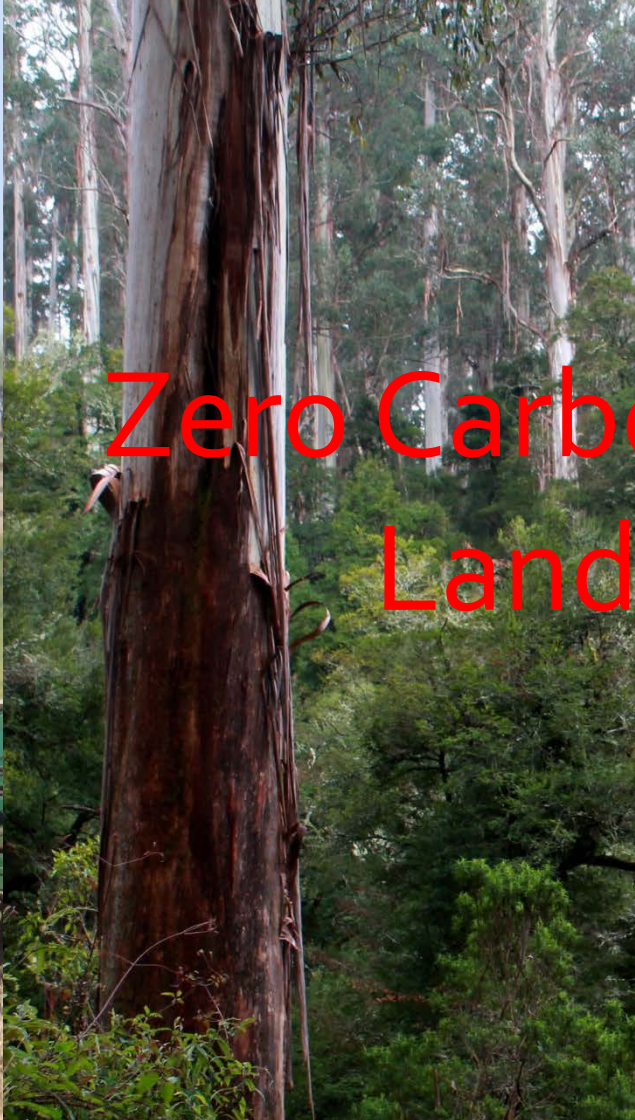


Zero Carbon Australia Land Use Report



THE UNIVERSITY OF
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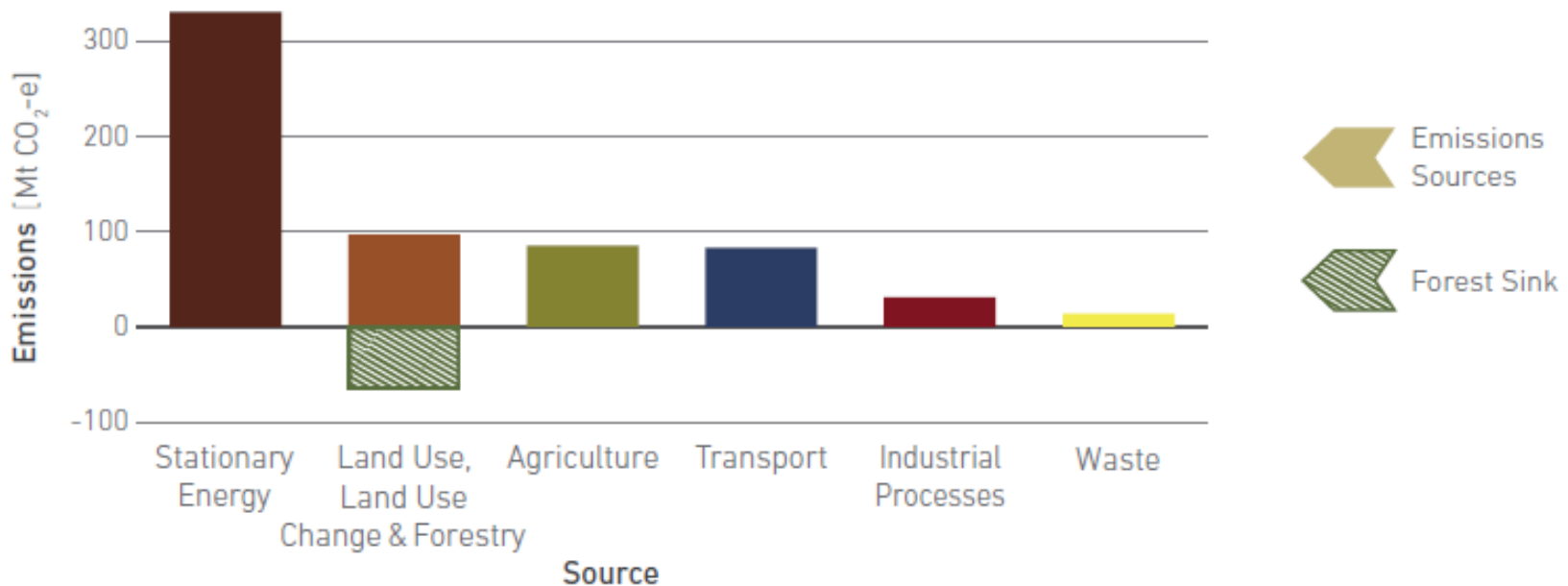
Land Use Report

A project to achieve net zero emissions from agriculture and forestry in Australia.



