Presentation to Soil carbon workshop, Sydney
5th May 2010

Anna Skarbek
Executive Director, ClimateWorks Australia
Contact: anna.skarbek@climateworksaustralia.org

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:

ClimateWorks

CLIMATE SCIENTISTS AUSTRALIA

Low Carbon Growth Plan for Australia

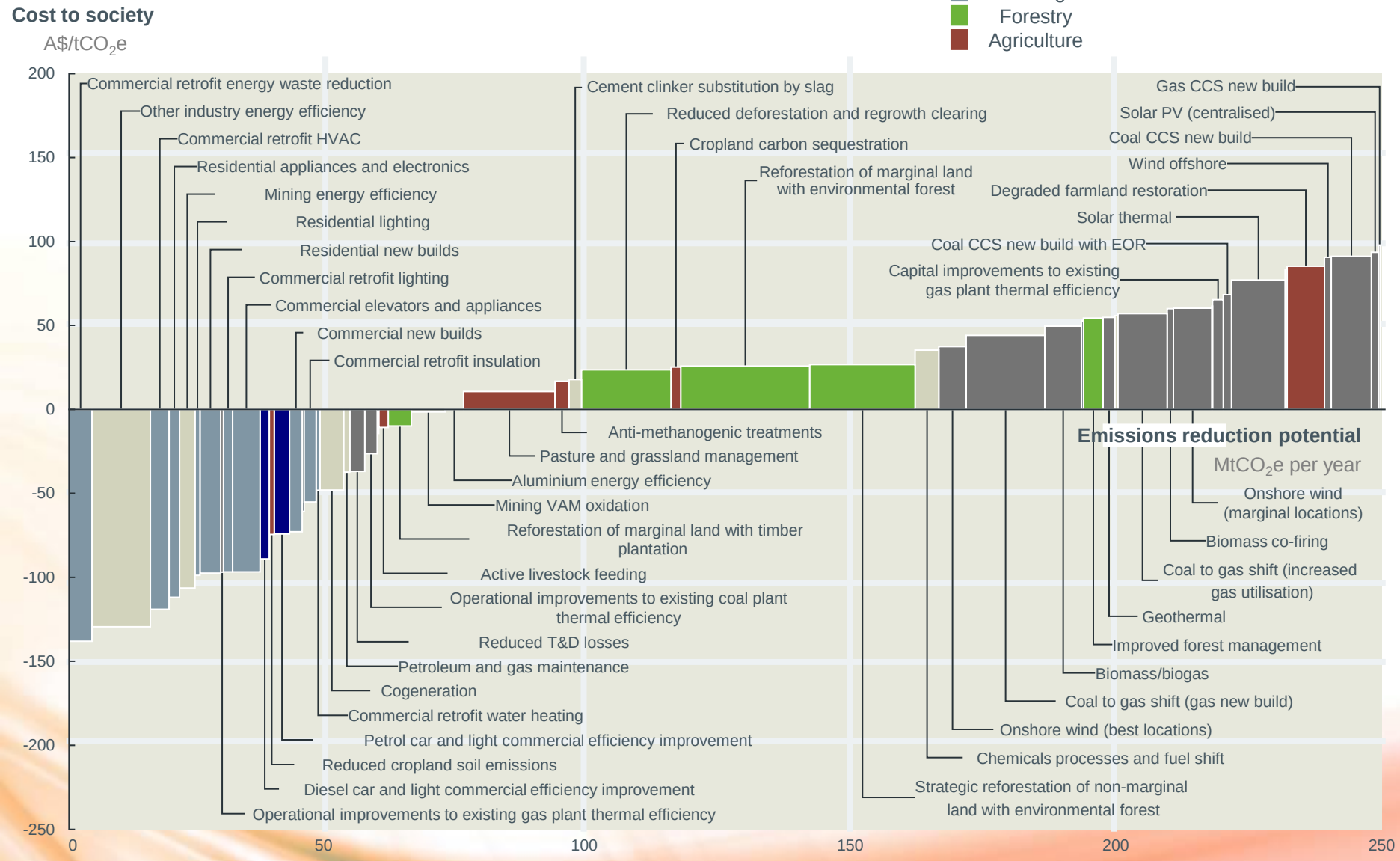
- Low Carbon Growth Plans (LCGPs) are an internationally recognised tool for integrating nationwide actions to reduce emissions alongside economic growth

