

# The IWTO Green Book

... reclaiming the narrative – and our value

Dr Paul Swan



2026 Annual Convention  
Reno, Nevada USA  
26-31 January 2026

CONFINDUSTRIA  
MODA FEDERAZIONE  
TESSILE E MODA 



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

# The IWTO Green Book

With a major funding commitment from Italy, the **Green Book** initiative commenced in Jul-24.

There are 2 complementary streams of effort:

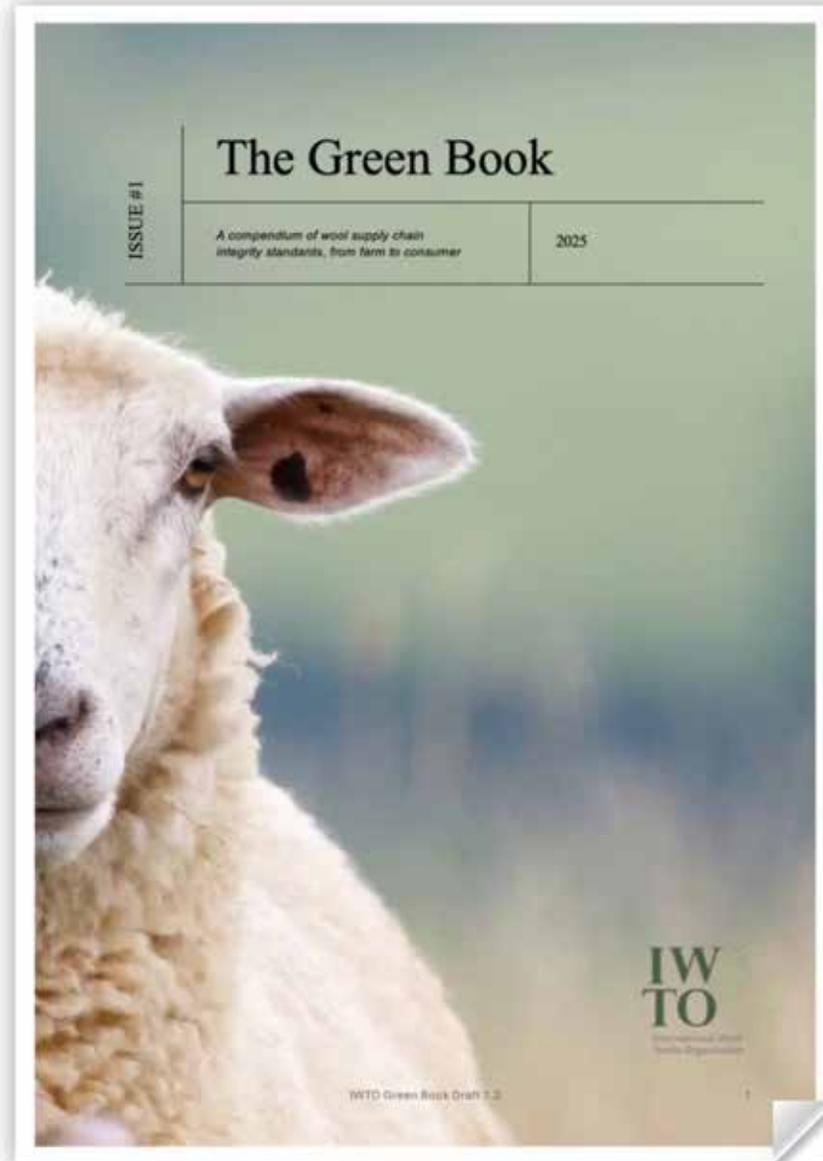
1. **A technical compendium**, complementing IWTO's existing Red, Blue & White books by
  - Addressing wool's eco-credentials & supply chain integrity standards
  - Assisting wool stakeholders combat misleading narratives
  - Targeting brand, retailers, and consumers
2. **New research** to challenge **unfair narratives**, with additional funding support from others.



# The book itself is well advanced

The IWTO Green Book:

- Exposes the key flaws in eco-accounting standards
- Positions wool in the context of the planetary carbon cycle
- Provides information of sourcing and sustainability standards
- Showcases wool's unique attributes
- IWTO's critical role
- Links to knowledge resources



We are in a contest of ideas



VS

# ECOLOGIST

THE JOURNAL FOR THE POST-INDUSTRIAL AGE

Home » News

## The environmental impact of wool

Elisa Allen | 12th March 2019



Far from being an eco-friendly material, wool is a nightmare for the living planet.

# We are in a contest of ideas



## ECOLOGIST

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### The environmental impact of wool

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Far from being an eco-friendly material, wool is a nightmare for the living planet.

#### Greenhouse gasses

As with other forms of animal agriculture, raising sheep for wool gobbles up precious resources. Land is cleared and trees are cut down to make room for grazing, leading to increased soil salinity and erosion and a decrease in biodiversity.

Sheep, like cows, release enormous amounts of **methane gas** into the atmosphere and have been referred to as the "Humvees" of the animal kingdom.

**Manure generated by farmed animals** – including in countries like Australia and New Zealand, where vast flocks of sheep have been expanded to meet the world's demand for wool – has significantly contributed to the increase in atmospheric greenhouse gases over the last 250 years.

#### This Author

Elisa Allen is the director of People for the Ethical Treatment of Animals (PETA).

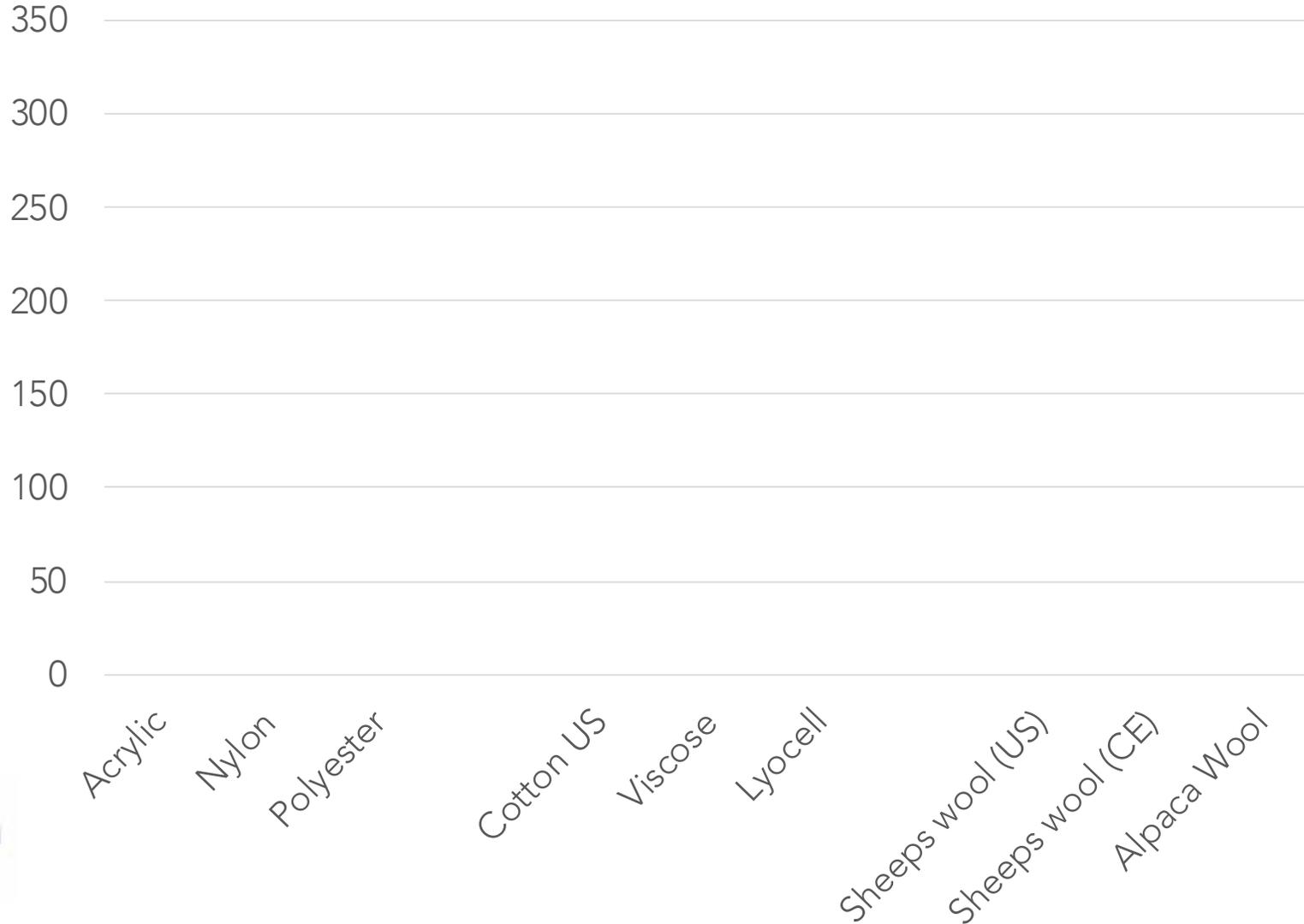
...sounds just like

EU-PEF, Higg MSI, MADE-BY, etc.