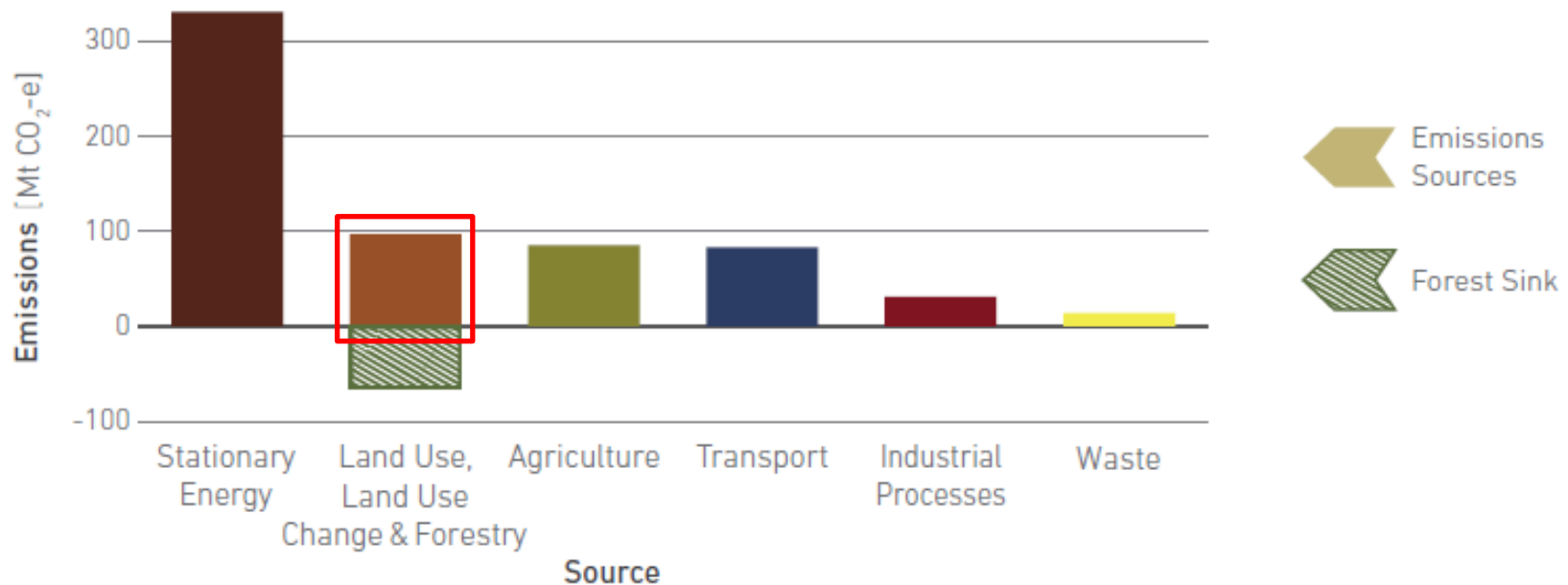
2. Emissions Sources

National Inventory Report



2. Emissions Sources

National Inventory Report



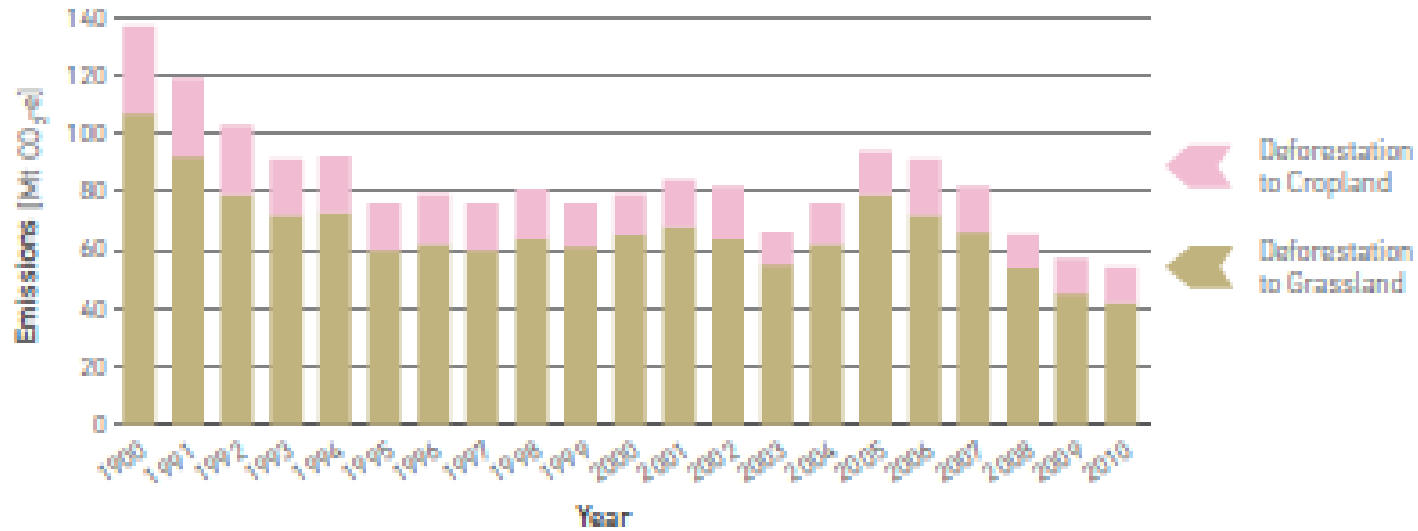
2. Emissions Sources



<https://www.youtube.com/watch?v=aTR7Av81X5w#t=223>

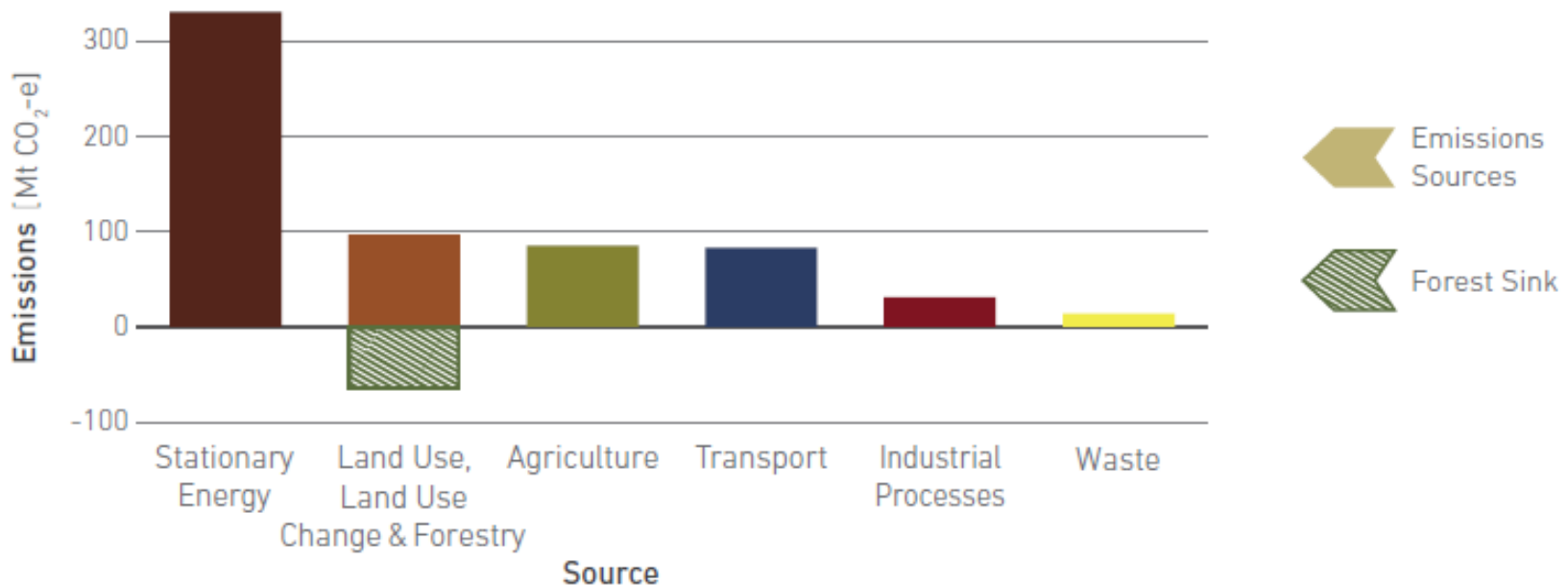


Deforestation



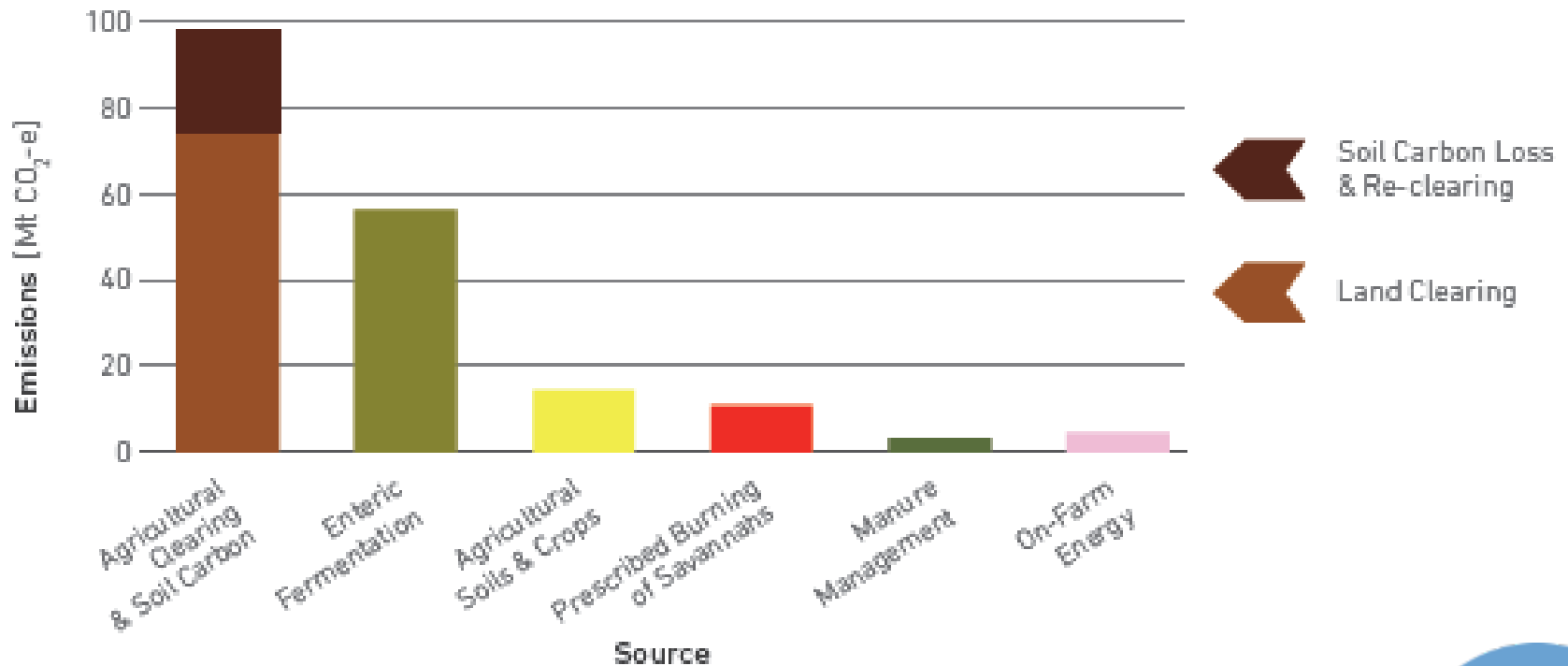
2. Emissions Sources

National Inventory Report



2. Emissions Sources

National Inventory Report



