



Presentation to Soil carbon workshop, Sydney
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About ClimateWorks Australia



ClimateWorks Australia is a new non-profit organisation created by a partnership between The Myer Foundation & Monash University, focused on enabling practical projects to deliver emissions reductions in Australia



THE MYER
FOUNDATION



MONASH University

Affiliations:



- ▶ Low Carbon Growth Plans (LCGPs) are an internationally recognised tool for integrating nationwide actions to reduce emissions alongside economic growth
- ▶ ClimateWorks Australia's Low Carbon Growth Plan is the first comprehensive economy-wide Low Carbon Growth Plan for Australia. It updates the Australian cost curve using McKinsey methodology
- ▶ Key findings:
 - Australia has the potential to achieve GHG emissions reductions of 25% below 2000 levels (249 MtCO₂e) at a low average cost by 2020
 - 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



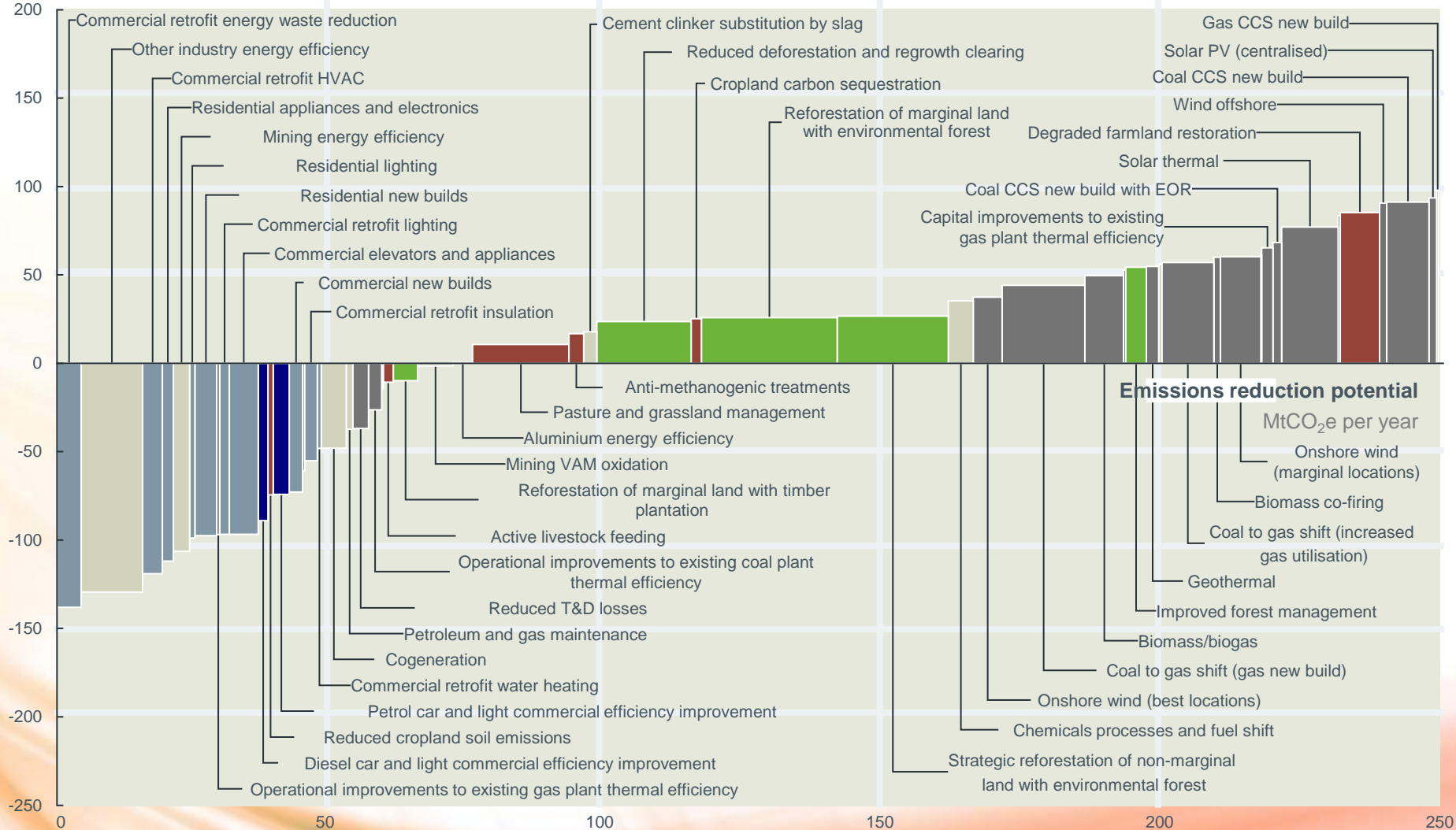
- Power
- Industry
- Transport
- Buildings
- Forestry
- Agriculture

