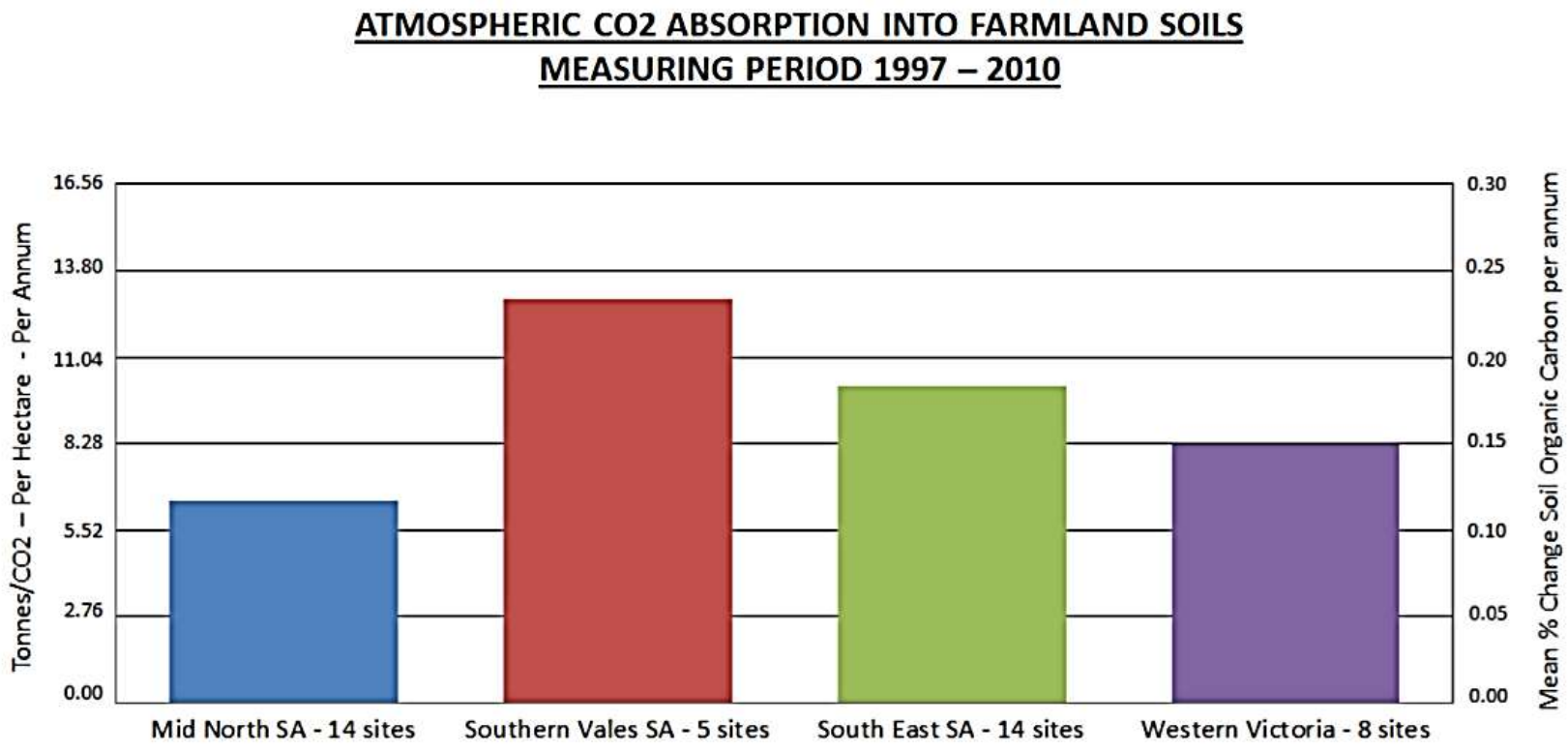
The CSIRO baseline

t CO2e/h	Ineligible land	Marginal benefit	Some benefit	More benefit
Sustainable intensification #	0	0.11	0.59	1.65
Stubble retention	0	0.07	0.29	0.73
Conversion to pasture	0	0.22	0.13	0.38