Enteric Fermentation

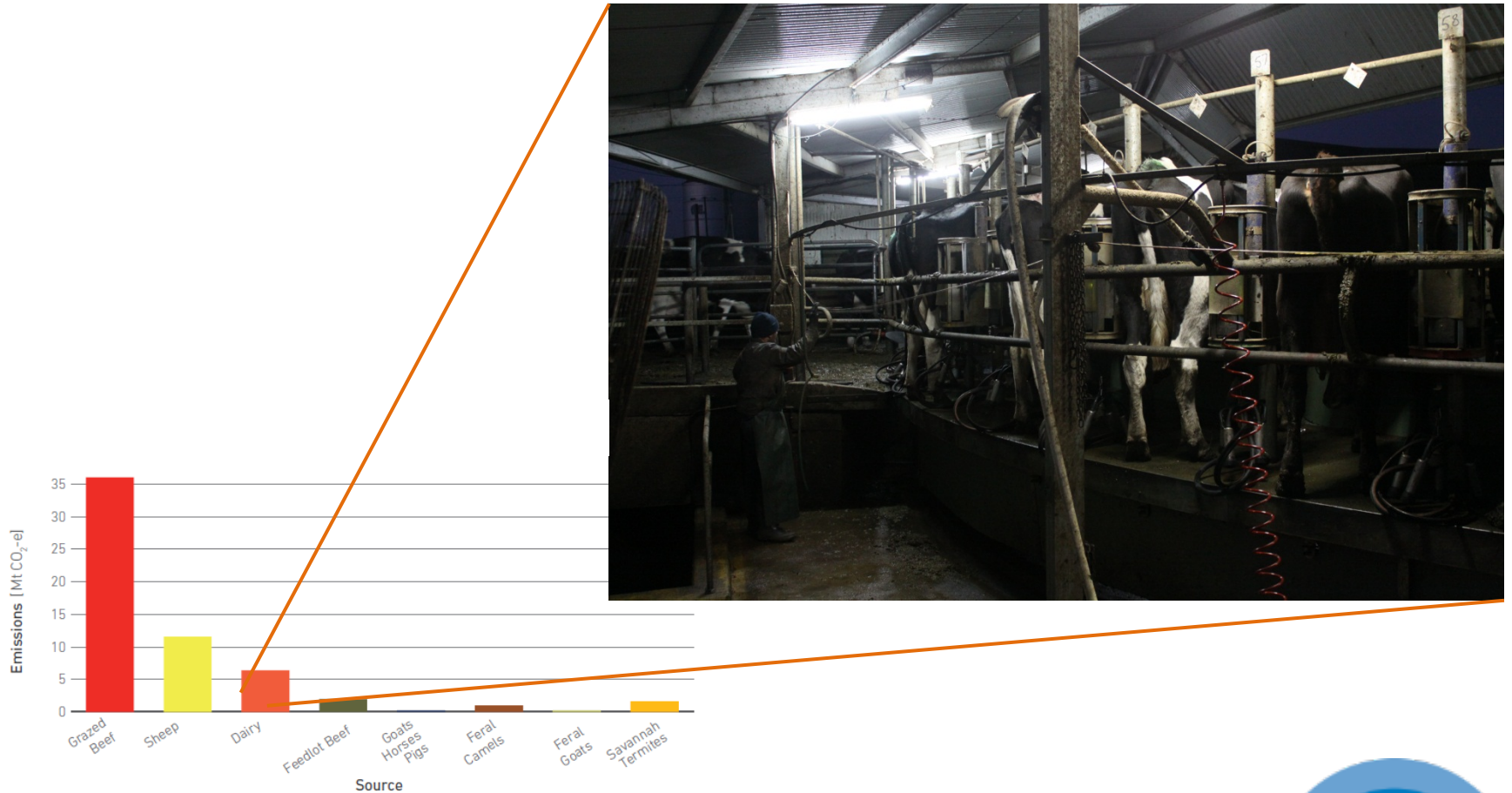


Figure 3.7 National enteric fermentation emissions (Mt CO₂-e/yr). Feral animals and termites are excluded from the national inventory.



Enteric Fermentation

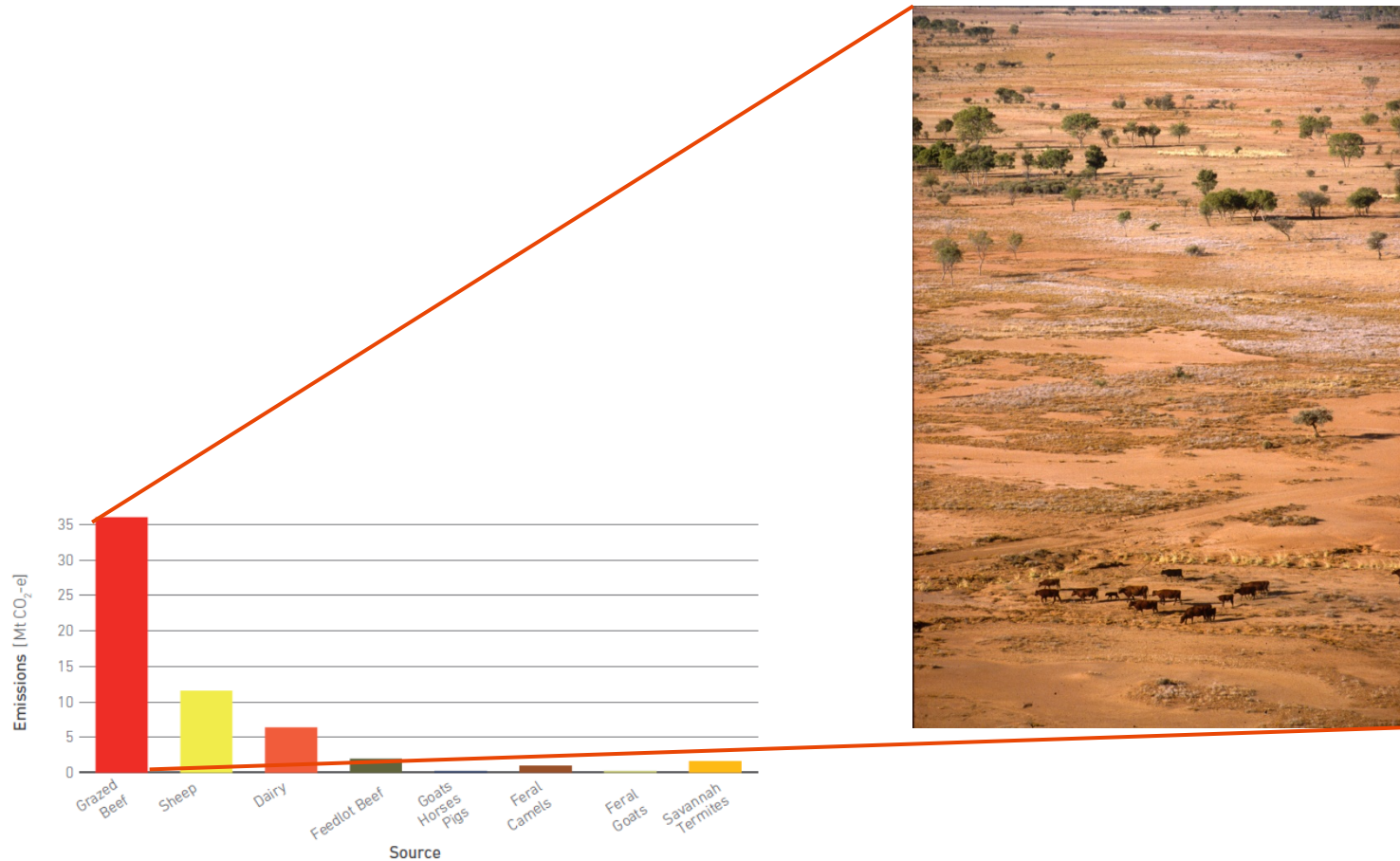
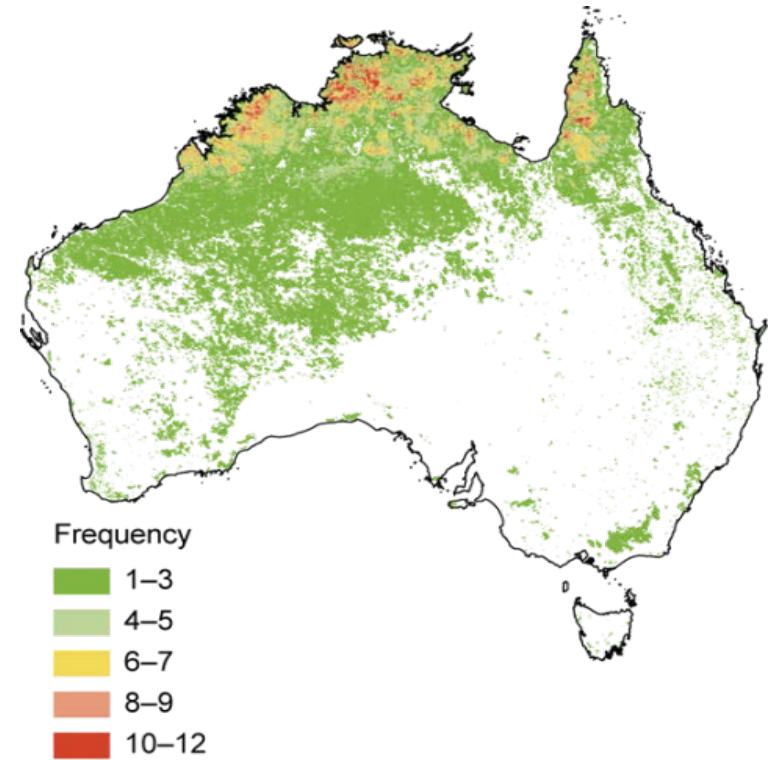


Figure 3.7 National enteric fermentation emissions (Mt CO₂-e/yr). Feral animals and termites are excluded from the national inventory.



