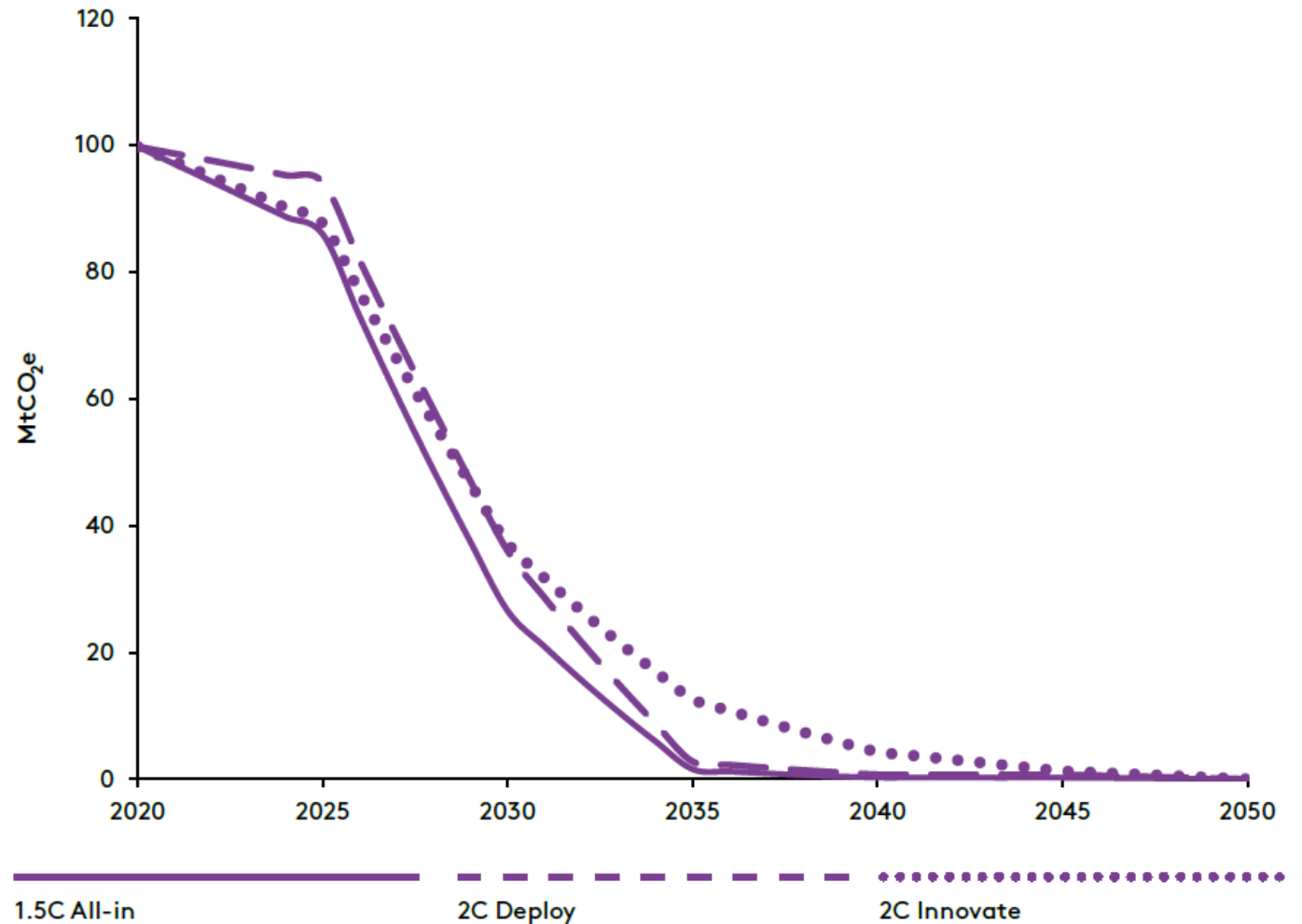


# Electricity: All scenarios reach