2020 GHG emissions reduction societal cost curve

Lowest cost opportunities to reduce emissions by 249 Mt CO₂e¹

Cost to society

A\$/tCO₂e



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 sector¹

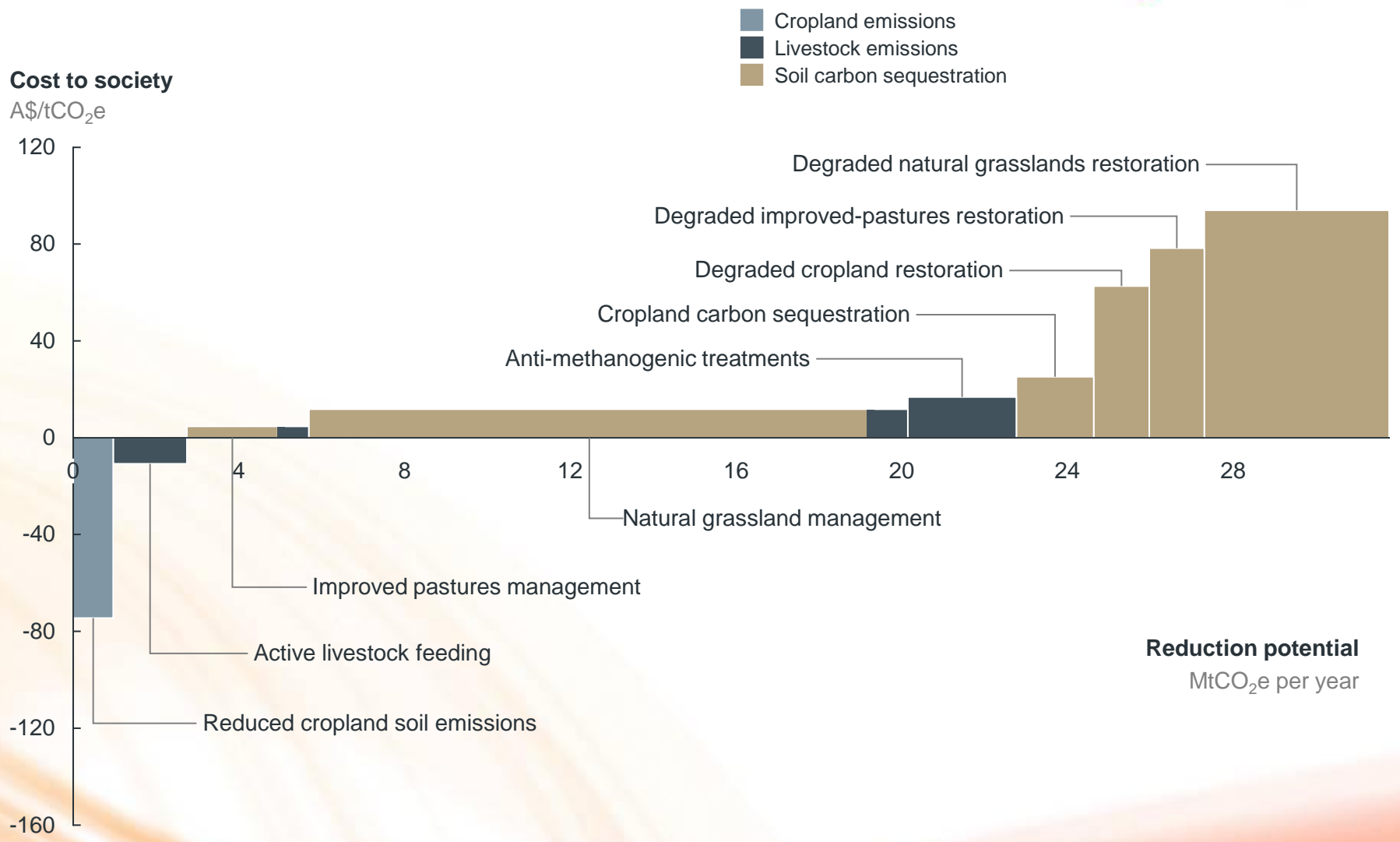


	Volume MtCO ₂ e	Average cost per tonne Real 2010 A\$		Example opportunities
		Societal	Investor	
Power	77	54	87	<ul style="list-style-type: none"> ▶ Renewables ▶ Coal-to-gas shift
Forestry	70	25	24	<ul style="list-style-type: none"> ▶ Reforestation ▶ Reduced deforestation
Industry	37	-48	-25	<ul style="list-style-type: none"> ▶ Industrial energy efficiency ▶ Ventilation air methane oxidation