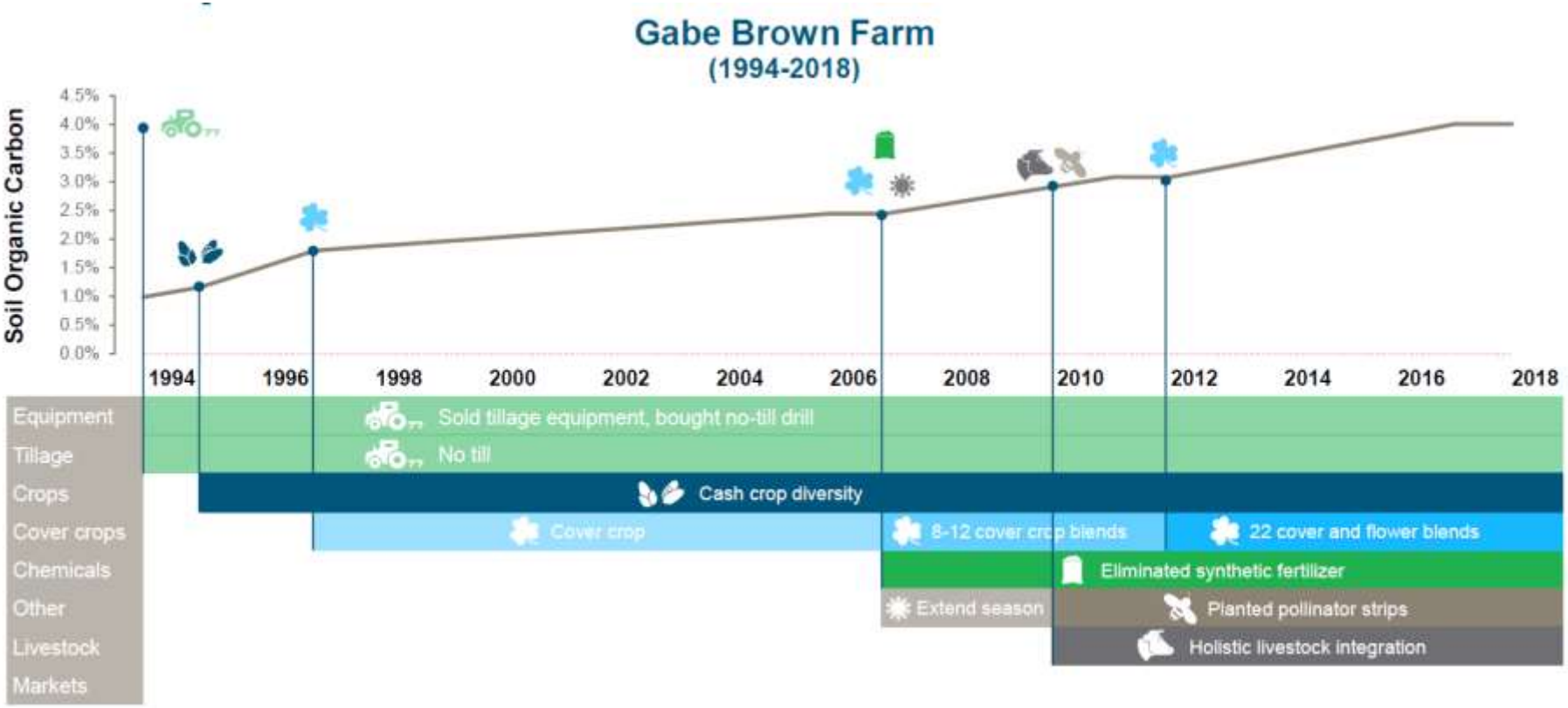
Sustainable intensification by any 2 of nutrient management (to remedy a deficiency), soil acidity management, new irrigation, pasture renovation

But those that practice Regenerative Agriculture achieve much more:



Some North American practice cites results of 5-30 t CO2e/h/y

But it is not a simple journey and there are no guarantees



An Australian journey: Deane Belfield, MD ECO2Sys

- Follow-up soil carbon results after 3 years.
- Despite the lack of spring rains, our SOC levels (0-30cm) went from 0.95% to 1.4%, or 0.15% per year.
- Evidence suggests that there is an inflection point where the SOC grows much faster.
- We're not there yet; but I think it starts around 3% soil organic matter, when the soil microbiome is becoming functional and symbiotic.
- No chemicals, fertilisers, etc. only blood sweat & tears, biodynamic preparation, holistic grazing using cattle, and management that is learning every day.
- It does take time, commitment, persistence and belief.
- It's a good outcome, for a journey that is just beginning.
- We see it daily in the 4000 /y electric fence pigtail soil compaction test.