about 75% renewable electricity generation by 2030, and 100% by 2050

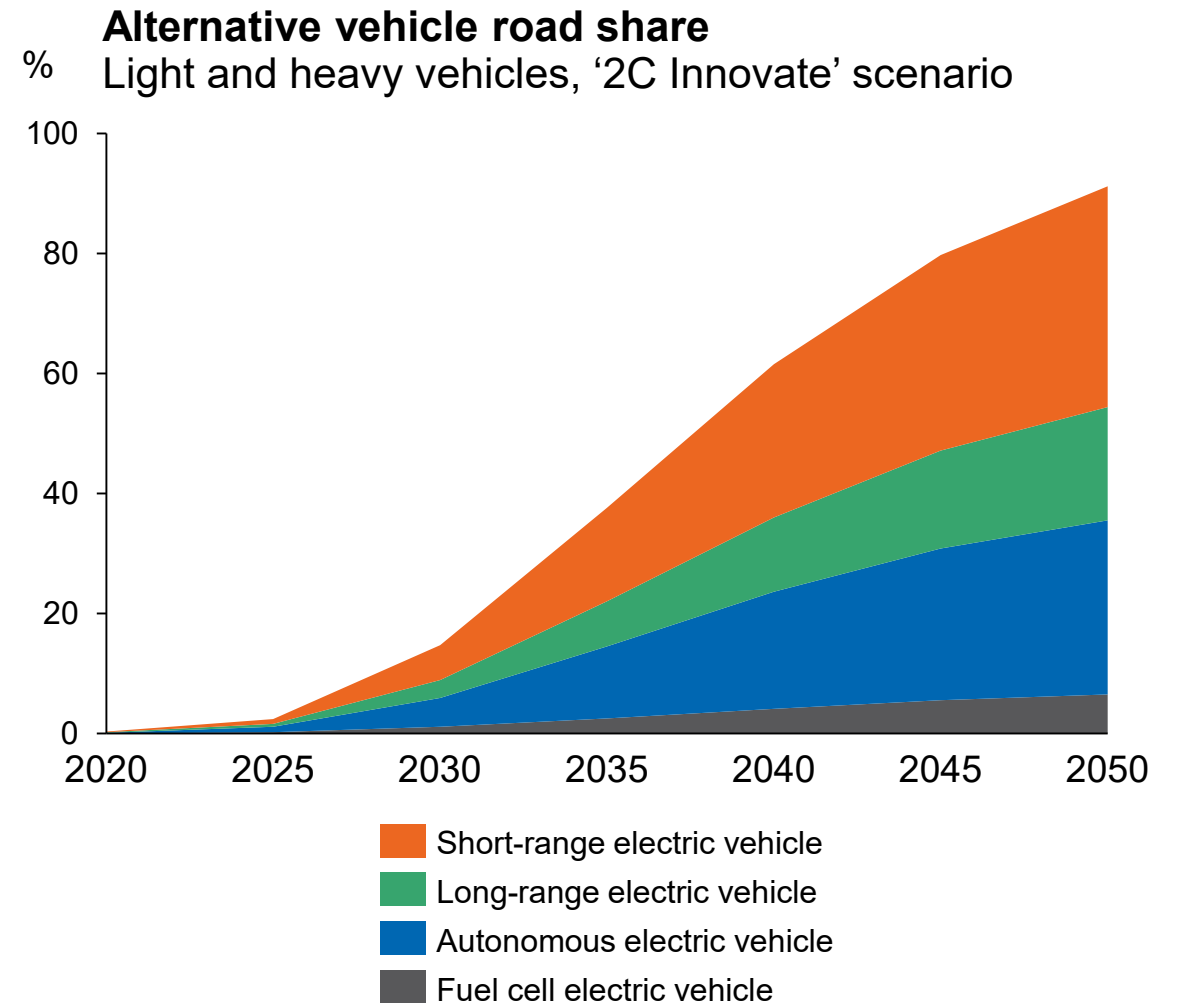
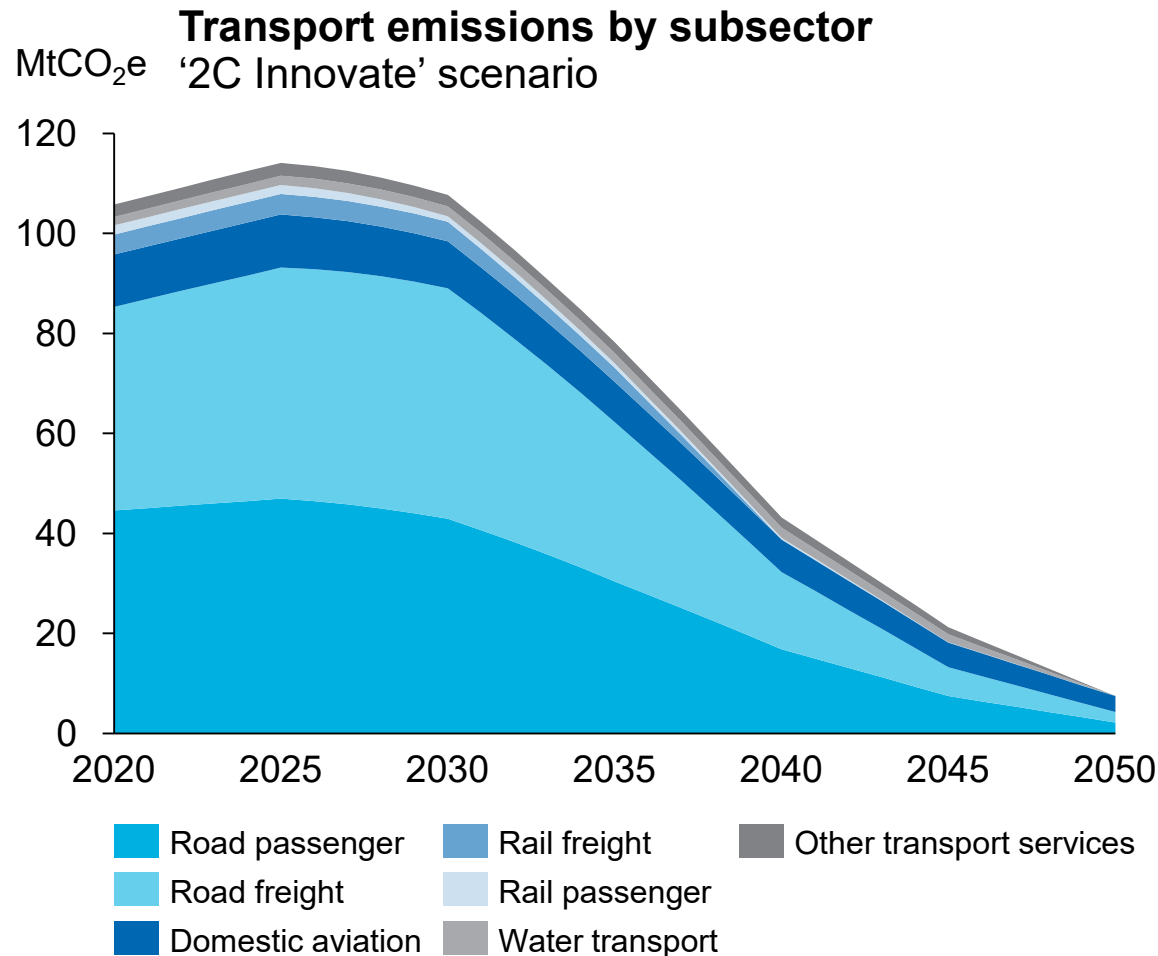