Agriculture	32	25	25	<ul style="list-style-type: none"> ▶ Soil carbon sequestration ▶ Reduced livestock emissions
Buildings	28	-99	-90	<ul style="list-style-type: none"> ▶ Commercial retrofits ▶ Residential new builds
Transport	6	-60	-194	<ul style="list-style-type: none"> ▶ Combustion vehicle efficiency ▶ Hybrids
Total	249	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)

2020 Agriculture GHG emissions reduction cost curve



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

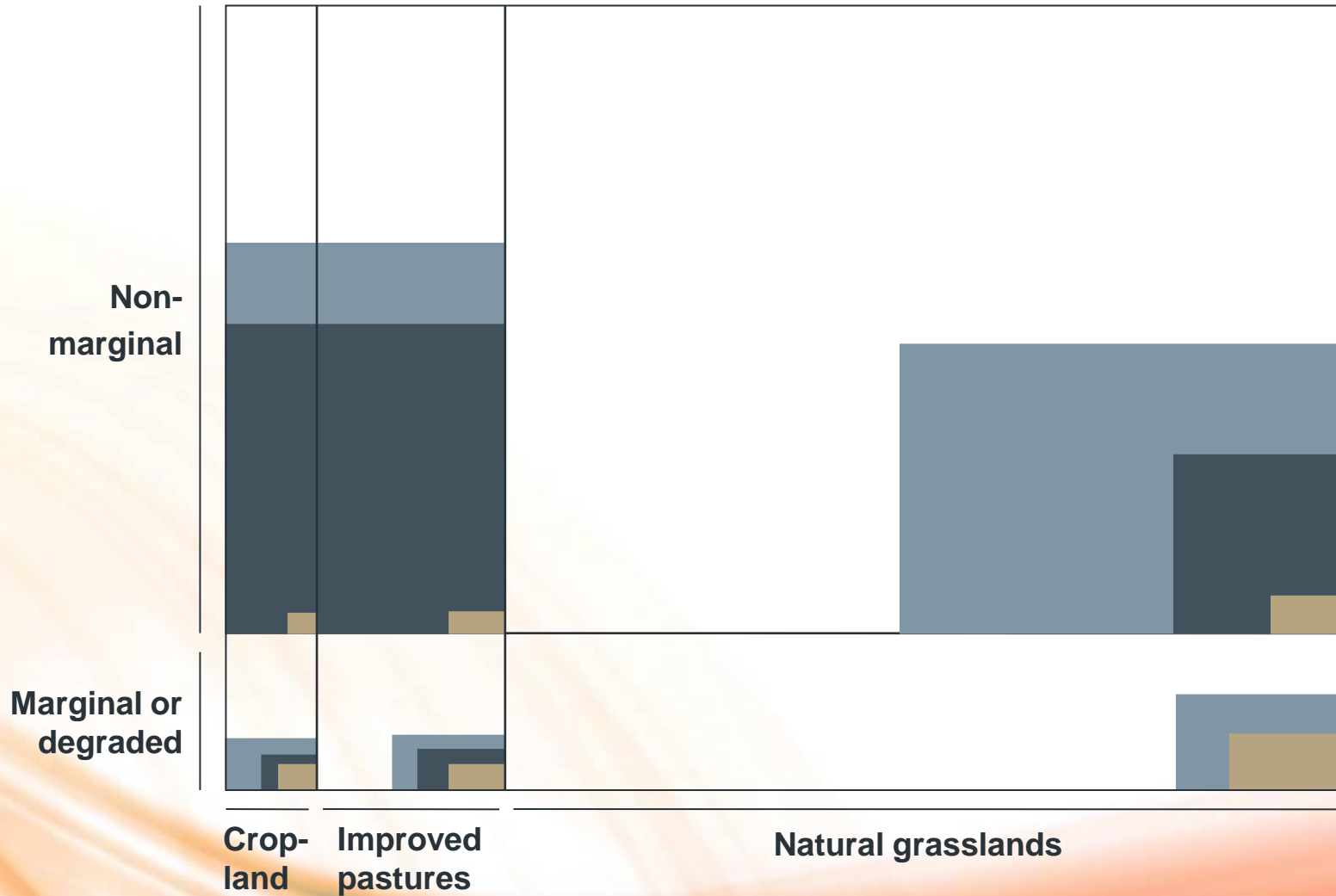
Potential farmland penetration of carbon sequestration practices