# Eco-accounting – good business for some



Environmental damage score per lb



~~NIKE~~

~~SAC~~

~~Cascade~~

Worldy



# Eco-accounting – good business for some



~~NIKE~~

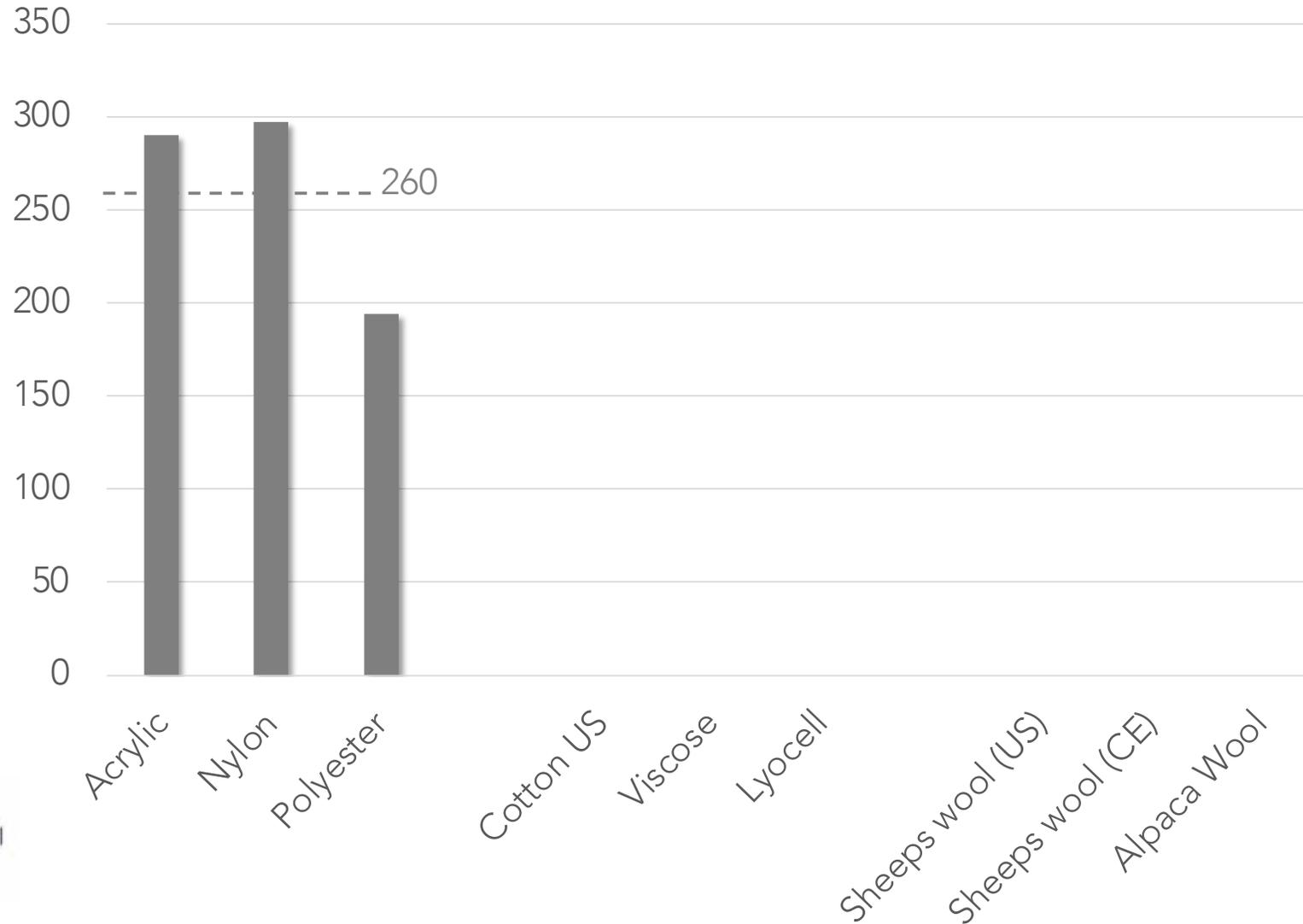
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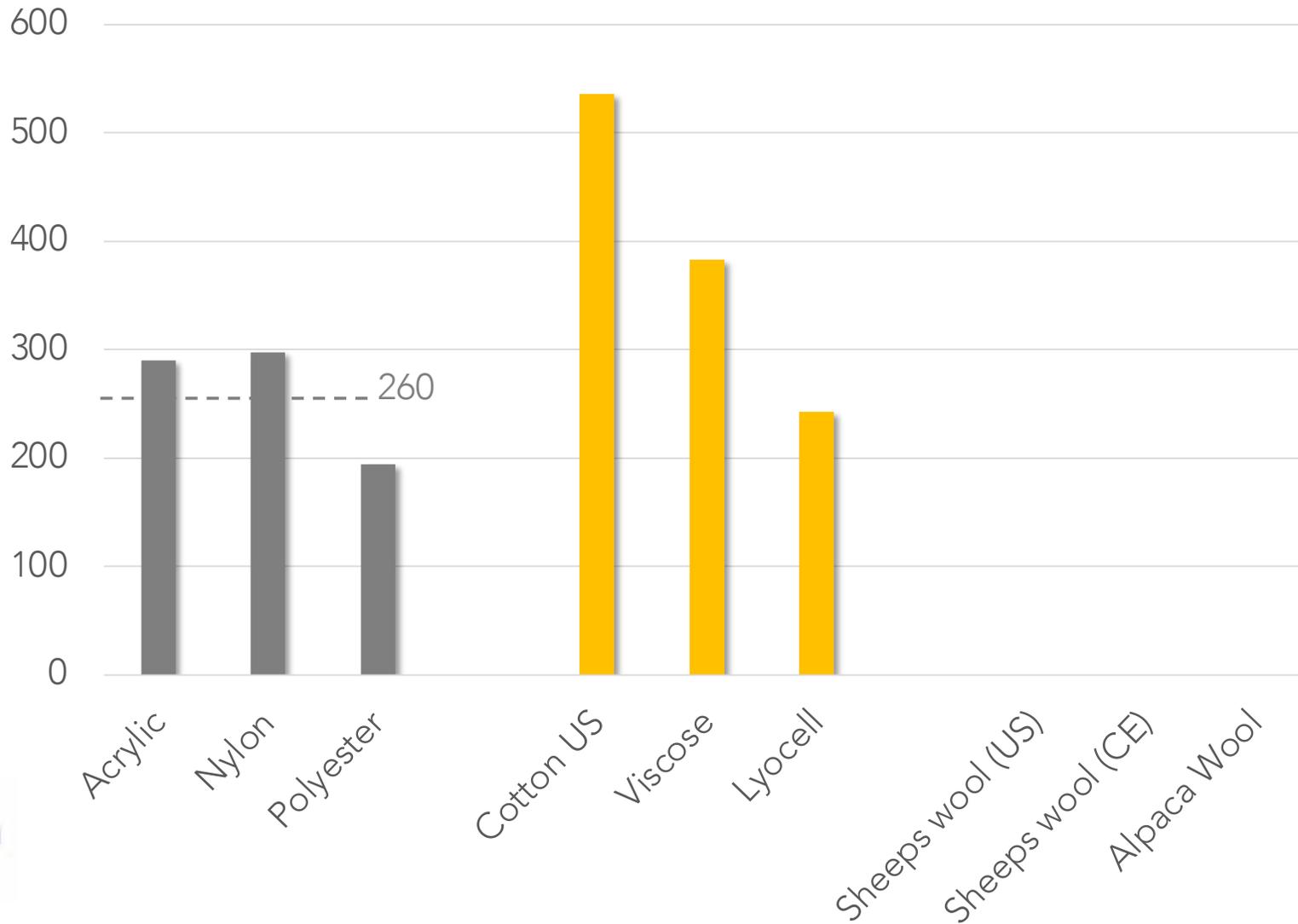