Pasture Fire



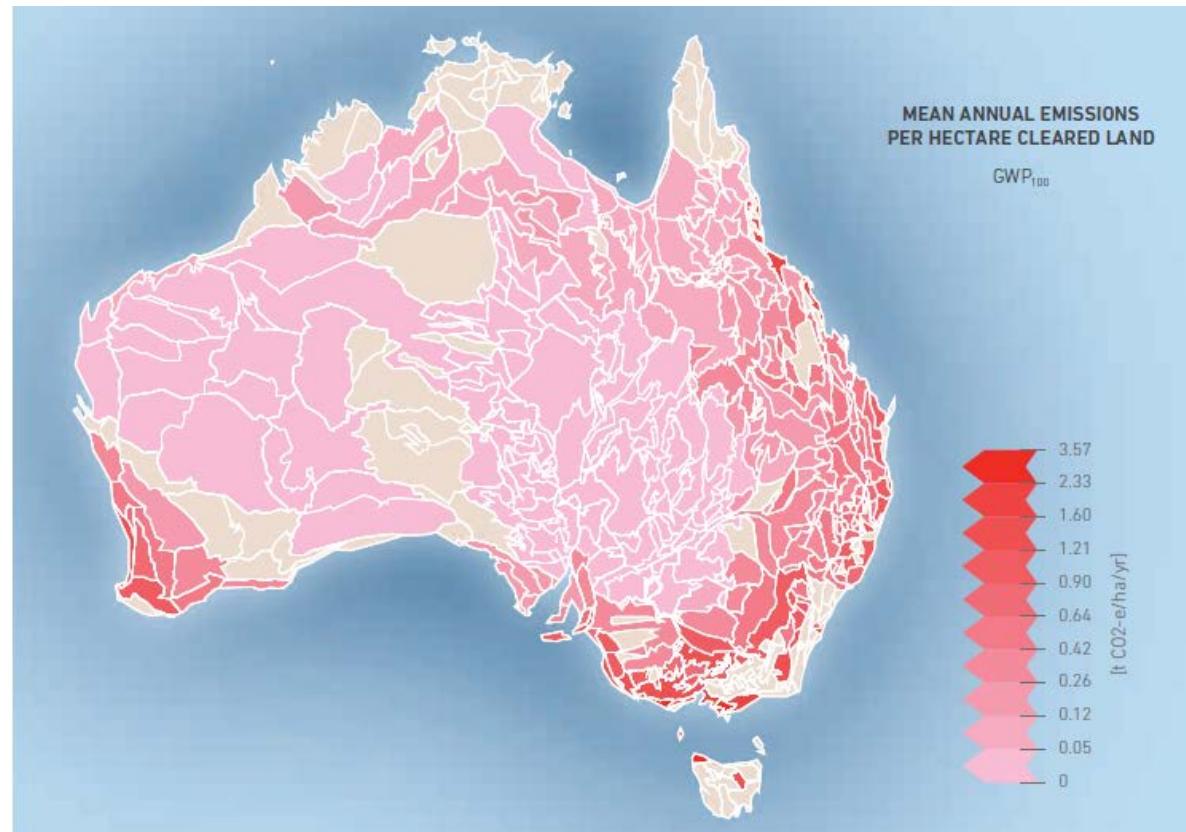
46 million ha of northern Australia burnt each year



4. Modelling

Greenhouse emissions from agriculture (Excludes clearing and savanna fire)

Quartile	Emissions [t CO ₂ e/ha/yr]			
	Intensive		Extensive	
	GWP ₁₀₀	GWP ₂₀	GWP ₁₀₀	GWP ₂₀
Q1	0.301	1.154	0.014	0.046
Median	0.567	1.832	0.022	0.072
Q3	0.953	2.745	0.063	0.201

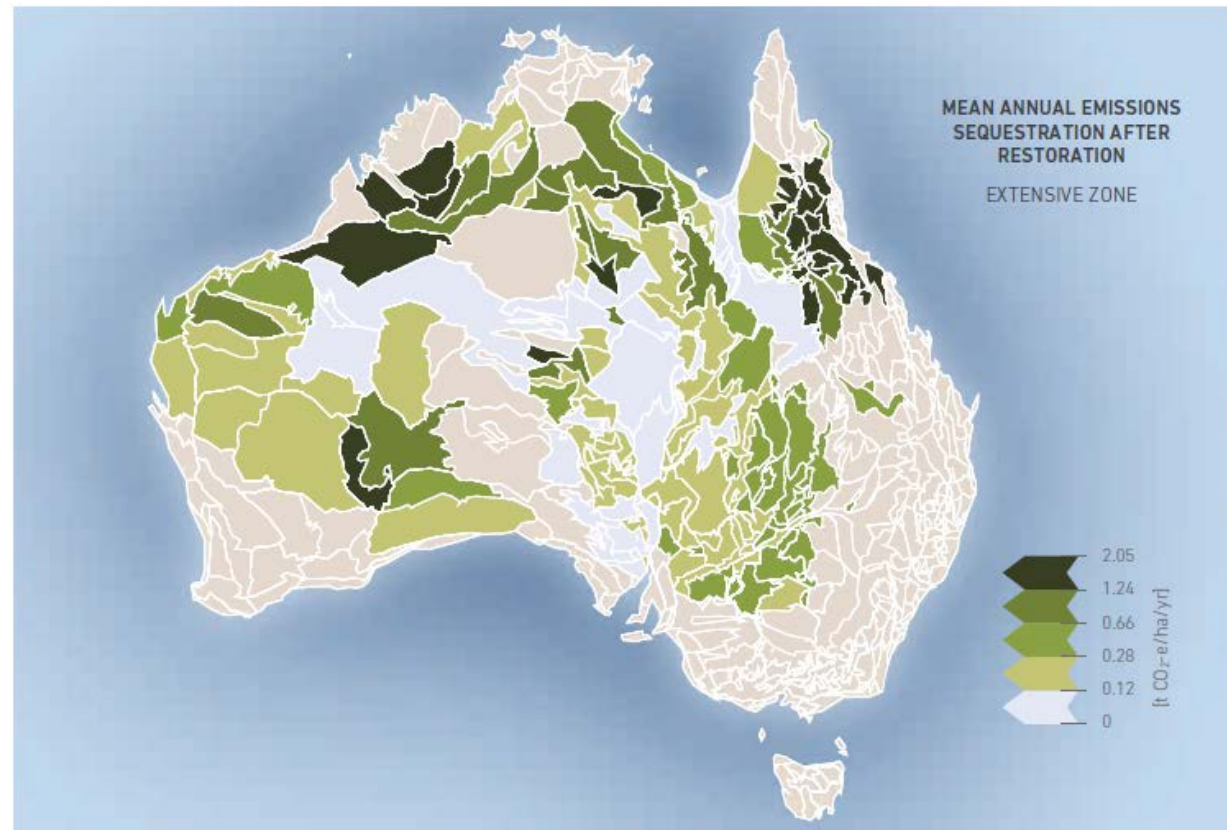


4. Modelling

Sequestration potential – RangeASSESS

n=146

Quartile	Sequestration potential after restoration [t CO ₂ /ha/yr]	
	Intensive	Extensive
Q1		0.137
Median		0.253
Q3		0.619