- 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 $MtCO_2e$) 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

2020 GHG emissions reduction *societal* cost curve

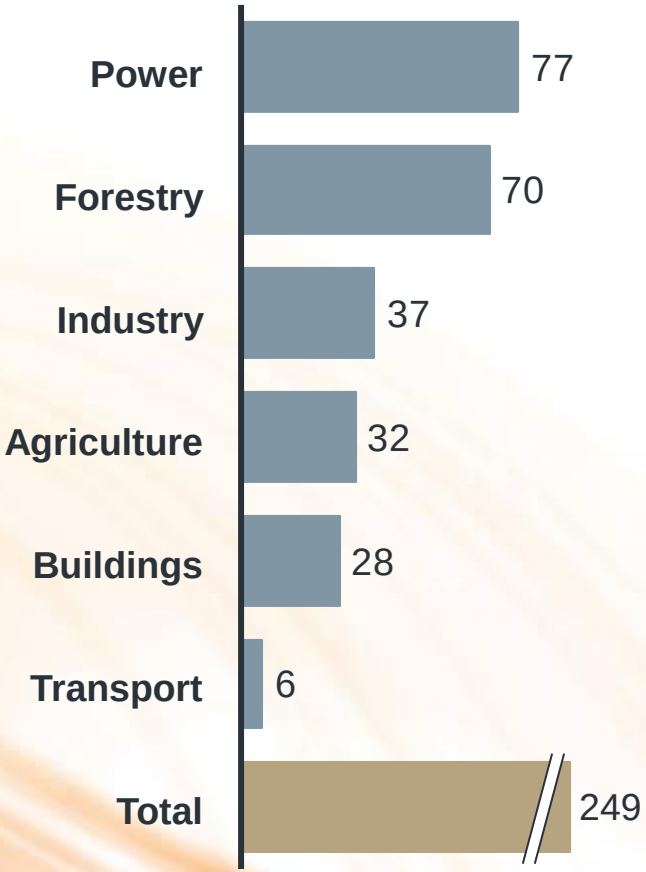
Lowest cost opportunities to reduce emissions by 249 Mt CO_2e[1]



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]