EU-PEF v3.1 Environmental damage score per lb



# Eco-accounting – good business for some

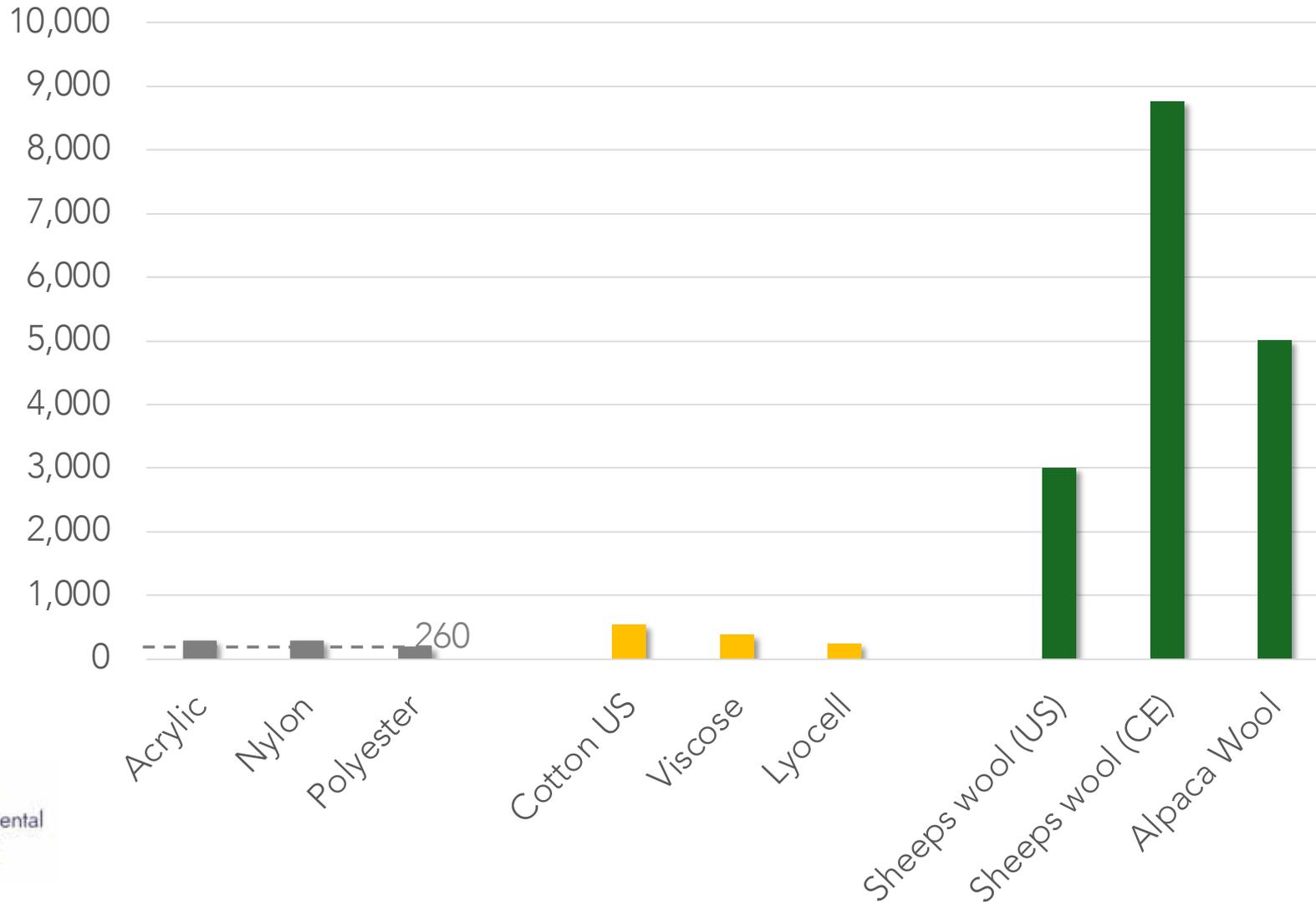
EU-PEF v3.1 Environmental damage score per lb



# Eco-accounting – good business for some



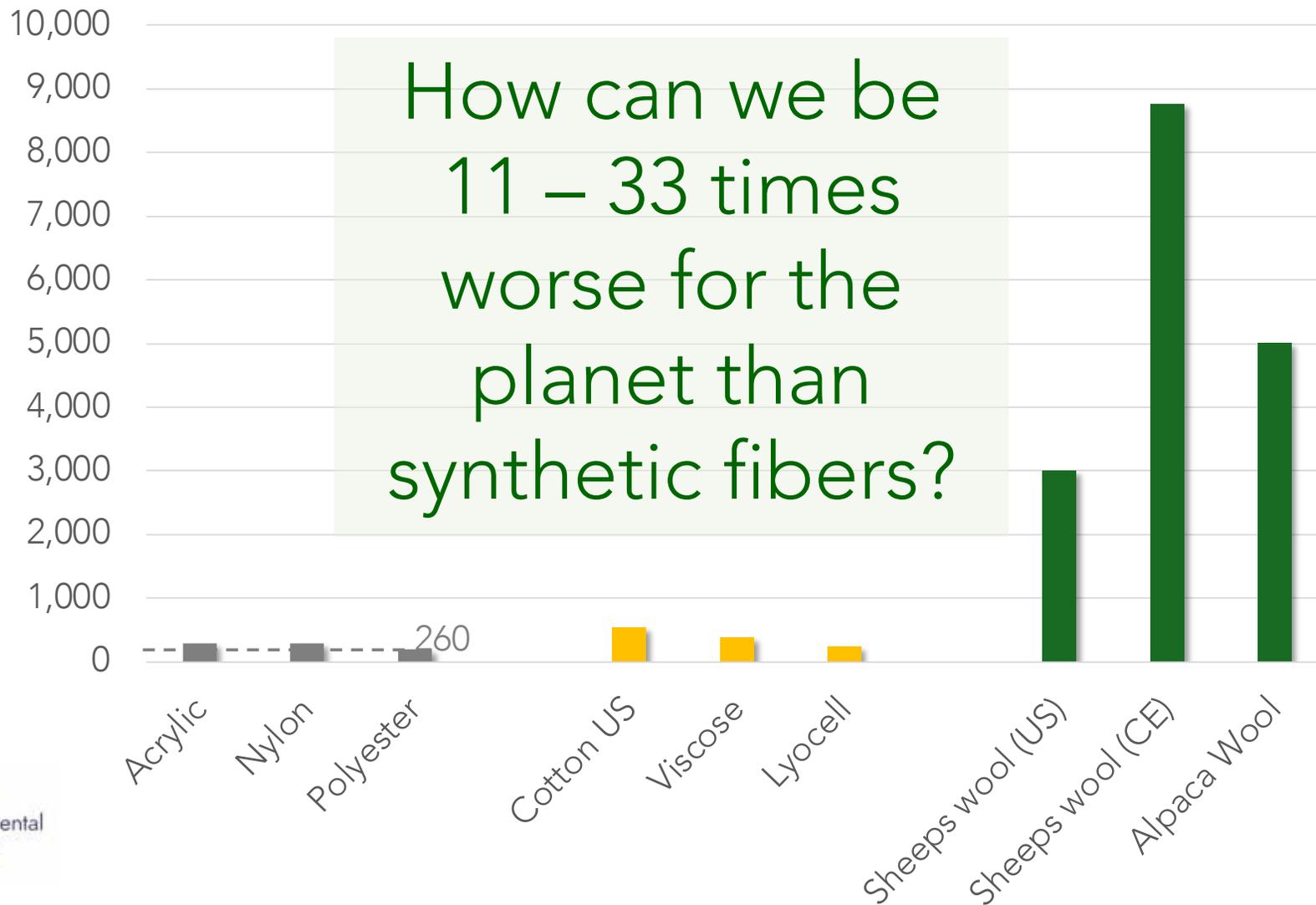
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# Eco-accounting – good business for some



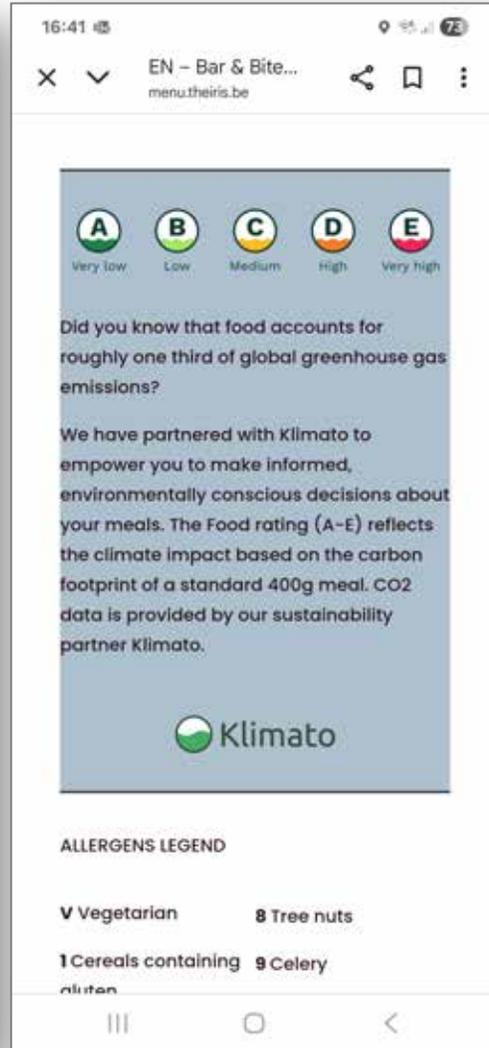
EU-PEF v3.1 Environmental damage score per lb



How can we be 11 – 33 times worse for the planet than synthetic fibers?