2020, hectares

(Total represents all Australian agricultural land, ~400m ha)

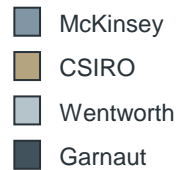
- Opportunity to expand soil carbon practices
- Soil carbon practices already in process (BAU)
- Reforestation opportunity



Description of measures and penetration assumptions

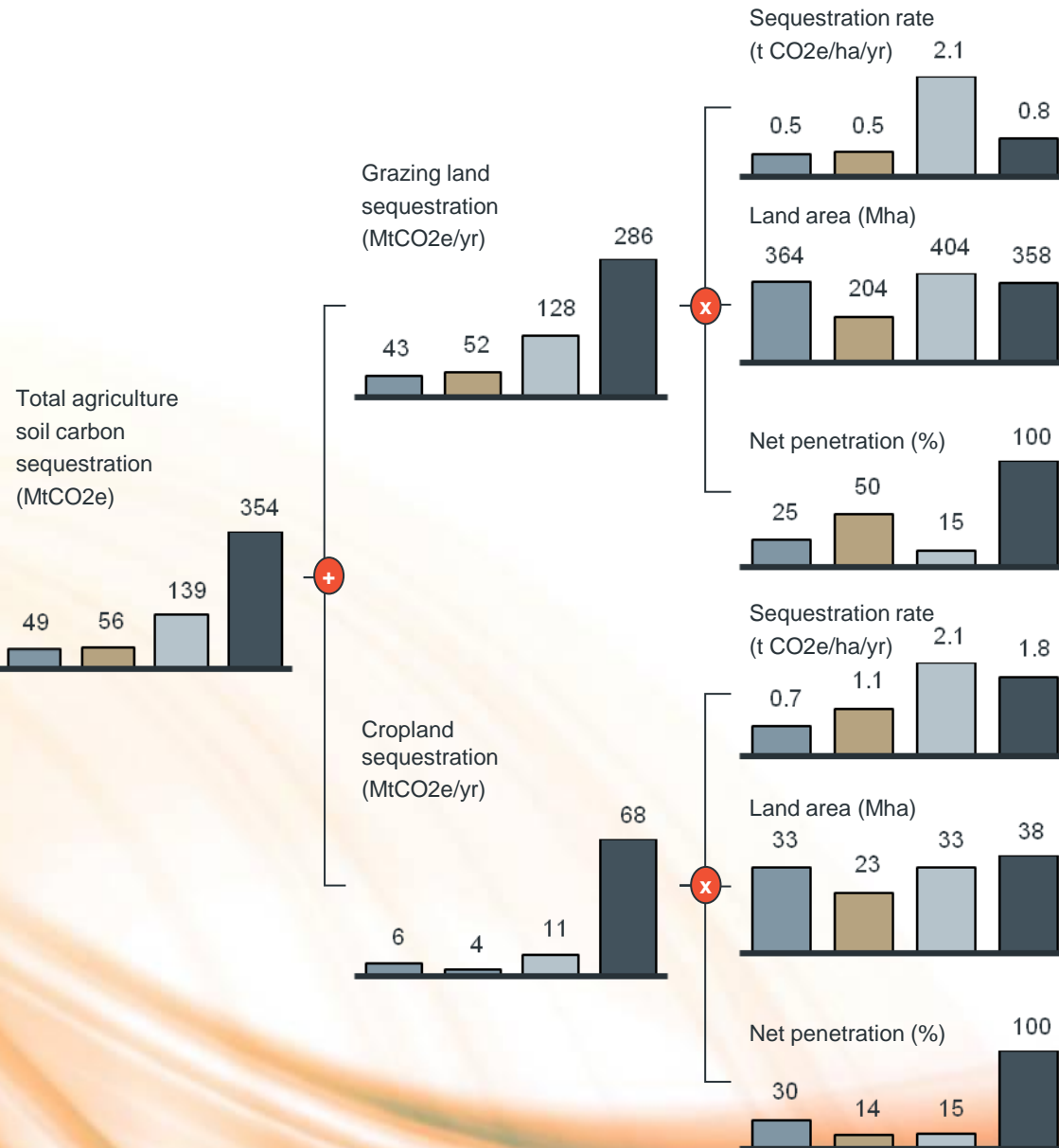
	Included actions	Penetration BAU—abatement	Limitations
Cropland emissions	<ul style="list-style-type: none"> Nutrient management techniques to minimise N2O losses such as soil and leaf nutrient testing Conservation tillage 	<p>65% – 90%</p> <p>65% – 90%</p>	<ul style="list-style-type: none"> N2O emissions from livestock difficult to address Weed and water impact
Livestock emissions	<ul style="list-style-type: none"> Active feeding regimes to increase growth rate and reduce overall lifespan Pasture improvement and modification of stocking rate Anti-methanogenic treatments – eg vaccines, medications 	<p>4% – 15%</p> <p>0% – 50%</p> <p>0% – 50%</p>	<ul style="list-style-type: none"> Limited market ability to increase feedlotting Linked to grazing soil carbon practices penetration Technological development required
Soil carbon sequestration	Cropland	50% – 75%	<ul style="list-style-type: none"> Australian water constraints make further reducing bare fallow difficult Low yielding soils mean may be difficult to sequester without crop yield loss – eg pasture cropping Limits to destocking techniques such as carbon grazing in more remote areas Quarantine and environmental limits on species introduction Restoration difficult on less managed land May be cheaper/more effective to convert land to new use – eg salt bush grazing
	<ul style="list-style-type: none"> Improved crop varieties Extended crop rotations, especially perennial crops that allocate more carbon below ground Avoided or reduced bare fallow, using cover crops 		
	Pastures or grasslands	Improved pastures: 50% – 75%	
	<ul style="list-style-type: none"> Optimised intensity and timing of grazing to maximise pasture growth/carbon allocation Species introduction—eg, introducing deep rooted perennial grass species with higher productivity/greater carbon allocation Other measures to increase the productivity of land Fire management 	Natural grassland: 5% – 40%	
	Degraded land	Cropland: 5% – 45%	
	<ul style="list-style-type: none"> Restoration of acidified land through addition of lime and other nutrients Addressing salinity issues—eg, planting salt resistant plants, ground cover, trees 	Improved pastures: 5% – 25%	
		Natural Grassland: 0% – 15%	