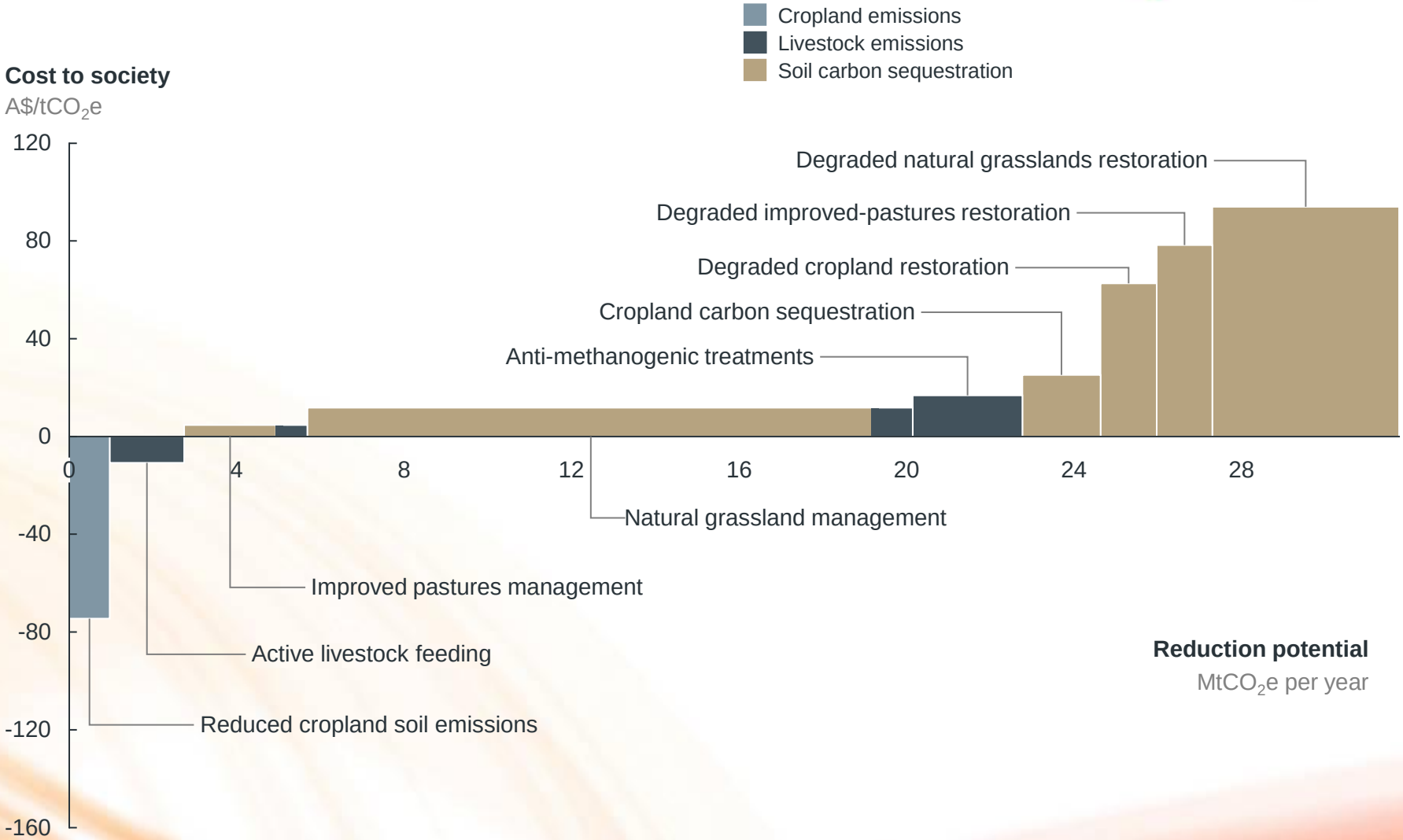


	Volume $MtCO_2e$	Average cost per tonne Real 2010 A$ Societal	Investor	Example opportunities
Power	77	54	87	▸ Renewables ▸ Coal-to-gas shift
Forestry	70	25	24	▸ Reforestation ▸ Reduced deforestation
Industry	37	-48	-25	▸ Industrial energy efficiency ▸ Ventilation air methane oxidation
Agriculture	32	25	25	▸ Soil carbon sequestration ▸ Reduced livestock emissions
Buildings	28	-99	-90	▸ Commercial retrofits ▸ Residential new builds
Transport	6	-60	-194	▸ 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