# The same playbook is in action for red meat



# The same playbook is in action for red meat



16:43 EN – Lunch | M...  
menu.theiris.be

**The Iris Beef Burger**

Brioche Seed Bun | Cheddar | Arugula | Sundried Tomato | Caramelized Onions | The Hotel Sauce | €20

**Carbon rating E**  
1 (wheat), 3, 6, 7, 10, 11

+ Sweet Potato Fries | Classic Fries or Mesclun Salad | €7

**Linguine**

Basil Pesto | Potatoes | Green Beans | €19

**Carbon rating B**  
1 (wheat), 7, 8 (pine nut)

FROM THE ROBATA

**Grilled Angus Rib-Eye**

Stuffed Zucchini | Béarnaise or Sarawak Pepper Sauce | €46

**Carbon rating E**  
3, 7, 9, 10, 12

16:41 EN – Bar & Bite...  
menu.theiris.be

**A B C D E**  
Very low Low Medium High Very high

Did you know that food accounts for roughly one third of global greenhouse gas emissions?

We have partnered with Klimato to empower you to make informed, environmentally conscious decisions about your meals. The Food rating (A-E) reflects the climate impact based on the carbon footprint of a standard 400g meal. CO2 data is provided by our sustainability partner Klimato.

Klimato

**ALLERGENS LEGEND**

**V** Vegetarian      **8** Tree nuts  
**1** Cereals containing gluten      **9** Celery

**Klimato** WHAT WE DO WHO IT'S FOR OUR PLANS WHO WE ARE GOOD TO KNOW FOR USERS BOOK A DEMO ENGLISH

# CUT YOUR FOOD BUSINESS' CARBON FOOTPRINT

Empowering food businesses with tools to measure, report, and reduce the climate impact of recipes — making sustainability simple and profitable, meeting compliance requirements.

[Get more info](#)

**THE FOOD SECTOR ACCOUNTS FOR 34% OF GLOBAL EMISSIONS.**

**Partners:** IHG HOTELS & RESORTS, Marriott INTERNATIONAL, EXCLUSIVE COLLECTION, ACCOR, ForSea Solutions, sodexo, University of BRISTOL, FLORA Food Group, Hilton, Quorn

<https://menu.theiris.be/en-lunch/>

# The carbon 'currency' has a blindspot



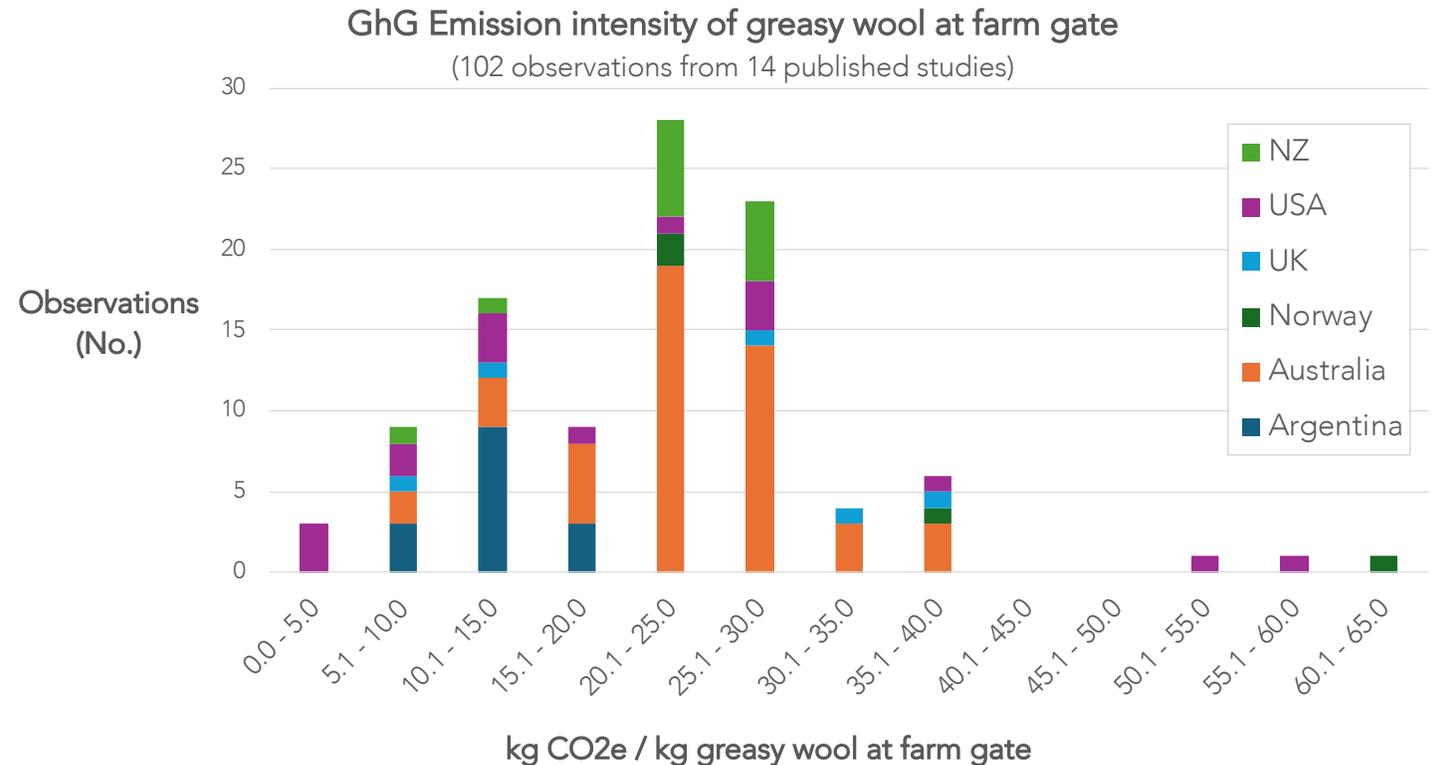
IPCC & Kyoto generated a new currency – CO<sub>2</sub>e units

LCA typically adopt these IPCC-based rules for GhG accounting

These focus on **emissions** and require 'permanent' **removals**

System biology & carbon recycling (biogenesis) is devalued or ignored

Existing good farm practices which sequester carbon don't count, since 'business as usual'



# Biogenic vs fossil carbon ...



Pump-jacks, releasing fossil carbon



Grassland, recycling atmospheric carbon  
(biomass-based carbon = *biogenic carbon*)

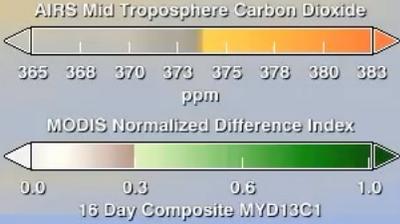
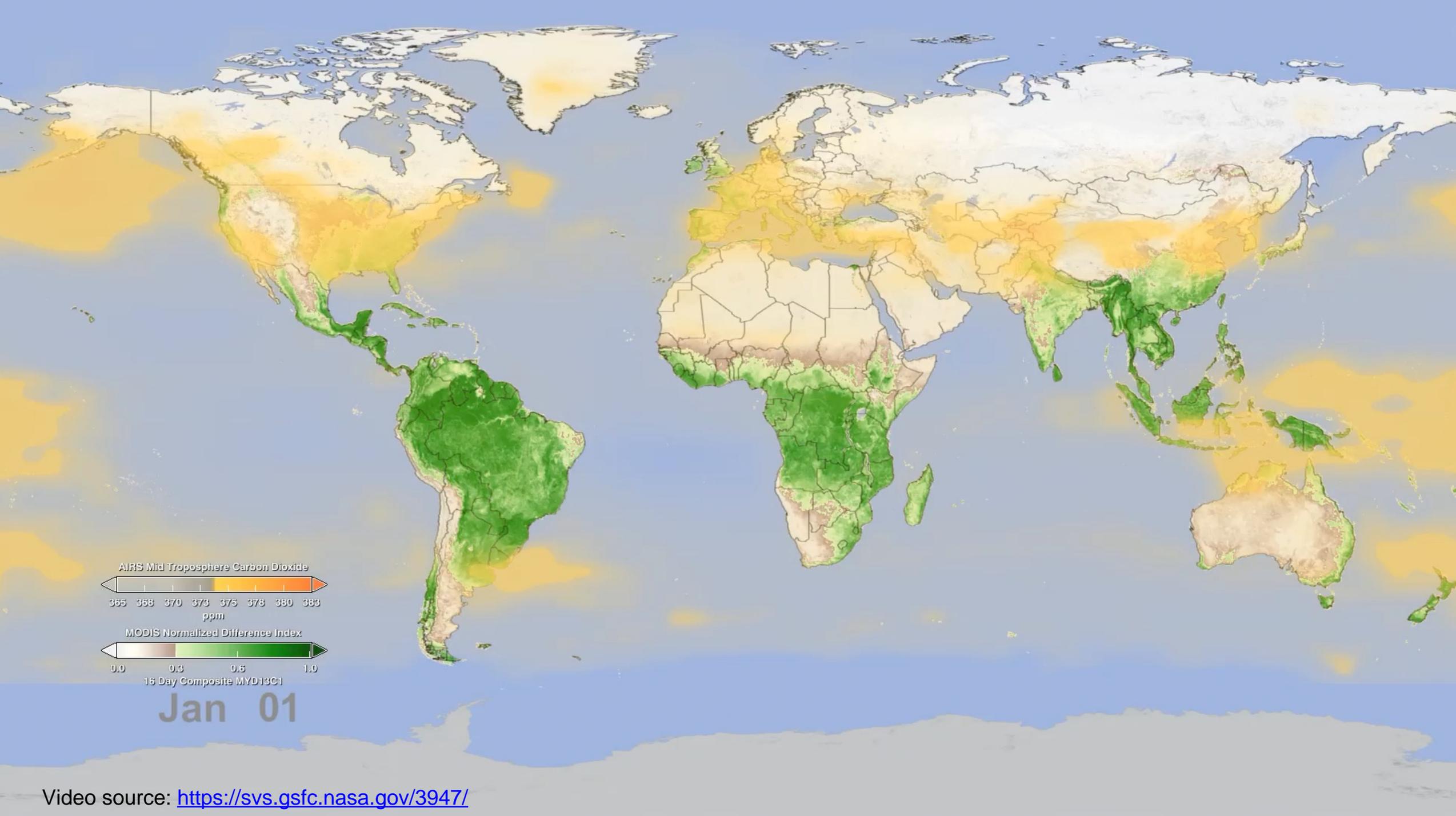
# Wool is *biogenic*