Soil carbon abatement opportunity comparison with other sources



Comments

- ▶ McKinsey rates based on IPCC rates adjusted for Australian conditions on advice
- ▶ Wentworth sequestration tonne rate based on approximately 2% increase in soil carbon levels per year
- ▶ CSIRO (2009) only assess opportunity on deteriorated rangelands – 40% of rangeland total of 510Mha
- ▶ McKinsey weighed net additional penetration rate based on advice that in improved pastures reasonably good management practices exist, and in natural grasslands low penetration but low intensity of management and environmental conditions makes penetration difficult
- ▶ CSIRO is QLD attainable penetration applied to Australia
- ▶ McKinsey rate based on IPCC. Not adjusted as close to rate if follow CSIRO logic that can probably only adjust soil carbon levels to 75% of native level under active use
- ▶ CSIRO rate back-solved from stated abatement number and hectares
- ▶ McKinsey land area taken from ABS Land Management and Farming in Australia, 2007-08. Not all of this land will be planted every year for commercial crops but is still considered available for sequestration
- ▶ Wentworth does not split cropland out from total, assumed same as McKinsey. CSIRO back-solved from abatement result
- ▶ McKinsey weighted net additional penetration assumes high existing penetration of agronomy practices in cropland based on existing difficult farming conditions



Challenges and gaps

- ▶ The challenges in unlocking this potential include improving the quality of the data, to enable a robust system of measurement, incentive and regulation
- ▶ Data is lacking in key areas such as:
 - i. the productivity improvement from a given set of actions and the costs and sequestration volumes associated with those actions;
 - ii. the existing nutrient content of Australian soil, so as to understand what is needed to boost carbon sequestration volumes;
 - iii. monitoring costs and tools given that natural fluctuation in soil carbon levels is likely.

Thank you

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