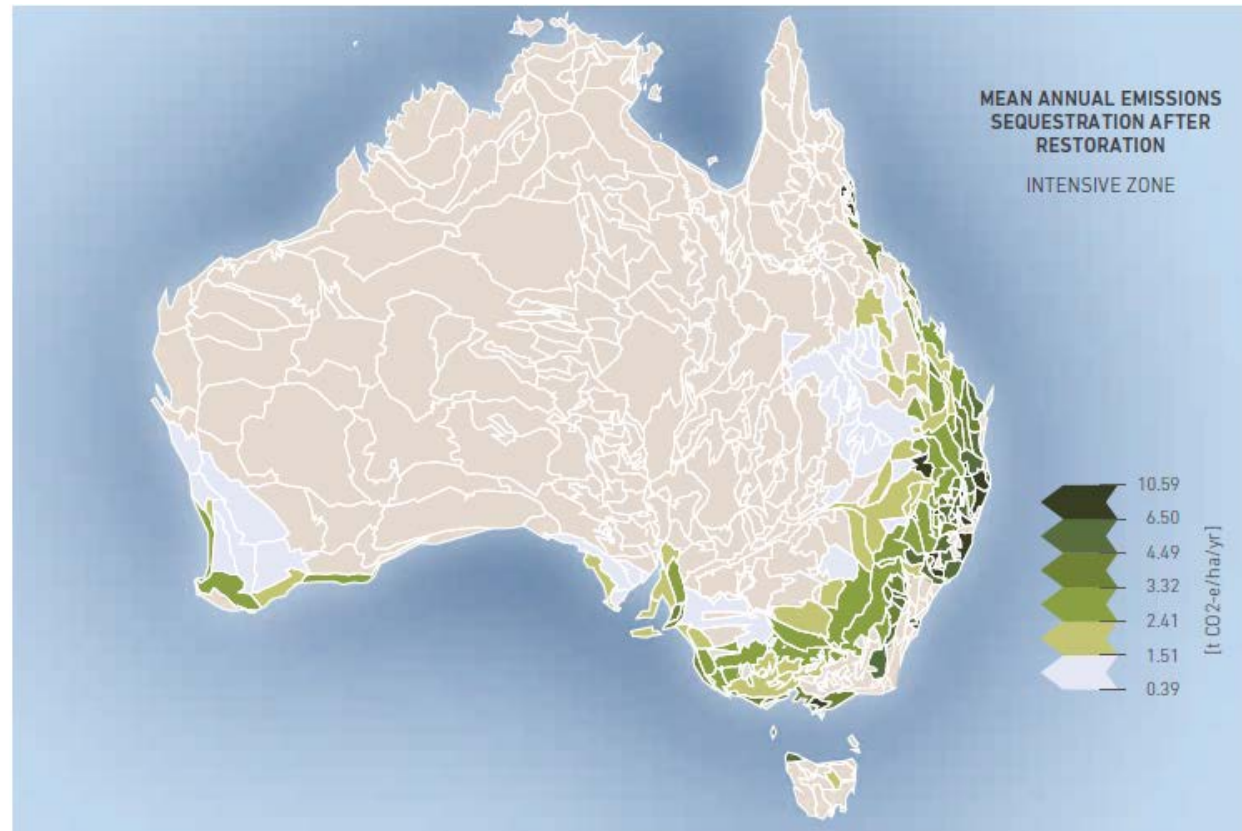


4. Modelling

Sequestration potential – FullCAM

n=154

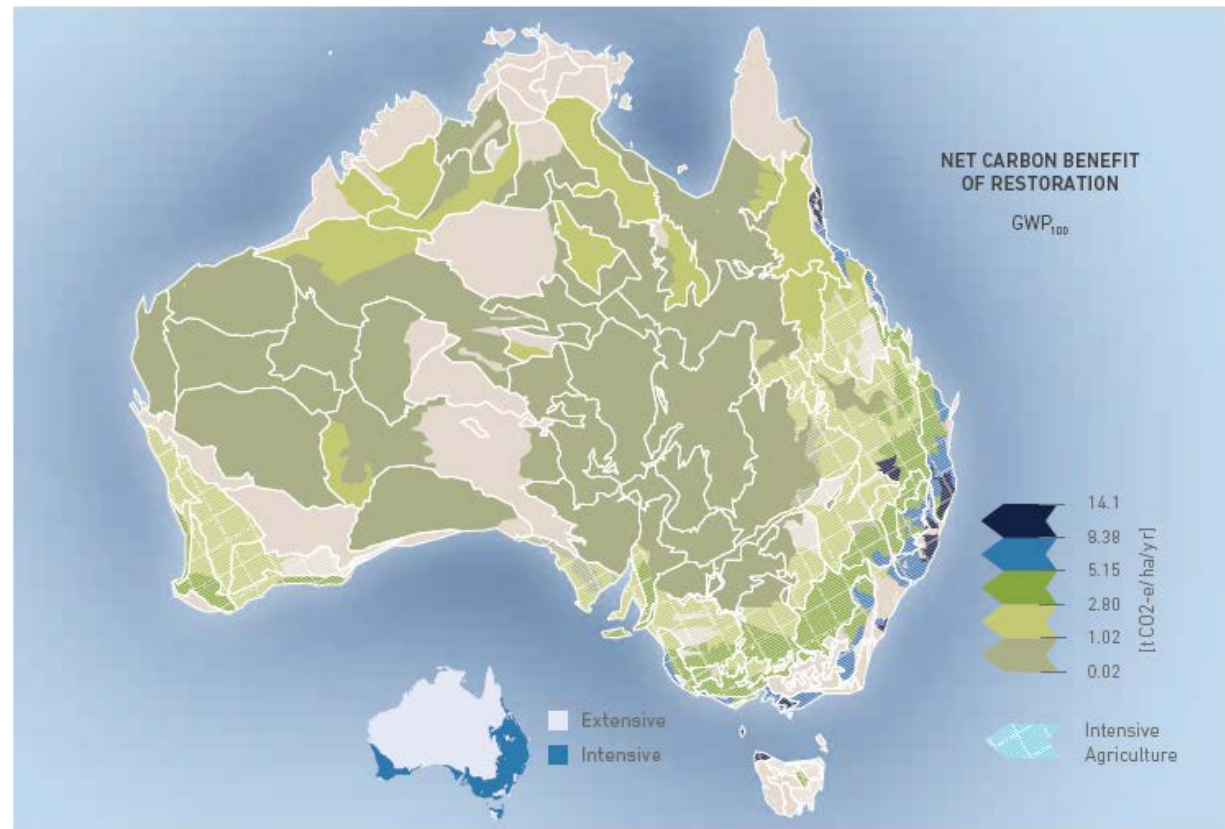
Quartile	Sequestration potential after restoration [t CO ₂ /ha/yr]	
	Intensive	Extensive
Q1	1.815	0.137
Median	2.876	0.253
Q3	4.344	0.619



4. Modelling

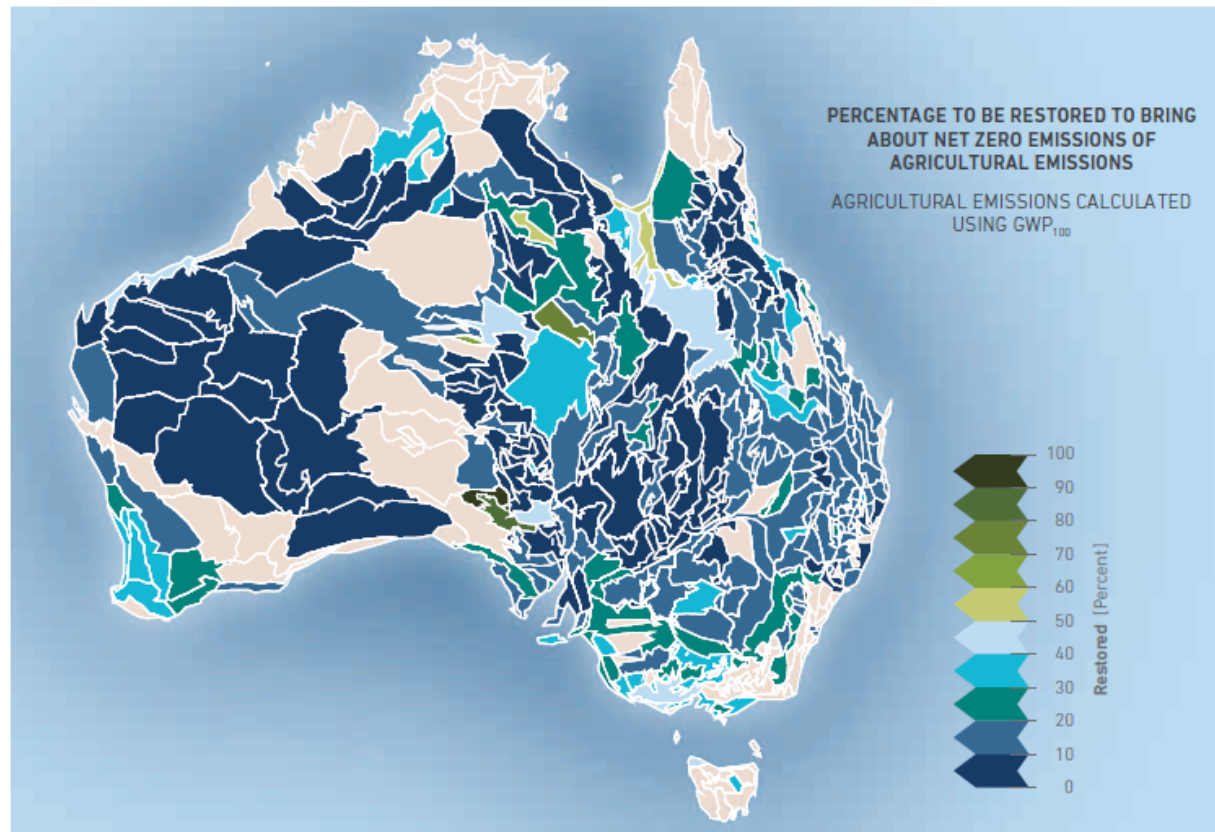
Net carbon benefit of transition
Avoided emissions + sequestration

Quartile	Net Carbon Benefit		CO ₂ e/ha/yr]	
	Intensive		Extensive	
	GWP ₁₀₀	GWP ₂₀	GWP ₁₀₀	GWP ₂₀
Q1	2.345	3.189	0.159	0.187
Median	3.571	4.936	0.273	0.411
Q3	5.875	7.421	0.714	0.795



4. Modelling

Proportion restored (GWP_{100})