Almost all wool is produced in open grassy woodland ecosystems

Since wool carbon is biomass-based, wool is a *biogenic* fibre - a *life* fibre

Since 100% biogenic, wool is biodegradable – *food for the next life*



Jan 01

# De-carbonisation is not happening



## Emissions

Land-use change: + 4.4 B t/yr (- 0.5%/yr)

Fossil sources: + 37.9 B t/yr (+1.2%/yr)

Total: + 41.4 B t/yr (+1.0%/yr)

## Sinks

Oceanic sink: - 10.9 B t/yr (+1.0%/yr)

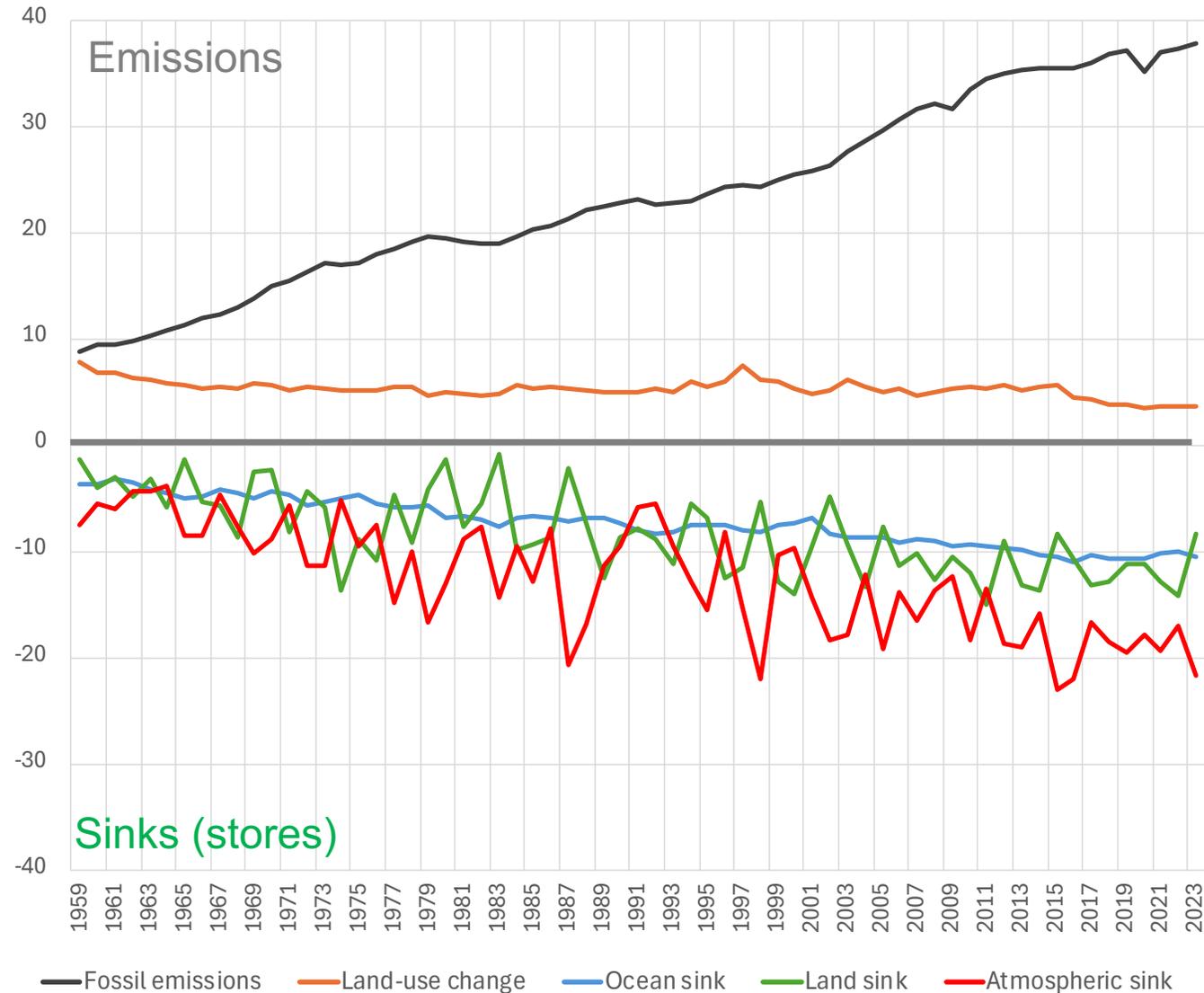
Photosynthesis: - 12.9 B t/yr (+1.1%/yr)

Total: - 23.8 B t/yr (+1.1%/yr)

## Balance:

Atmosphere: + 19.5 B t/yr (+1.1%/yr)

Global Carbon Budget flux (billions of t of CO<sub>2e</sub> per year)



# Our solution is to grow year-round photosynthesis

Drawing down CO<sub>2</sub> through GDP-creating biomass production (farming) creates:

- nutrient dense food
- rural communities
- employment
- exports

So, increasing photosynthetic drawdowns, biomass production and rainfall use efficiency should be encouraged – right?

# The permanence problem



GhG policy tries to reverse fossil emissions – only new ‘permanent’ carbon removals have value