**Buildings:  
The emissions  
trajectory of the  
building sector is  
strongly linked to  
the transition to  
renewable  
electricity  
generation**

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



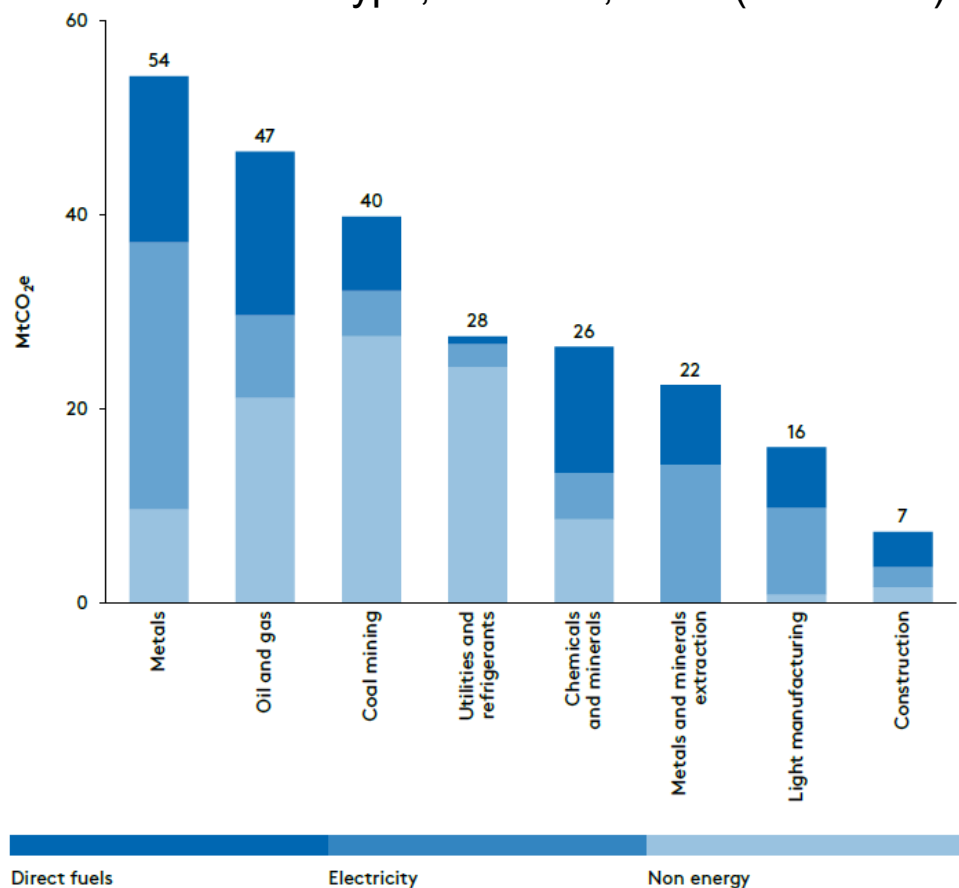
# Transport: It is possible to achieve near zero emissions by 2050



