



# DELIVERING CARBON EMISSIONS REDUCTIONS

JANUARY 2024



SUPPORTER OF THE  
**TERRACARTA**  
*For Nature, People & Planet*



**CLIMATE  
NEUTRAL NOW**

- Carbon Capture and Utilisation
- Capture of Biogenically produced CO<sub>2</sub>
- Use of recovered energy and physical resources
- Production of low Carbon premium products

# THE CCM PROCESS



## CAPTURE



Ammoniacal  
Capture agent

+



Organic Fibre  
Material



Calcium  
Salt

## STABILISATION



## PREMIUM PRODUCT



Sustainable,  
low carbon,  
pellefised,  
drop-in  
Plant Nutrients

9 years of independent field trials validate agronomic efficacy & Carbon Trust certification of Carbon Footprint

# Key Features

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- The process uses directly captured CO<sub>2</sub> to stabilise the matrix with chalk
- The process uses directly captured CO<sub>2</sub> to stabilise ammonia
- The stabilisation process increases the dry matter content of the material and allows the inclusion of additional dry nutrient materials into a formulation
- The process creates a stable matrix which can influence that rate of nutrient release and/or breakdown

# Key Features



- The level of capture is proportional to the N content of the end product
- So high capture rates deliver High N product – 15N
- CO<sub>2</sub> retained in product as Calcium Carbonate
- Use of biogenically source CO<sub>2</sub> and recovered/renewable power result in low Carbon footprint
- Cradle to Gate footprint certified by Carbon Trust as **minus 0.9kg CO<sub>2</sub>e/kg of product** (12 4 4 plant nutrient material)



# Potential Impact

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➤ Will this approach actually make a difference ?

# nature



UNIVERSITY OF  
CAMBRIDGE

The analysis found that manure and  
synthetic fertilisers emit the  
equivalent of 2.6 gigatonnes of carbon  
per year

more than global aviation and  
shipping combined.

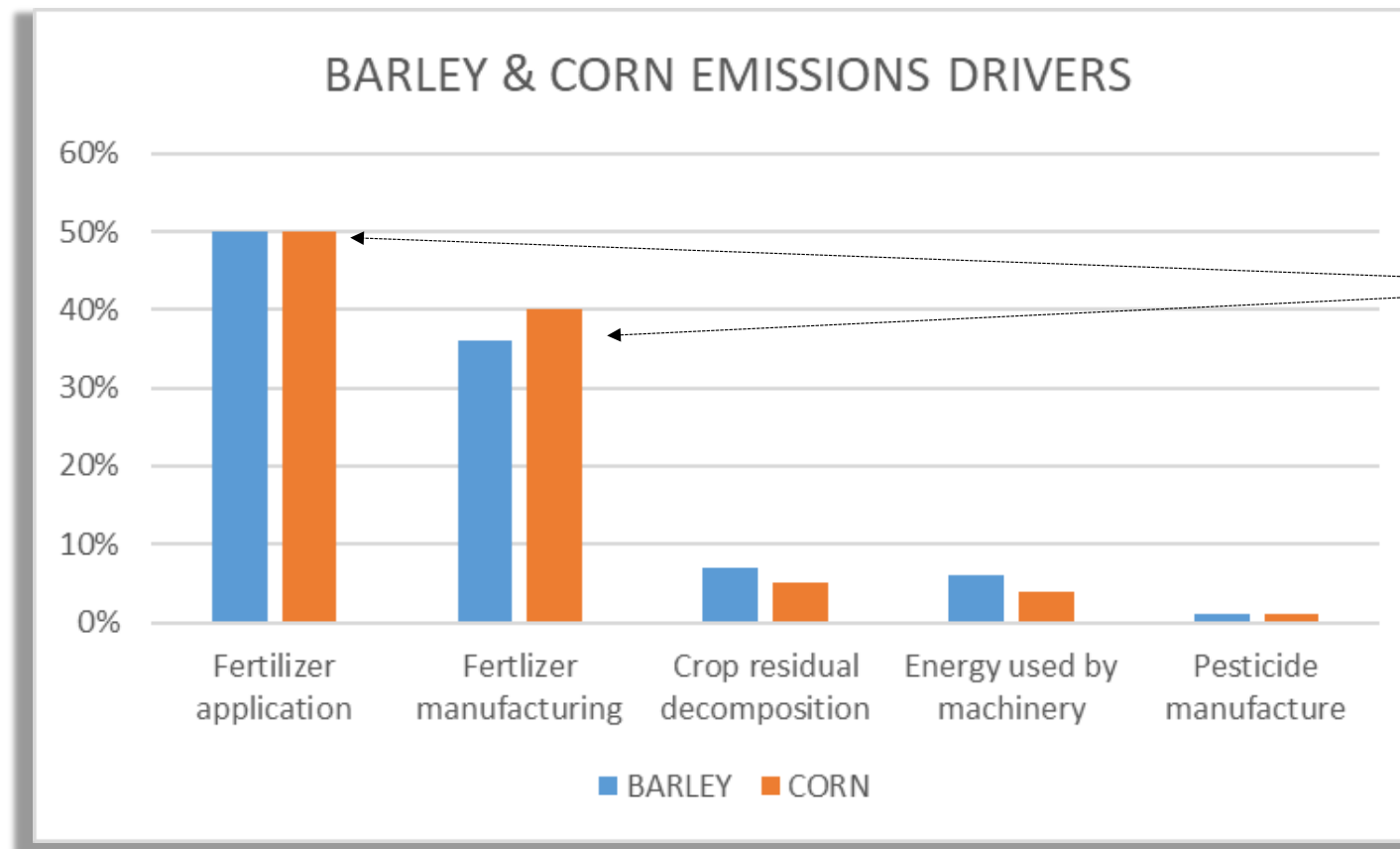
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Sources: [U Cambridge](#); [Nature.com](#); [Financial Times](#)