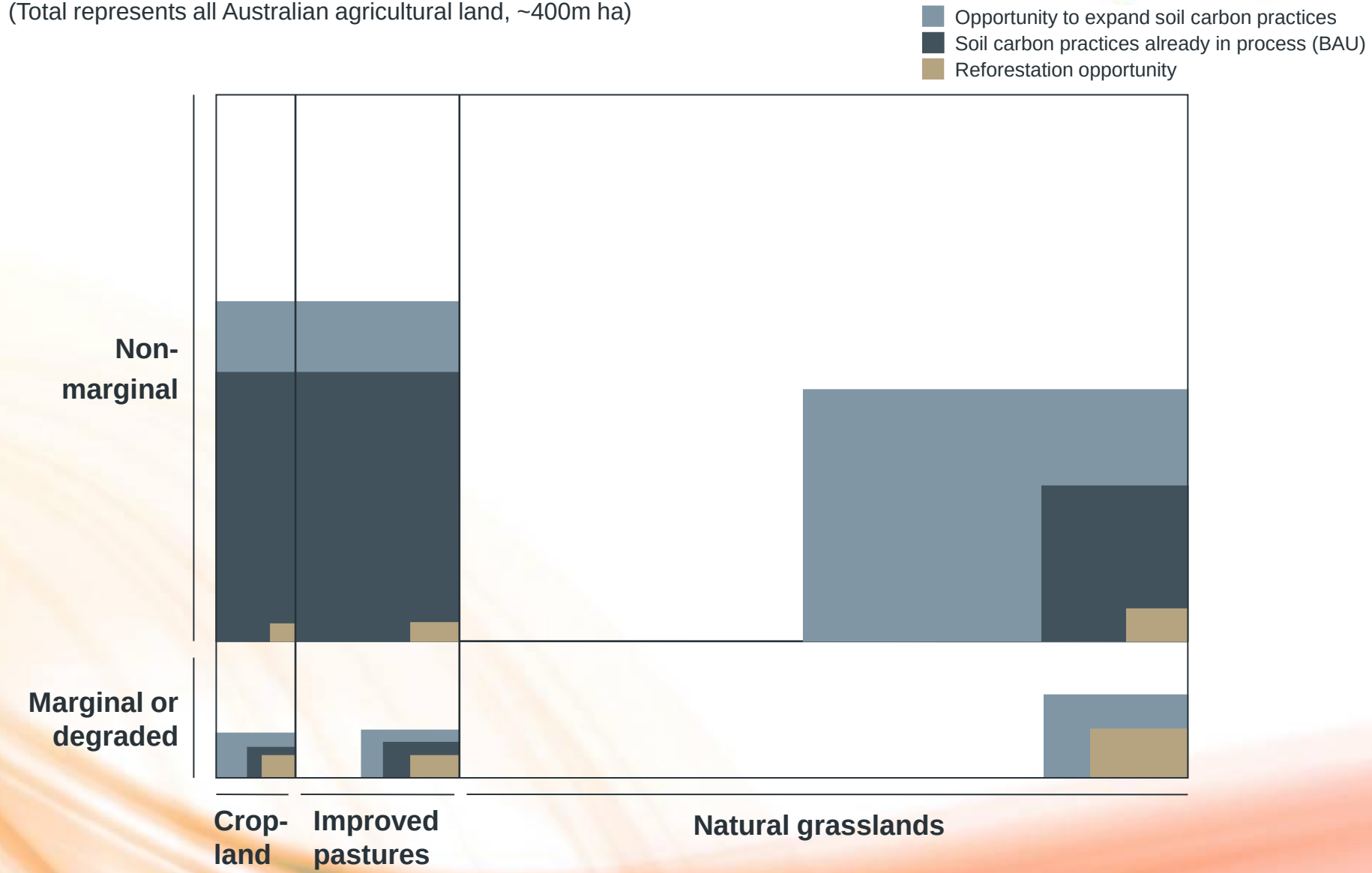


SOURCE: ClimateWorks team analysis, derived from 2020 GHG emissions reduction cost curve (exhibit 4)