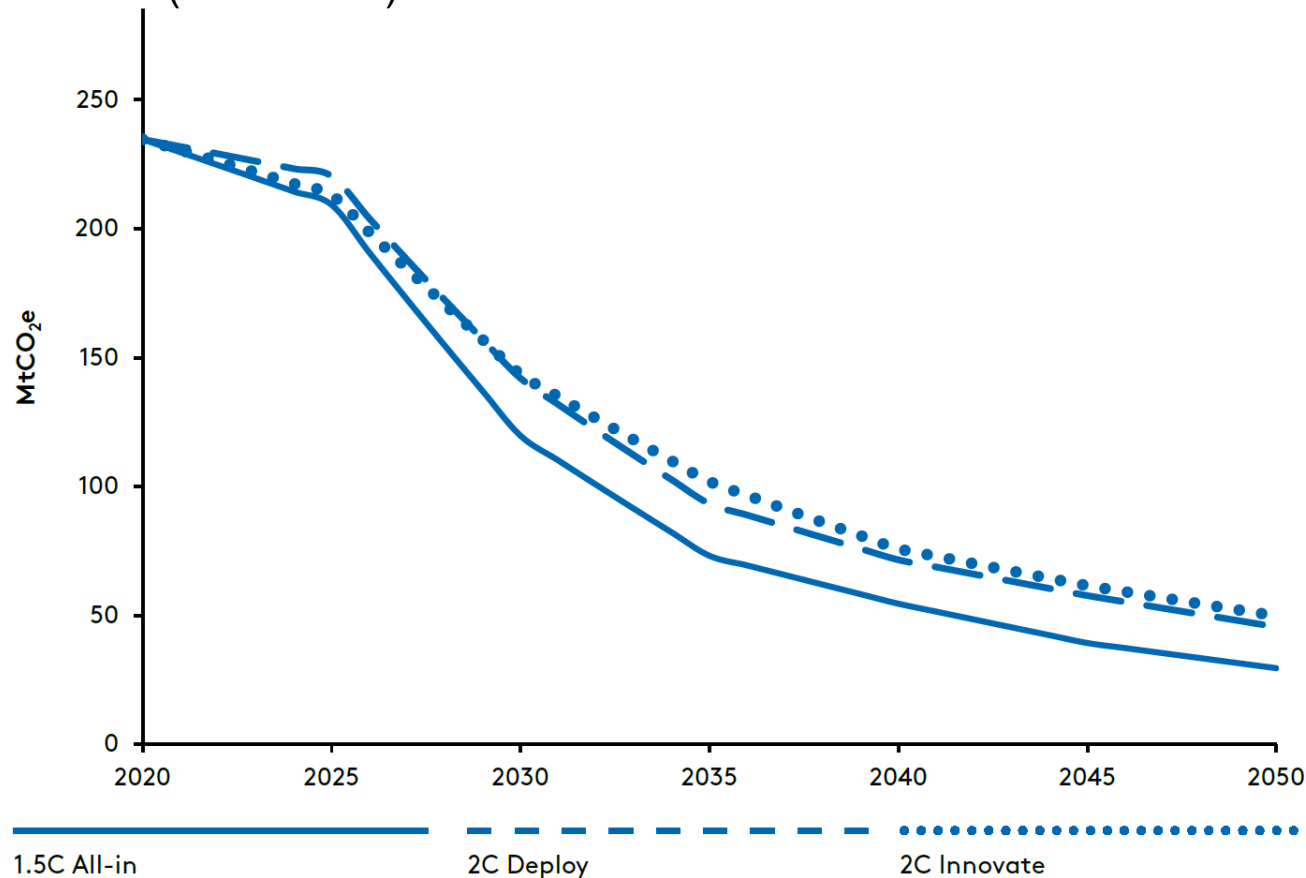


# Industry: Industry produces nearly half of Australia's emissions, with a significant proportion from non-energy sources

Industrial emissions by subsector and emissions type, MtCO<sub>2</sub>e, 2018 (estimated)

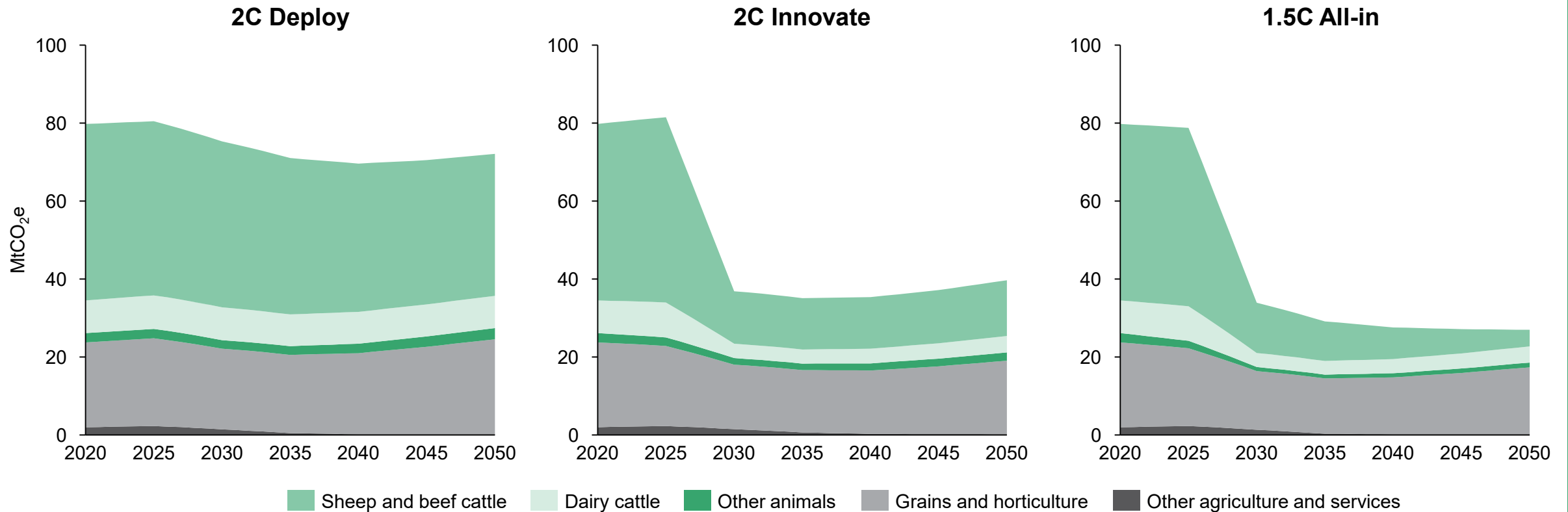


Overall Industry emissions in the modelled scenarios (2020-2050)