Biogenic carbon cycling has been discounted or ignored until now



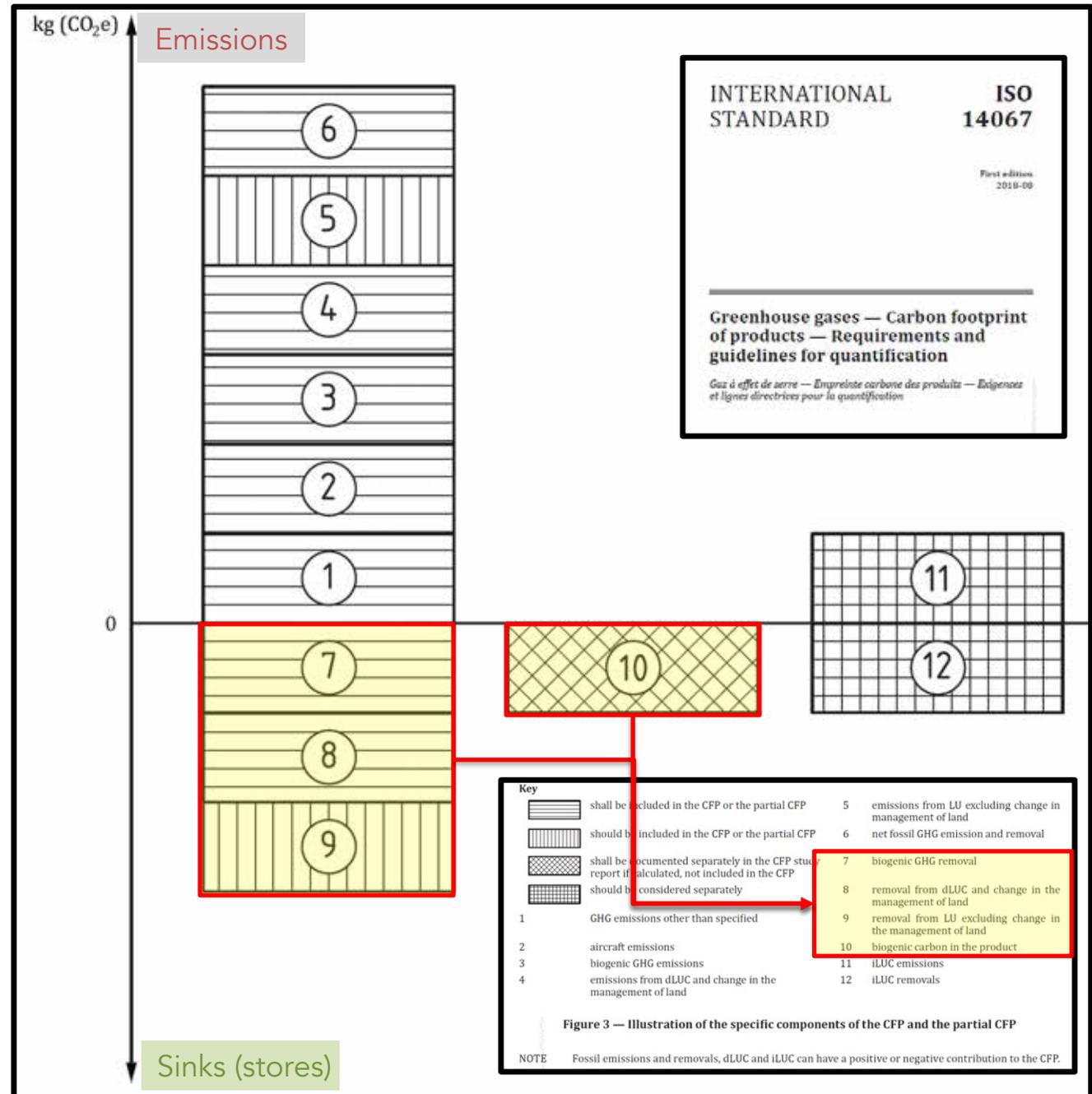
# Balance is a choice

ISO 14067-2018 is a global standard for product carbon footprints, including in Environmental Product Declarations.

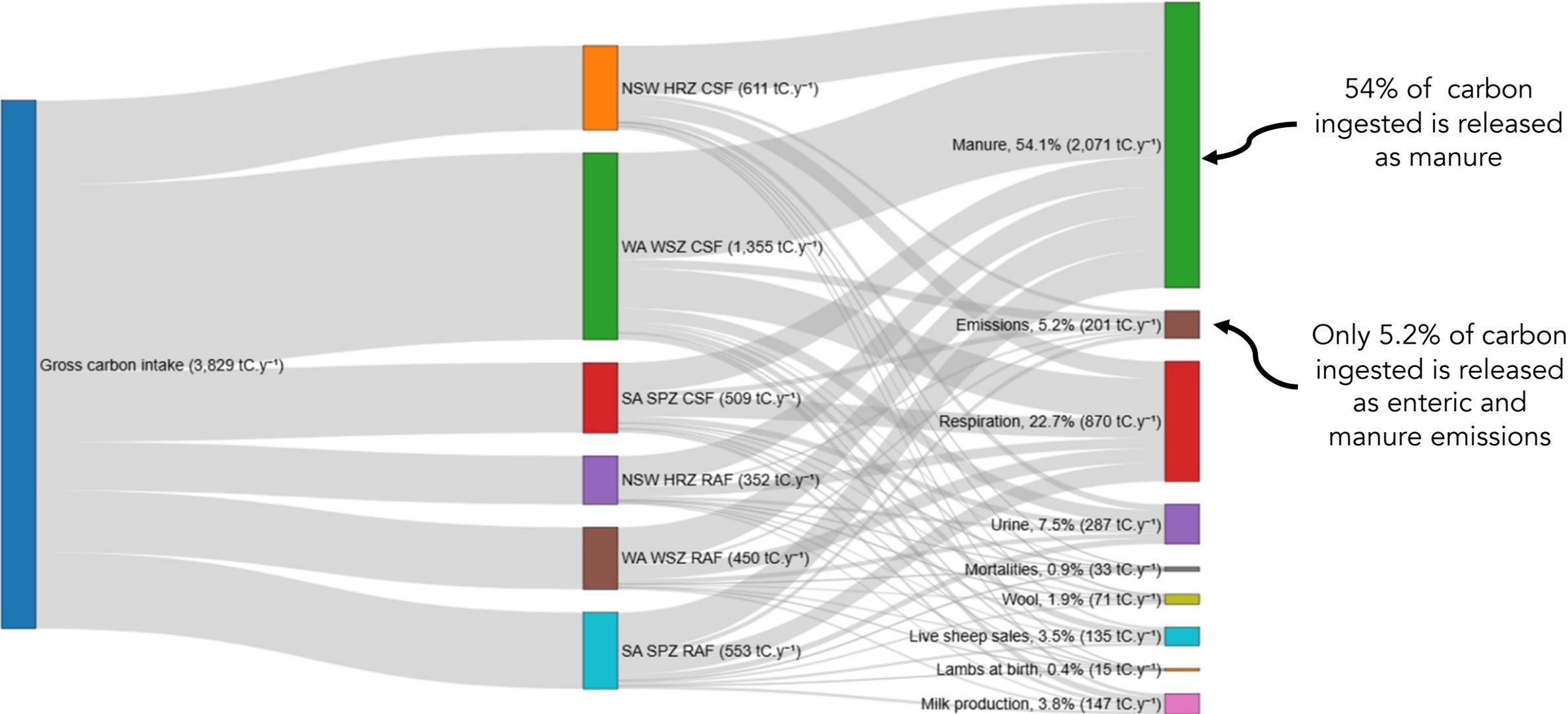
It recommends inclusion of:

- Biogenic greenhouse gas removals
- Removals from land use, including management and usage changes
- Biogenic carbon in products, if reported separately