And in the cinema: the biggest little farm

Source: https://cinemanova.com.au/films/biggest-little-farm-the

We need more leaders:

AND followers who recognize the advantages and adopt best practices

Summary to date: Tim Reeves* says it all

From GRDC update meeting, Wagga, 2 Feb 2020. Tim Reeves.

Is sustainable intensification of cropping systems attainable?

Sustainable intensification is based on **simultaneous** improvements in productivity and ecosystem health to underpin profitability.

It is not more of what we are currently doing; it requires **significant system changes** towards greater diversification involving crops, forages, livestock, shrubs and trees.

Regeneration of soil health; soil nitrogen, soil carbon and other key elements is required.

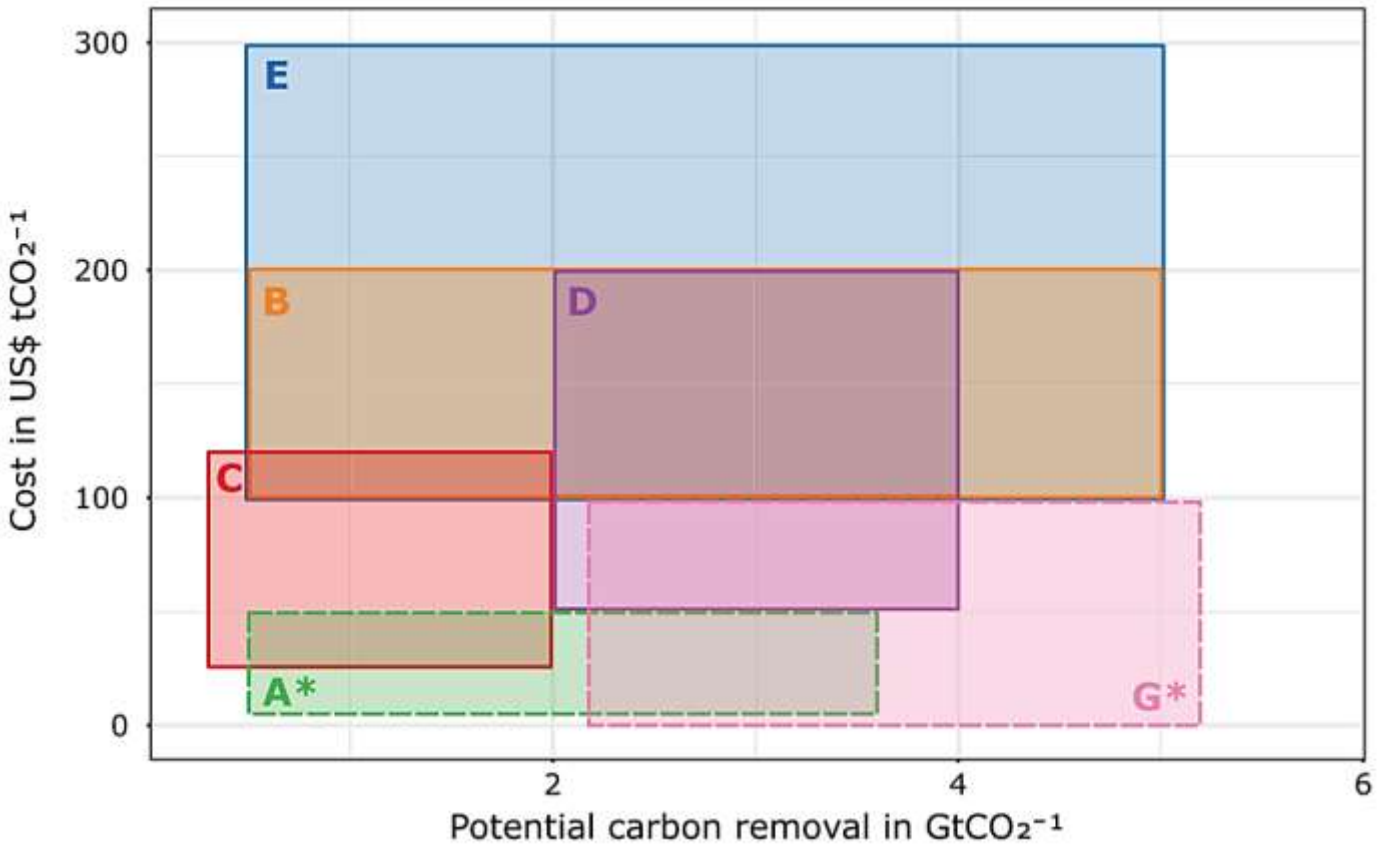
Input use-efficiency, water use-efficiency, less energy-rich inputs, integrated pest management and better genetics are all essential components.