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

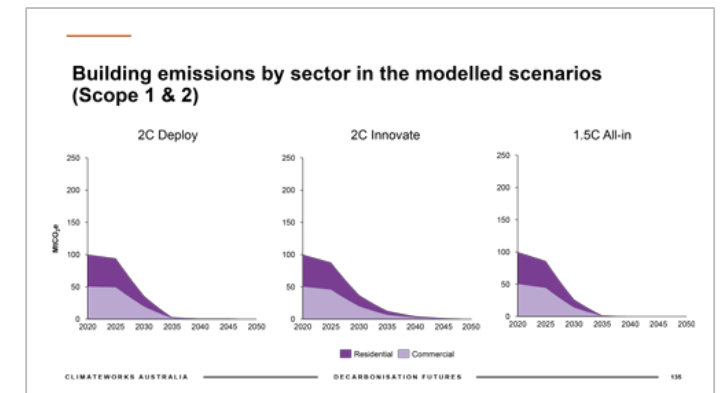
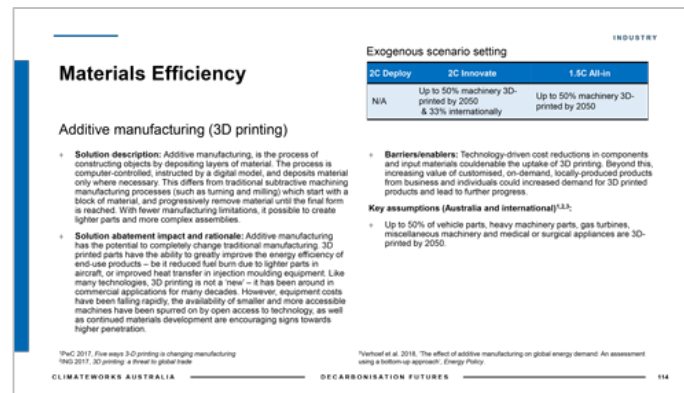
Agriculture emissions by sector in the modelled scenarios (Scope 1 & 2)



# The 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/>

# 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 <sub>2</sub> e/GWh	63-67% decrease	177 tCO <sub>2</sub> 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	

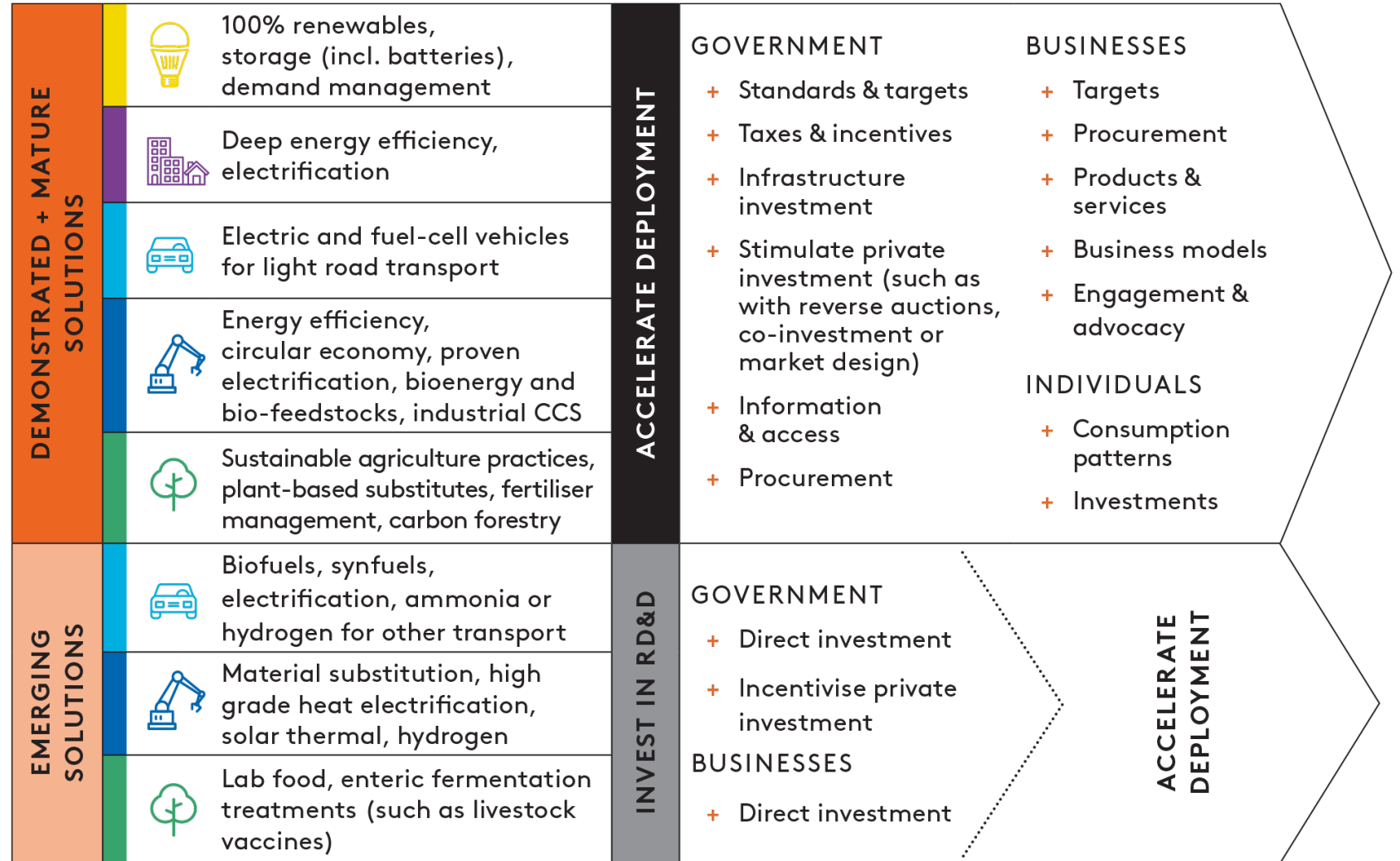
# ... as well as energy and emissions measures