Potential farmland penetration of carbon sequestration practices

2020, hectares

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

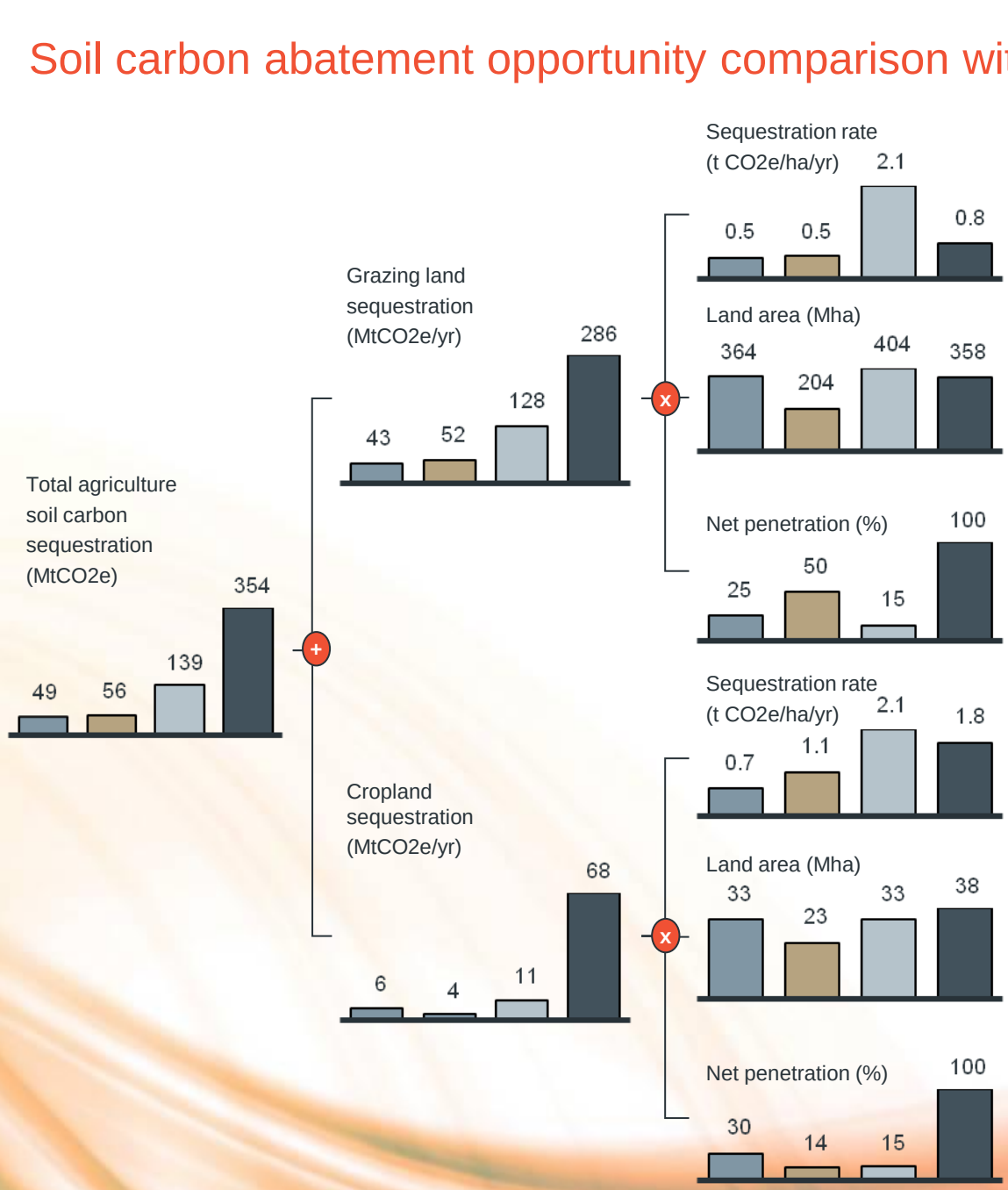


SOURCE: ClimateWorks team analysis, derived from 2020 GHG emissions reduction cost curve (exhibit 4)

Description of measures and penetration assumptions

	Included actions	Penetration BAU—abatement	Limitations
Cropland emissions	▸ Nutrient management techniques to minimise N20 losses such as soil and leaf nutrient testing ▸ Conservation tillage	65% – 90% 65% – 90%	▸ N20 emissions from livestock difficult to address ▸ Weed and water impact
Livestock emissions	▸ Active feeding regimes to increase growth rate and reduce overall lifespan ▸ Pasture improvement and modification of stocking rate ▸ Anti-methanogenic treatments – eg vaccines, medications	4% – 15% 0% – 50% 0% – 50%	▸ Limited market ability to increase feedlotting ▸ Linked to grazing soil carbon practices penetration ▸ Technological development required
Soil carbon sequestration	**Cropland** ▸ Improved crop varieties ▸ Extended crop rotations, especially perennial crops that allocate more carbon below ground ▸ Avoided or reduced bare fallow, using cover crops	50% – 75%	▸ 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
	Pastures or grasslands ▸ 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	Improved pastures: 50% – 75% Natural grassland: 5% – 40%	▸ Limits to destocking techniques such as carbon grazing in more remote areas ▸ Quarantine and environmental limits on species introduction
	Degraded land ▸ Restoration of acidified land through addition of lime and other nutrients ▸ Addressing salinity issues—eg, planting salt resistant plants, ground cover, trees	Cropland: 5% – 45% Improved pastures: 5% – 25% Natural Grassland: 0% – 15%	▸ Restoration difficult on less managed land ▸ May be cheaper/more effective to convert land to new use – eg salt bush grazing

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

1 Smith and Martino, IPCC Chapter 8, Agriculture, Table 8.4 'Annual Mitigation potentials in each climate region for non-livestock mitigation options')

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

Contact: anna.skarbek@climateworksaustralia.org
Anna Skarbek
Executive Director, ClimateWorks Australia