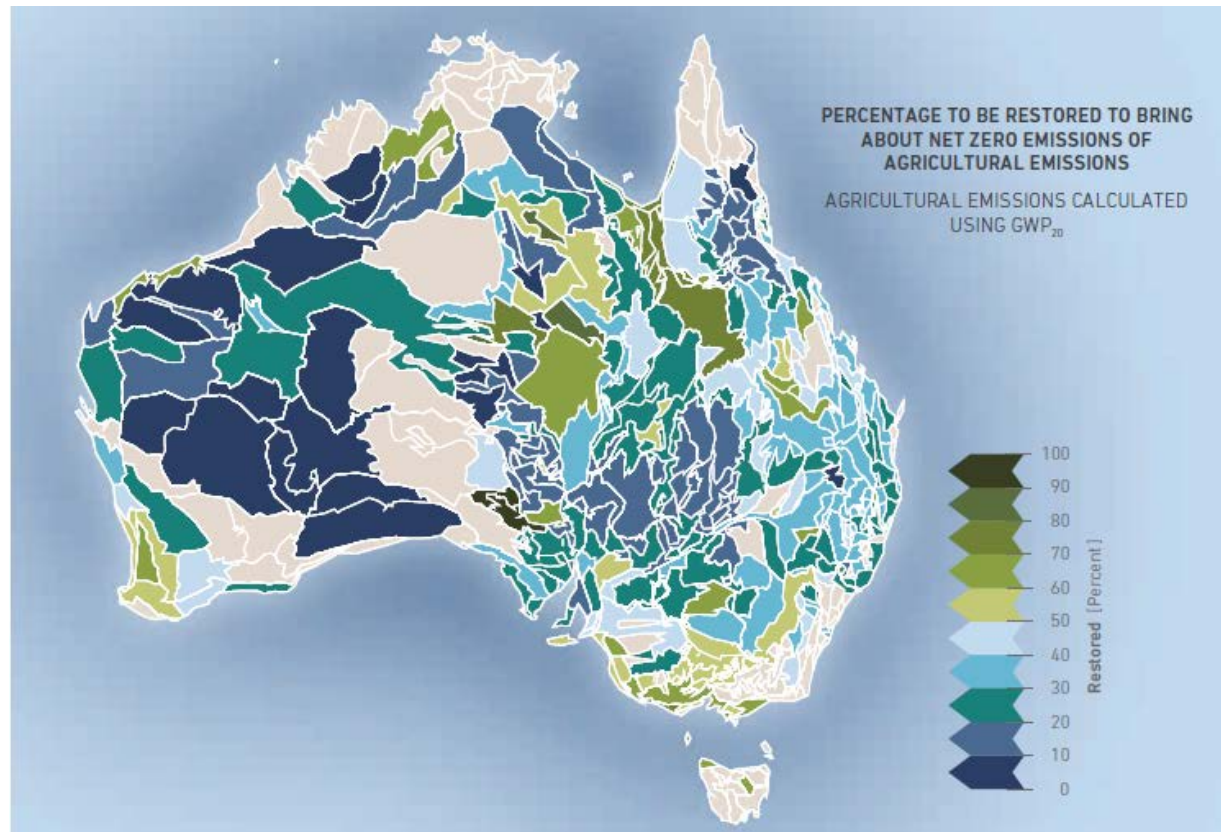


Longmire et al. (2014)



4. Modelling

Proportion restored (GWP₂₀)



Longmire et al. (2014)

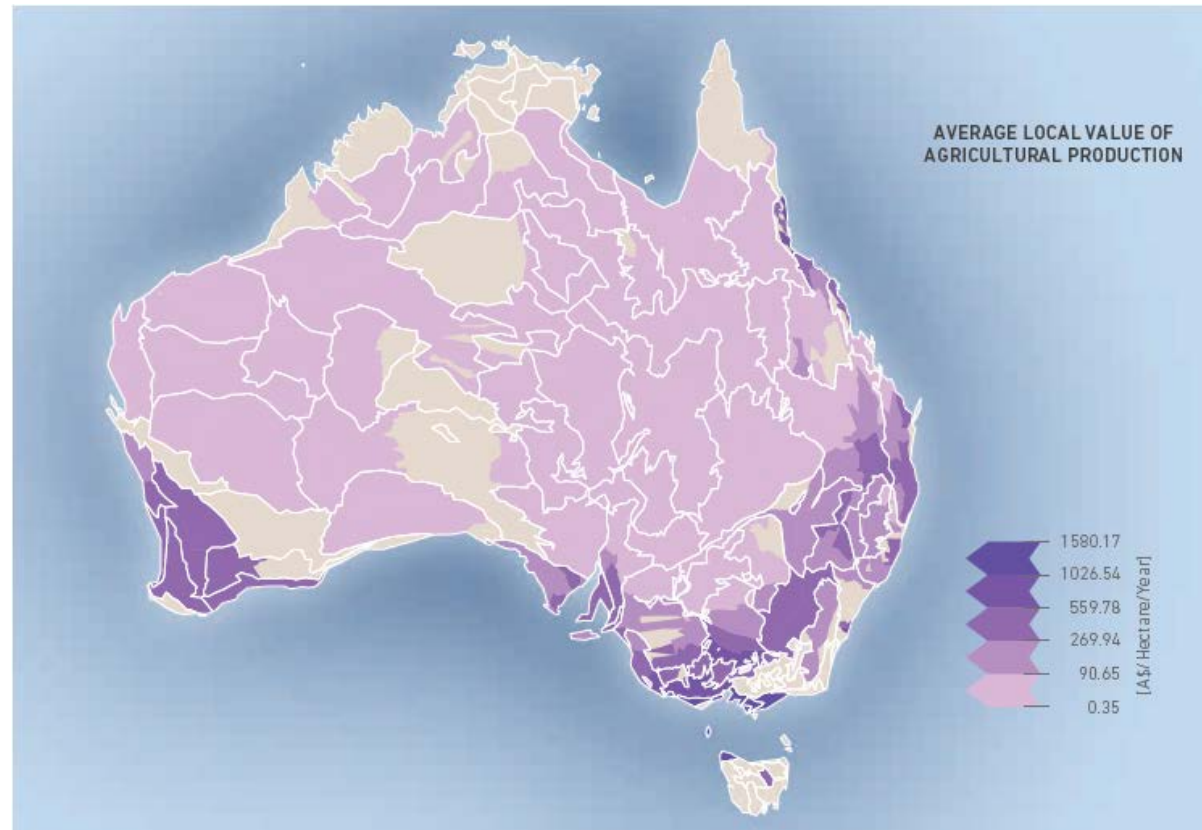


4. Modelling

Local value of agricultural production

Local Value of Agricultural Production [\$/ha/yr]

Quartile	Intensive	Extensive
Q1	125.00	1.75
Median	193.25	3.35
Q3	336.69	7.55



4. Modelling

Area restored / opportunity cost (GWP₁₀₀)

Table 5.10

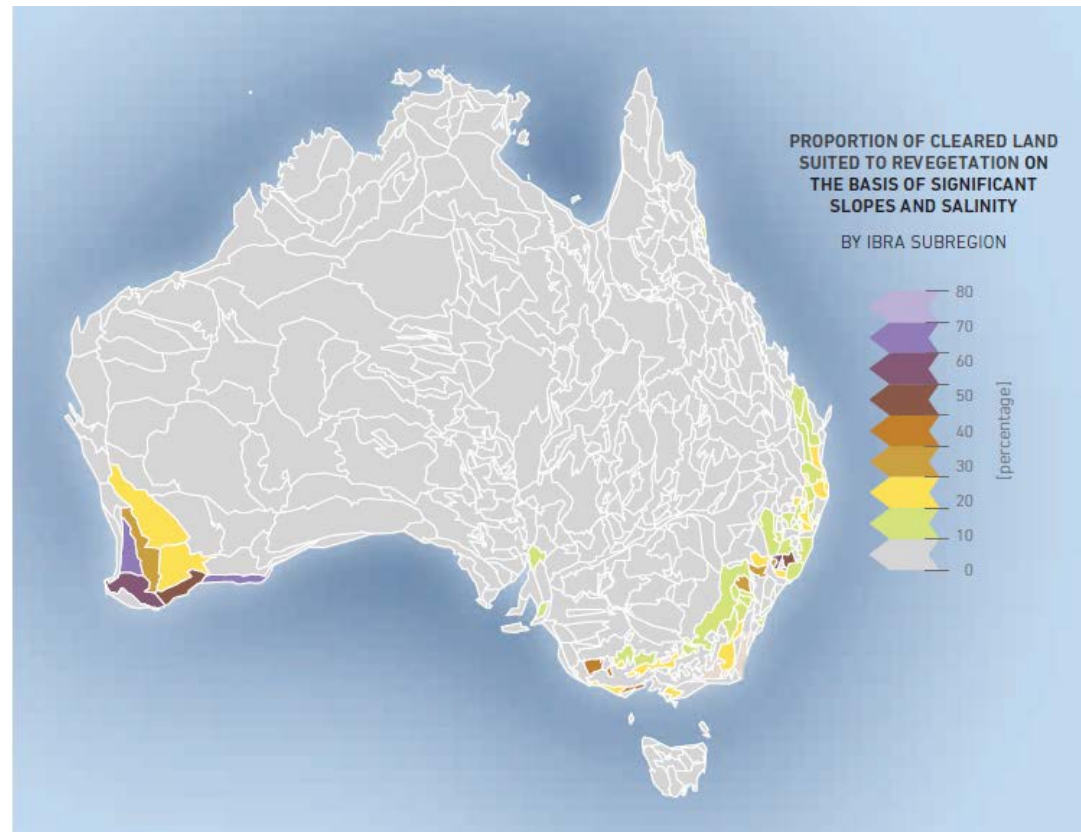
Outcomes of restoration in Scenario 1, based on emissions profiling at GWP₁₀₀.