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 <sup>5</sup>		44-48% decrease (improvement)		49% decrease (improvement)
Commercial building energy intensity <sup>6</sup>		16-25% decrease (improvement)		28% decrease (improvement)
Share of electricity in residential buildings	76-78%	2020 = 49%	75% <sup>7</sup>	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 <sub>2</sub> e	37-43% decrease <sup>1</sup>	159 MtCO <sub>2</sub> e	69% decrease <sup>2</sup>
Electricity emissions	62-65 MtCO <sub>2</sub> e	63-64% decrease	46 MtCO <sub>2</sub> e	73% decrease
Buildings emissions	36-37 MtCO <sub>2</sub> e	63-64% decrease	27 MtCO <sub>2</sub> e	73% decrease
Total transport emissions	108-115 MtCO <sub>2</sub> e	2-9% increase <sup>3</sup>	93 MtCO <sub>2</sub> e	12% decrease
+ Road transport emissions	89-95 MtCO <sub>2</sub> e	5-12% increase <sup>4</sup>	76 MtCO <sub>2</sub> e	11% decrease
+ Other transport emissions	18.8-19.5 MtCO <sub>2</sub> e	5-8% decrease	17 MtCO <sub>2</sub> e	16% decrease
Total industry emissions	141 MtCO <sub>2</sub> e	40% decrease	120 MtCO <sub>2</sub> e	49% decrease
+ Extractive sectors emissions	67-71 MtCO <sub>2</sub> e	36-39% decrease	56 MtCO <sub>2</sub> e	49% decrease
+ Manufacturing and other sectors emissions	70-74 MtCO <sub>2</sub> e	40-43% decrease	63 MtCO <sub>2</sub> e	49% decrease
Agriculture and land emissions	37-75 MtCO <sub>2</sub> e	6-54% decrease	34 MtCO <sub>2</sub> e	57% decrease
+ Livestock emissions	19-53 MtCO <sub>2</sub> e	5-66% decrease	18 MtCO <sub>2</sub> e	69% decrease
+ Other agriculture emissions	18-22 MtCO <sub>2</sub> e	7-24% decrease	16 MtCO <sub>2</sub> e	31% decrease
+ Carbon forestry sequestration	31-45 MtCO <sub>2</sub> e sequestration		112 MtCO <sub>2</sub> e sequestration	

# This is the transformational decade

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



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# QUESTIONS

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# You'll receive an email with:

- + A recording of the presentation
- + The briefing deck
- + Info on our upcoming webinar



**Thank you. Please contact us for more information.**

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**AMANDINE DENIS-RYAN //**

Head of National Programs

[amandine.denis@climateworksaustralia.org](mailto:amandine.denis@climateworksaustralia.org)

**TOM YANKOS //**

Senior Project Manager

[tom.yankos@climateworksaustralia.org](mailto:tom.yankos@climateworksaustralia.org)

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**CLIMATEWORKS AUSTRALIA**

Level 27, 35 Collins Street

Melbourne Victoria 3000

+61 3 99020741 // [info@climateworksaustralia.org](mailto:info@climateworksaustralia.org)

[www.climateworksaustralia.org](http://www.climateworksaustralia.org)



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