The role of agronomists has changed; productivity, profitability, compliance **and sustainability**.

Prof. Tim Reeves. Professor in residence, Dookie, UoM, Farrer Medallist, Past Director-General Cimmyt - International Maize and Wheat Improvement Center, Mexico

- A long and proud history of understanding our soils
- Where are we now?
- **What is the national opportunity in soils?**
  - In regenerative agriculture?
  - **In negative emissions?**
  - And do we separate the two?

Costs and capacities for negative emissions



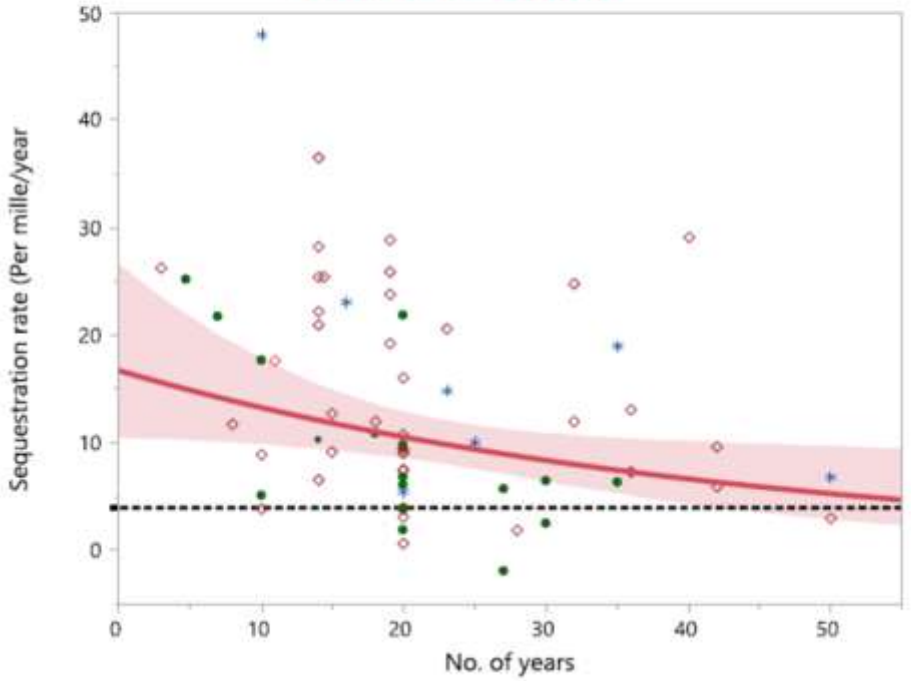
A Afforestation and reafforestation
B Bioenergy carbon capture and storage
C Biochar
D Enhanced weathering
E Direct air capture
F Ocean fertilisation
G Soil carbon sequestration

Source: Sabine Fuss et al 2018 Environ. Res. Lett. 13 063002

There are arguments on longevity

A 4 per 1000 SOC sequestration rate has often been exceeded in long-term arable field trials

(over up to 50 yrs)



This is the basis of the 4 per 1000 initiative that Australia has signed up for.

Source: Combined Academies of USA. Workshop on Terrestrial Carbon. Sept 19 2017. J-F Soussana. Soil carbon sequestration and croplands.

Some countries are taking this to heart

Recommends: a fifth of agricultural land taken out of traditional agricultural production and moved into long-term, natural carbon storage, that means growing trees, restoring soils.

Source: https://www.carbonbrief.org/ccc-one-fifth-of-uk-farmland-must-be-used-to-tackle-climate-change

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