Zone	Restored [%]	Restored [MHa]	Total sequestration [Mt CO ₂ /yr]	Avoided emissions [Mt CO ₂ -e/yr]	New total emissions [Mt CO ₂ -e/yr]	Net carbon benefit [Mt CO ₂ -e/yr]	Total cost [\$M/yr]
Intensive	19	16.2	36.3	11.2	36.3	47.6	5,058
Extensive	12	39.3	9.3	2.0	9.3	11.4	335
Total	13	55.5	45.6	13.2	45.6	59.0	5,393



Revegetating salt/steep land

- Slopes >10%
- Local groundwater flow systems at risk of salt
- 7.9Mha ~ half of intensive zone suggested reveg.



5. Other options

2.3Mha to mallee SRWC (Farine et al. 2011)

~14 Mt CO₂-e/yr as biochar



Image credit: Charlie Hawkins / CSIRO



6. Farm case studies

Farm	IBRA Sub-region	Emissions [t CO ₂ -e/yr]			Area [ha]	Emissions [CO ₂ -e/ha/yr]	Sequestration Potential [CO ₂ -e/ha/yr]	Revegetated [%]
		Animals	Cropping/ trees	Total				
GWP₁₀₀								
Belmont	RIV03	389	-271	118	1760	0.067	7.63	0.9
Dorrigo	NNC04	75	-300	-225	94	-2.394	23.50	-
Murray Eden	RIV03	3612	-39	3573	566	6.313	8.45	42.8
Prestbury	BBS17	642	134	776	1033	0.751	12.98	5.5
Winiam	MDD05	1202	613	1815	2782	0.652	5.85	10.0
Winona	NSS01	591	-109	482	840	0.574	9.48	5.7



6. Farm case studies

“Our commitment to further tree planting has lessened somewhat as a result of some hard economic times associated with drought. The old saying ‘you can’t be green if you are in the red’ comes to mind as the practice of tree planting, fencing etc. is quite costly.”

David McConnell, rice grower and sheep grazier, Barham NSW



6. Farm case studies

“Farmers in the Wimmera are at the coal face. We’ve lost two inches of growing season rain since the mid-90’s. That’s 20% of our income”.

On allocating 12% of his holding to carbon sequestration:

“It can be done — we can deal with that as long as the costs are shared”

Andrew Colbert, cereal and sheep farmer, Victorian Wimmera



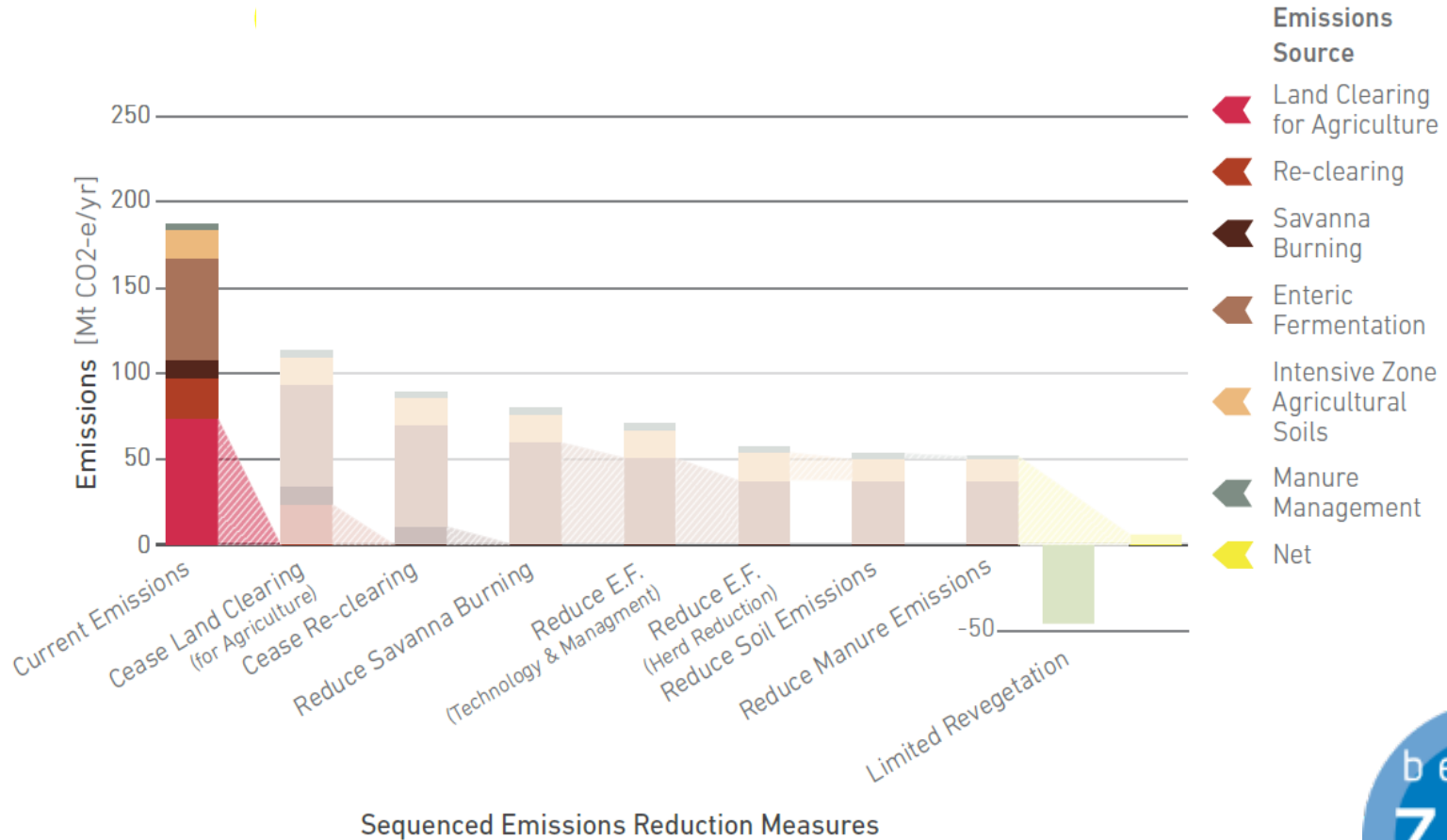
6. Farm case studies

“Tree planting in the south may succeed without watering, but [watering] would be essential here for at least the first year, as neighbours and the local LandCare group have found. There would be a large labor cost to this”.

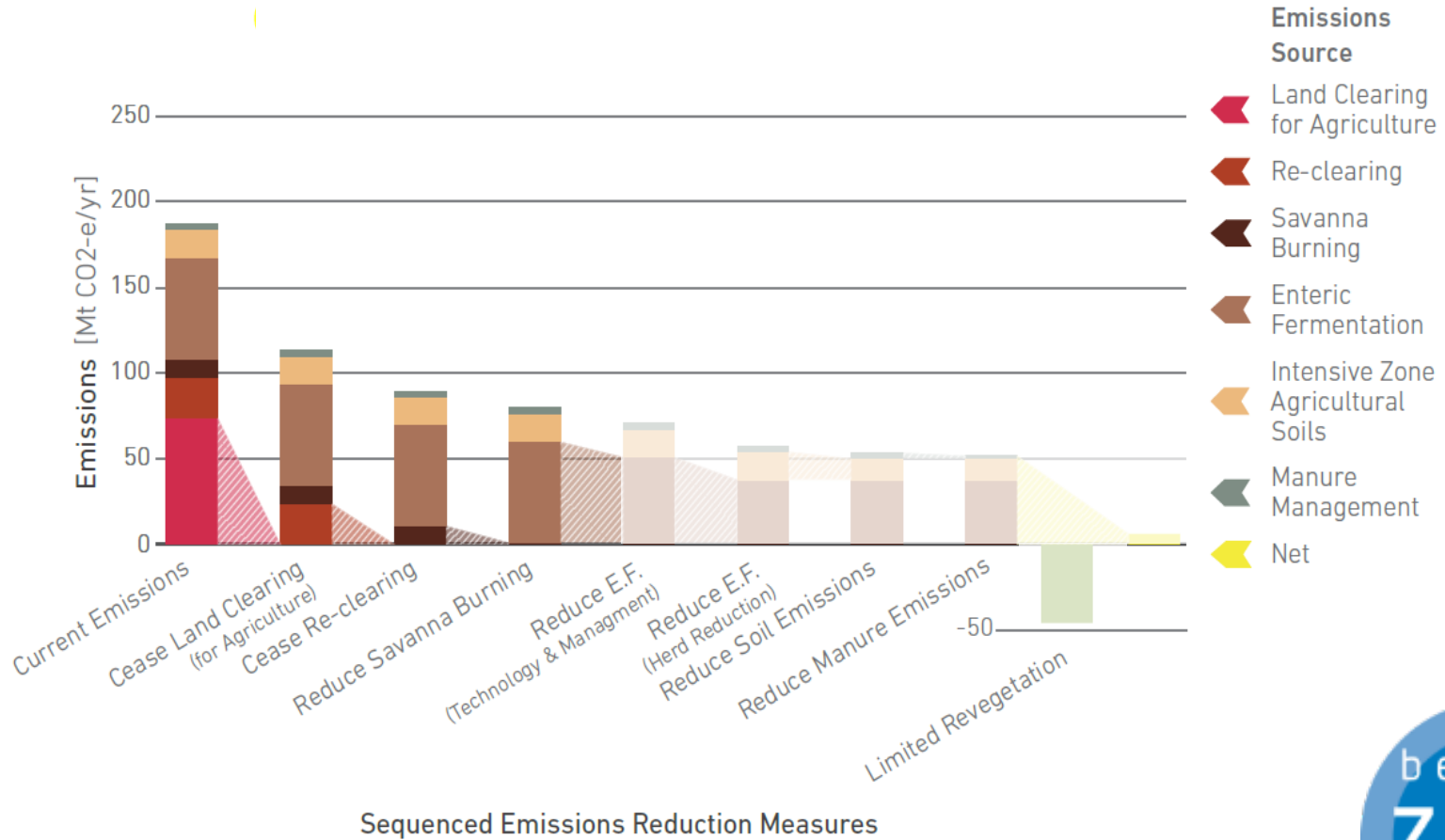
Rob McCreath, mixed crop and beef producer, Darling Downs, Queensland