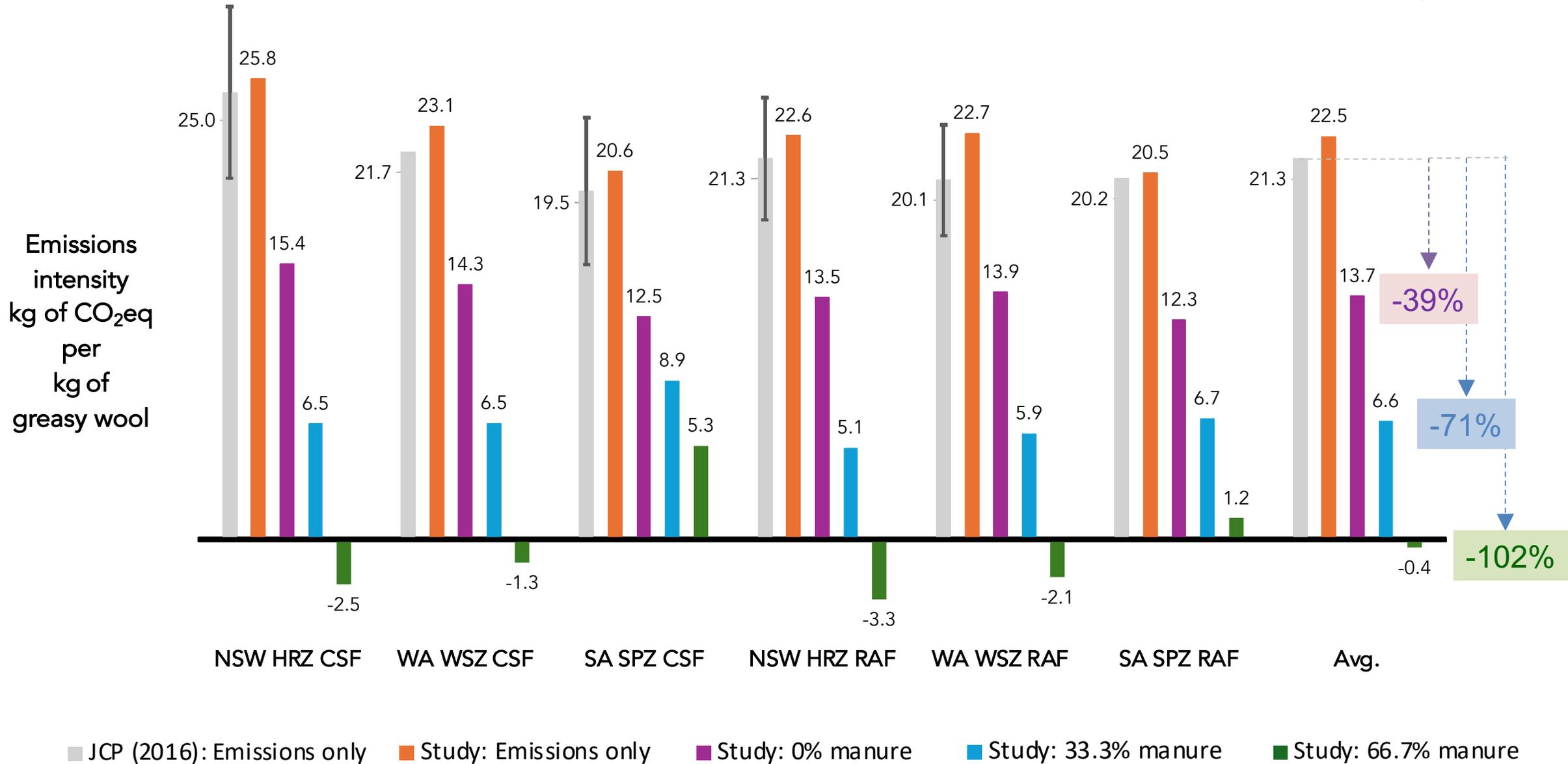
We have now applied ISO14067 to wool



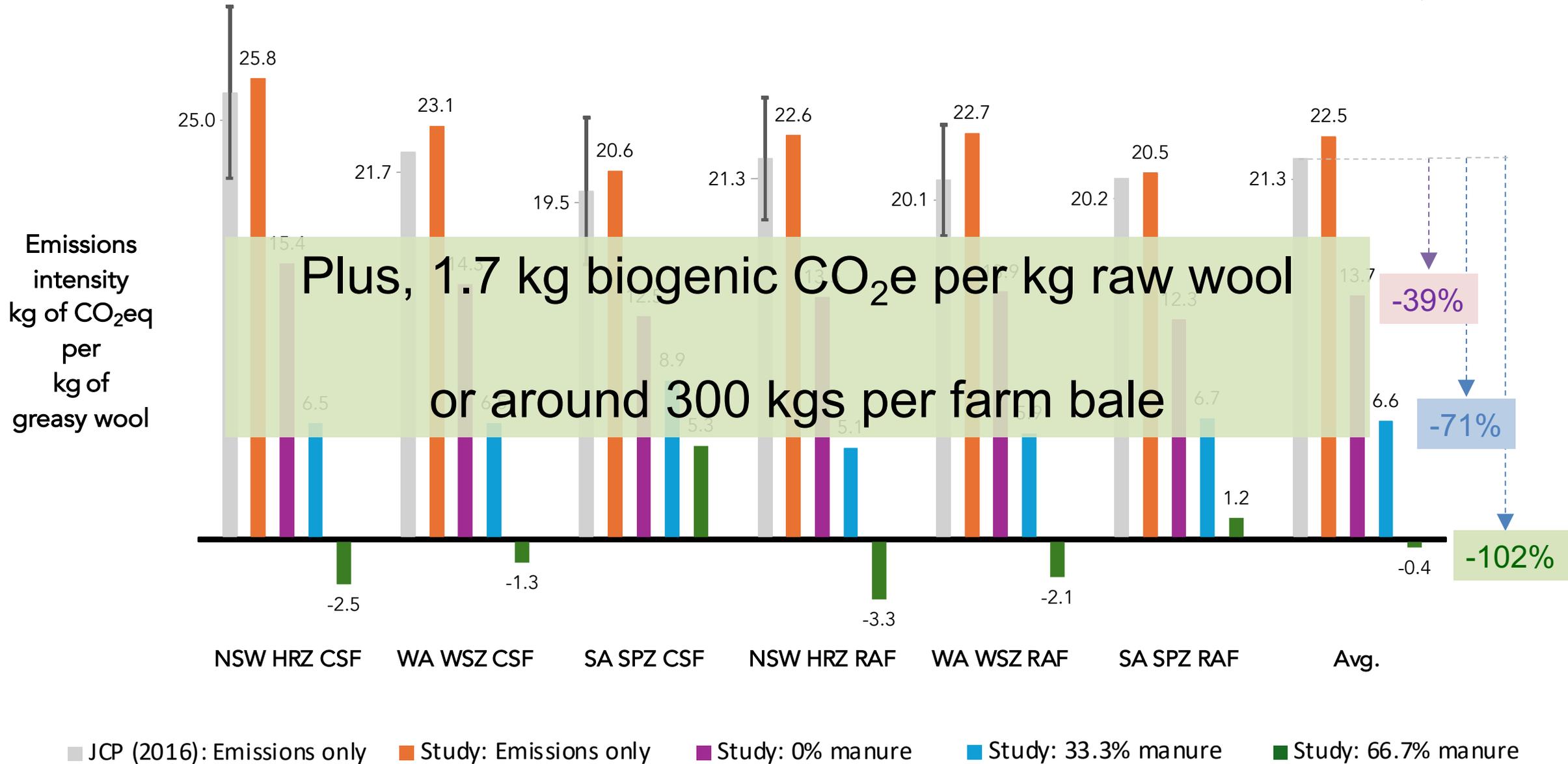
# Paper 1: Mapping carbon flows across & within farms



# Paper 1: including biogenic flows lowers emission intensity



# Paper 1: including biogenic flows lowers emission intensity



# Scientific recognition has started

1. On 26/12/25, our paper was published in Elsevier's *Agricultural Systems* journal.

Our principal conclusion is that *carbon footprinting which ignores biogenesis will result in overstated emissions intensity*

2. We also received commercial certifier confirmation (TÜV SÜD) that our study conforms with ISO14067 (Oct '25)

We can now start to change the narrative, and follow-on research and collaborations are in progress, across product sectors

Agricultural Systems 233 (2026) 104631

Contents lists available at ScienceDirect

**Agricultural Systems**

journal homepage: [www.elsevier.com/locate/agsy](http://www.elsevier.com/locate/agsy)

Research Paper

**A biogenic life cycle approach towards estimating the carbon intensity of wool production: Evidence from six Australian case studies\***

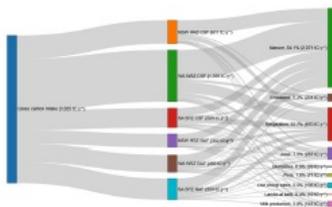
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**HIGHLIGHTS**

- Biogenic carbon flows in greasy wool production are mapped in conformance with ISO 14067:2018.
- Biogenic carbon emission intensities of six Australian case studies have been calculated.
- The results disaggregate fossil and biogenic removals and sources of emissions.
- Emissions intensity is shown to be sensitive to manure retention assumptions.
- We conclude that LCAs which ignore biogenic carbon overstates wool's emission intensity.

**GRAPHICAL ABSTRACT**



**ARTICLE INFO**

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Guest Editor: P. Goglio

**Keywords:**  
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Carbon accounting  
Carbon footprint  
Sheep farming  
Wool production  
Biogenic carbon  
ISO 14067:2018

**ABSTRACT**

**Context:** Life cycle assessments (LCA) of wool typically associate this natural textile fibre with a high greenhouse gas emissions intensity because of enteric emissions. We analysed the application of 14 LCAs published between 2010 and 2024 and found that they focused exclusively on emissions, disregarding the fact that wool production is embedded in a biogenic system. ISO 14067:2018 recognises biogenic carbon but has not been applied to wool yet. Here we seek to rectify this.

**Objective:** This study explores the application of ISO 14067:2018 to six representative Australian wool enterprises, extending the detailed LCA case study data from Wiedemann et al. (2016) to define and map the flows of biogenic carbon ingested by grazing sheep. Thereafter we explore the impact of key aspects of system biogenic function on calculated wool emissions intensity within the sheep production system.