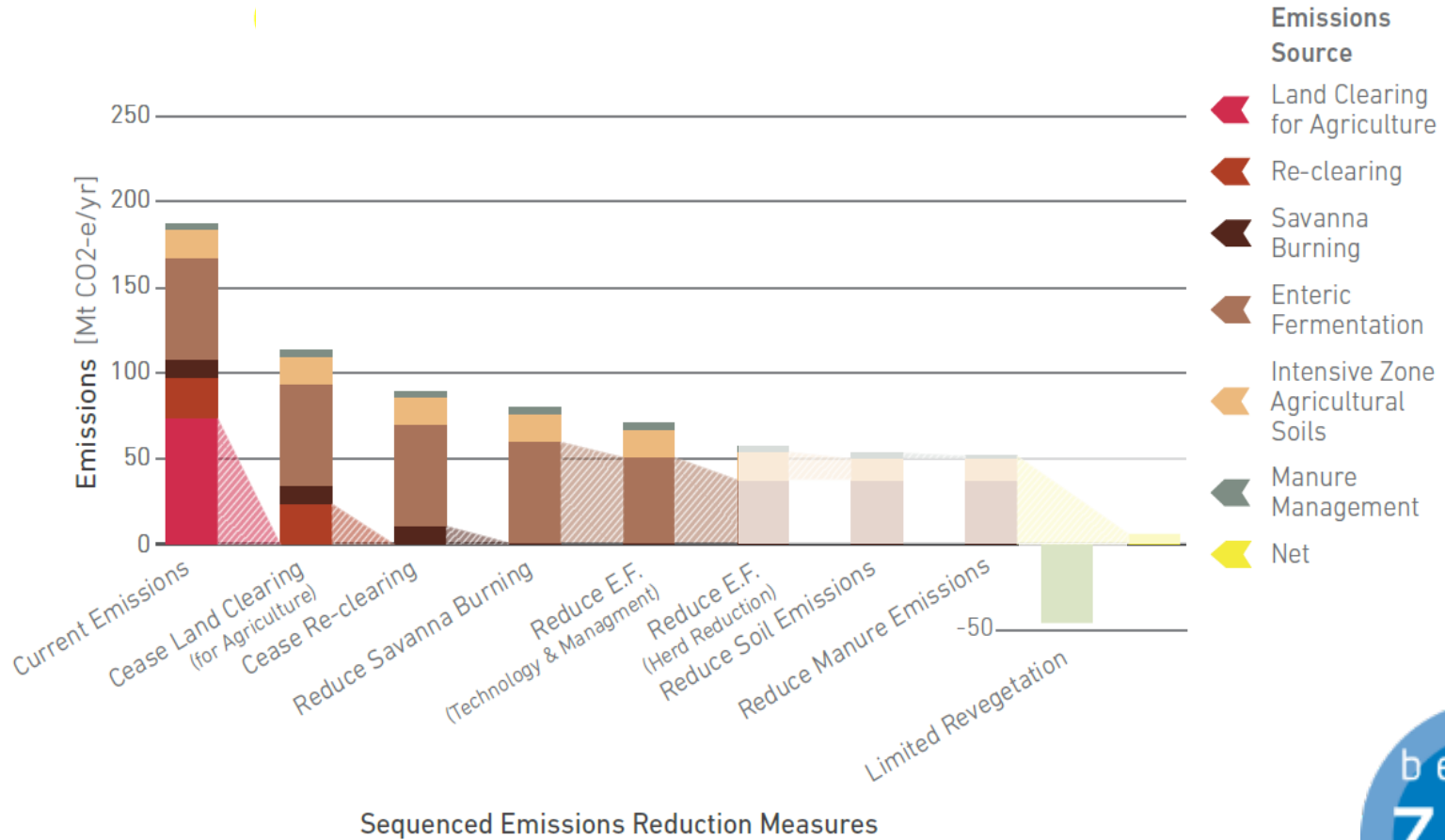
7. Summary



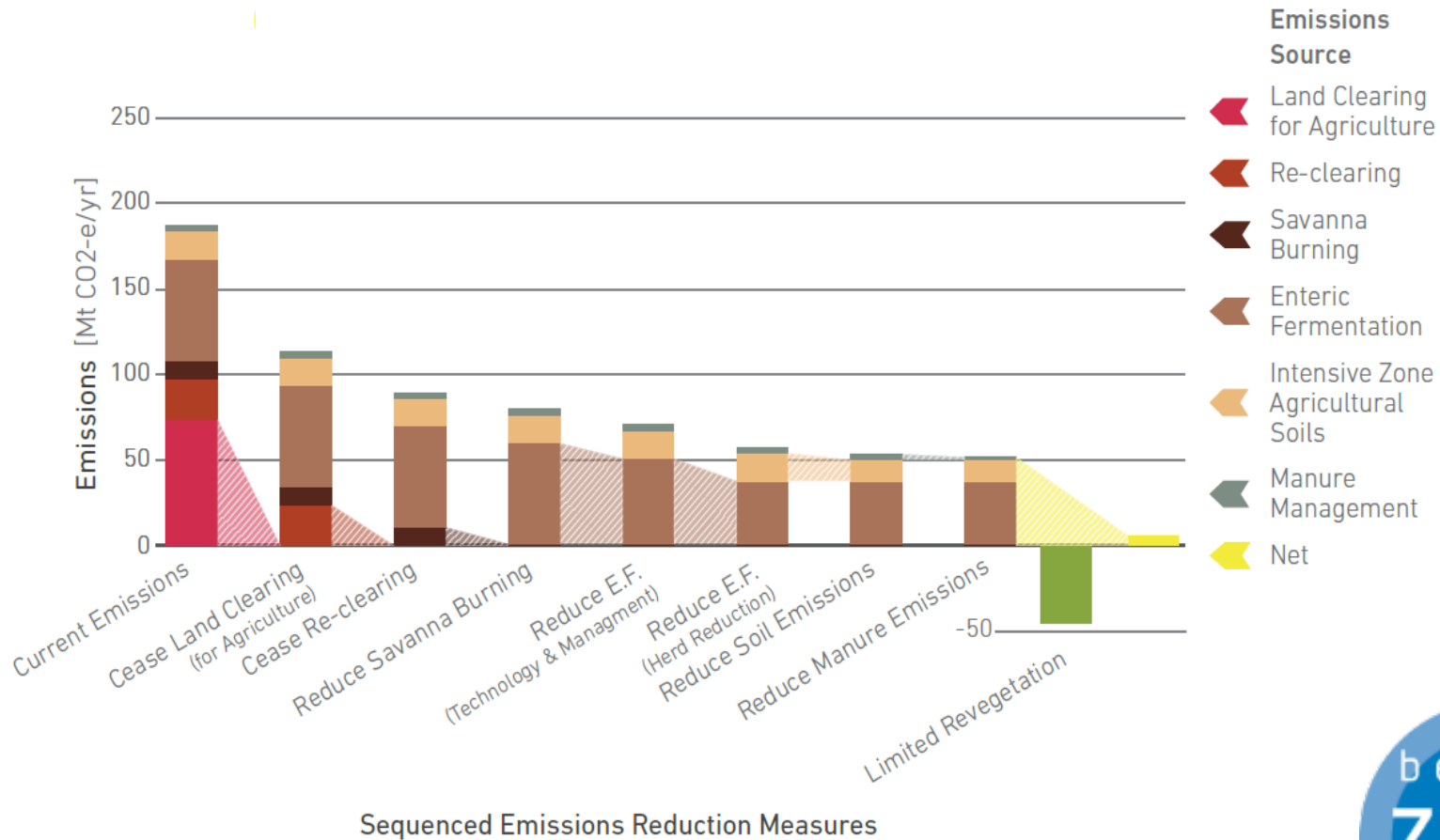
7. Summary



7. Summary



7. Summary



Key Findings

- Vegetation clearing for pasture causes more emissions than the rest of the agriculture sector
- A number of management changes can reduce emissions, but these have limited reach
- Revegetation can offset unavoidable agriculture emissions and provide revenue for farmers
- Forests in SE Australia can sequester 7,500 million tonnes of carbon dioxide if left to recover





Thank you



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