**Results and Conclusion:** Mapping of ingested carbon flows across enterprises showed that the major carbon destinations were manure (54.1 %), followed by respiration (22.7 %), urine (7.5 %), and enteric emissions (5.2 %). Exploration of the emissions intensity of wool production showed that while biogenic model outputs closely

\* This article is part of a Special issue entitled: 'Agricultural LCA methods' published in *Agricultural Systems*.  
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0308-921X/© 2025 The Authors. Published by Elsevier Ltd. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

# Global case studies are needed



10 farms

3 farms

- Initial paper (6 published cases)
- Completed commercial case studies
- In-progress or planned

6 farms

5 farms

4 farms

6 farms

# Case study results are flowing in:



## Australian CS1

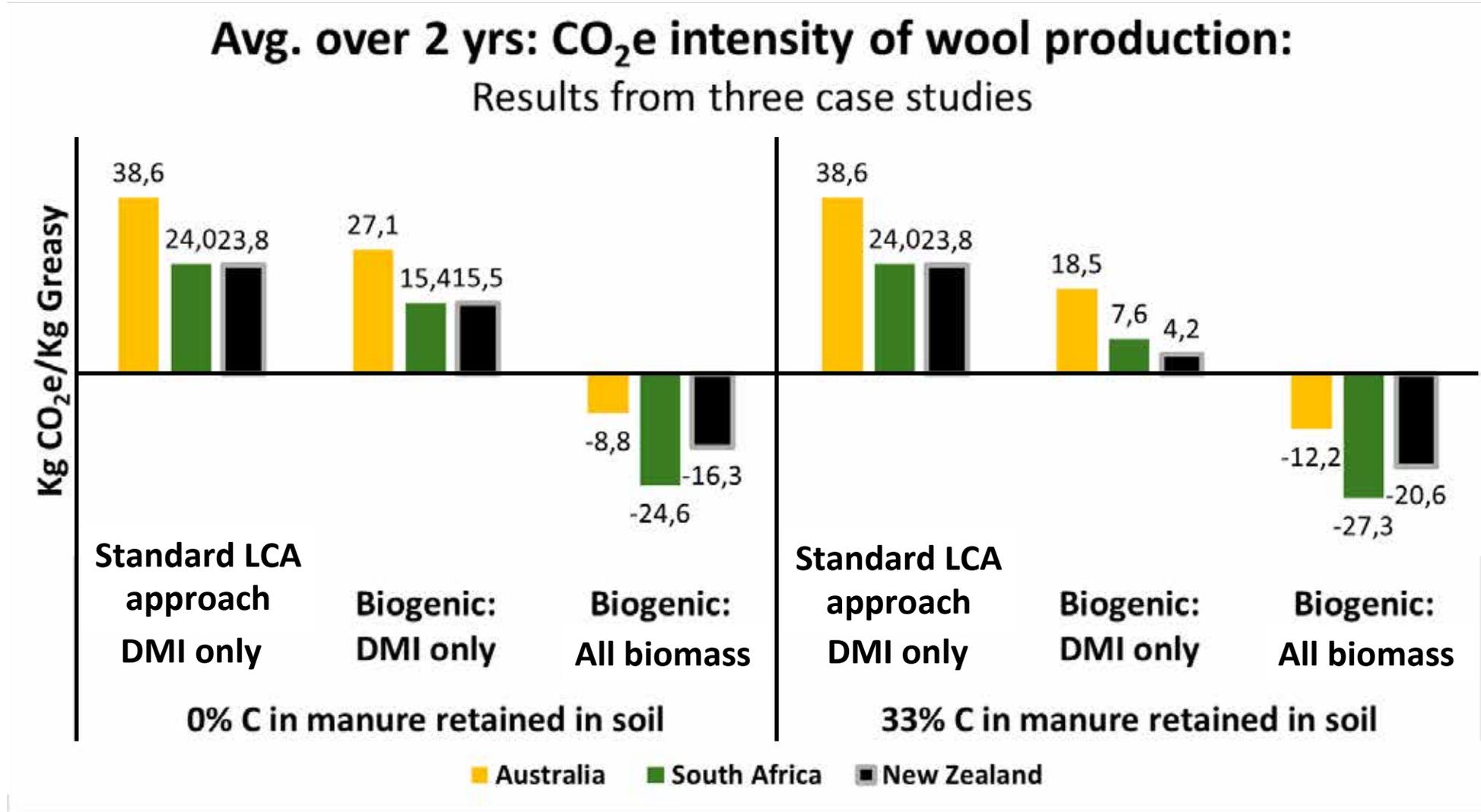
- 3,500 Ha grazed Southern VIC, 38°09" S
- 514 mm rainfall, Winter/Spring
- Superfine Merino

## South Africa CS1

- 7,700 Ha grazed, Eastern Cape 32°21' S
- 417 mm rainfall, Summer-dominant
- Medium Merino

## New Zealand CS1

- 5,900 Ha grazed Otago 44°67' S
- 617 mm rainfall, Summer-dominant
- Superfine Merino



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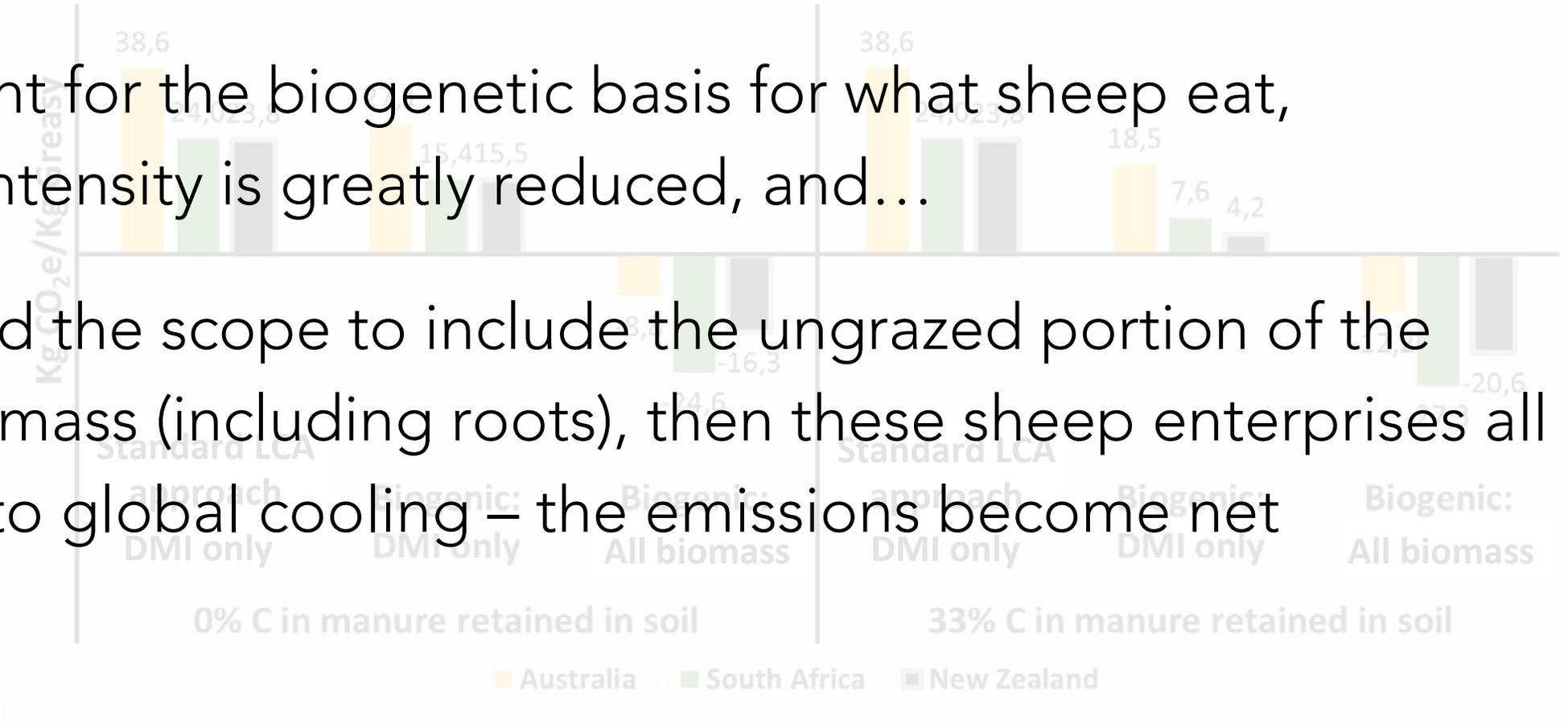
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Avg. over 2 yrs: CO<sub>2</sub>e intensity of wool production:

Despite the very different environments, the results are similar:

1. if we account for the biogenetic basis for what sheep eat, emissions intensity is greatly reduced, and...

2. if we expand the scope to include the ungrazed portion of the pasture biomass (including roots), then these sheep enterprises all contribute to global cooling – the emissions become net drawdowns



# Strategic implications for industry



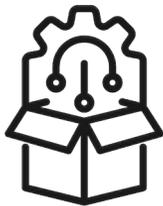
## For industry members & organisations

- See this as an overdue opportunity, move quickly to measure and report
  - Collaborate, and Communicate
- 



## For Brands & Sourcing

- Demand Biogenic Content (ISO 14067), and proven biodegradability
  - Prioritize farms that rotationally graze and maximise manure retention
- 



## For Product Designers

- Choose life-fibers (high Biogenic Content)
  - Design for biodegradability, re-use, recycling (insulation)
- 



## For Policy-makers

- Recognise biogenic carbon, and support year-round biomass producers
- Move beyond GWP100, by recognizing temporary carbon storage

# Questions from the future



What will future generations learn about sheep and wool?

*I hope they say: "When we started measuring reality instead of industrial abstractions, natural fibers emerged vital tools, instead of burdens"*



Biogenic



Biodegradable



Part of the climate solution