## THE SINGLE LARGEST CONTRIBUTOR



## TO AGRICULTURAL CO<sub>2</sub> EMISSIONS ARE SYNTHETIC MINERAL FERTILISERS



More than 80% of the carbon footprint come from fertilisers

Source: PepsiCo

CCm's technology targets both emissions from:

- Manufacturing &
- In-Field Use



2014 - 2017	RAU CIRENCESTER AND HARPER ADAMS (GRASS AND CEREALS)
2017 – 2022	VELCOURT AGRONOMY
2017- 2018	UNIVERSITY OF SHEFFIELD
2020 - 2021	NIAB/WWF
2020 – PRESENT	CRANFIELD UNIVERSITY
2022 – PRESENT	FRONTIER AGRICULTURE

- INDEPENDENT FARMERS FROM 2015 ONWARDS (9 YEARS)
- CUMULATIVELY TRIALLED AT MORE THAN 100 SEPARATE LOCATIONS COVERING CEREALS, OIL SEEDS AND POTATOES
- ADDITIONALLY TRIALLED WITH INDEPENDENT AGRIBUSINESSES, INCLUDING PEPSICO, SAINSBURY'S, TESCO, BRANSTON, FRONTIER AG., YARA AND ORIGIN/AGRII SINCE 2018

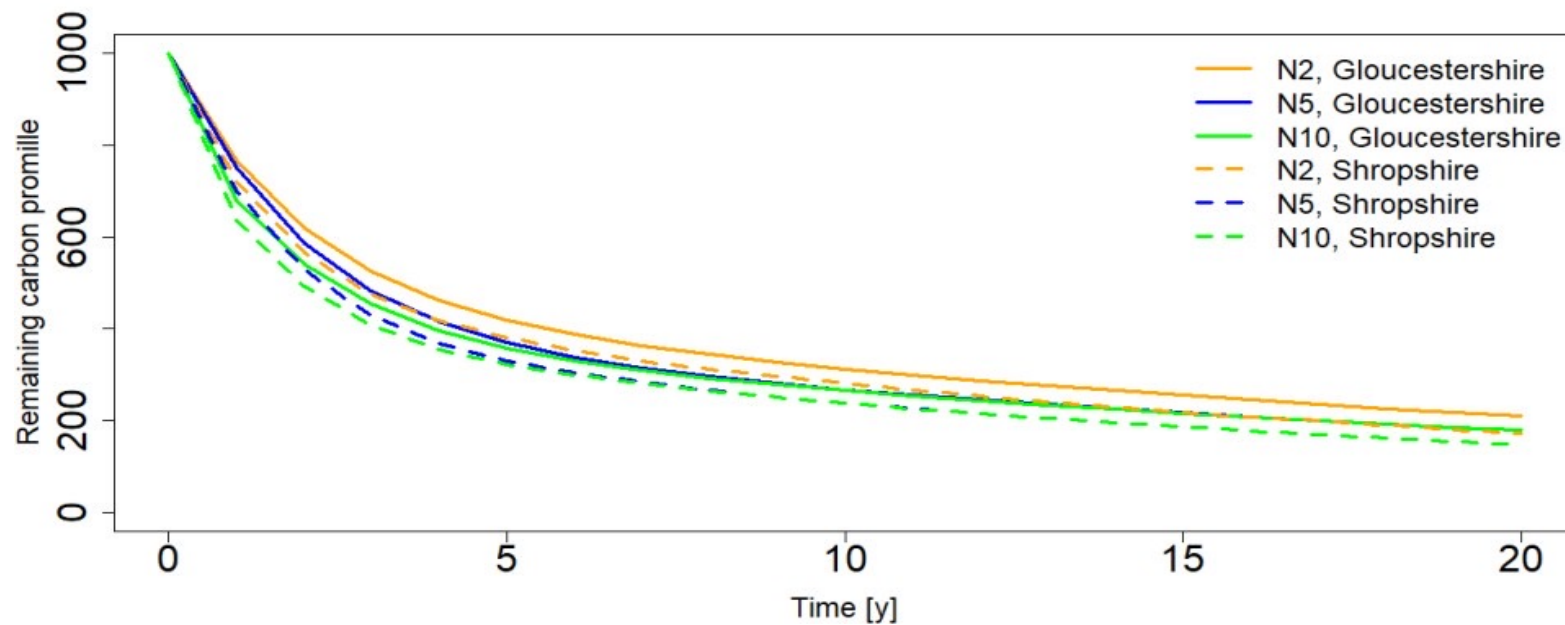
## Additional Benefits

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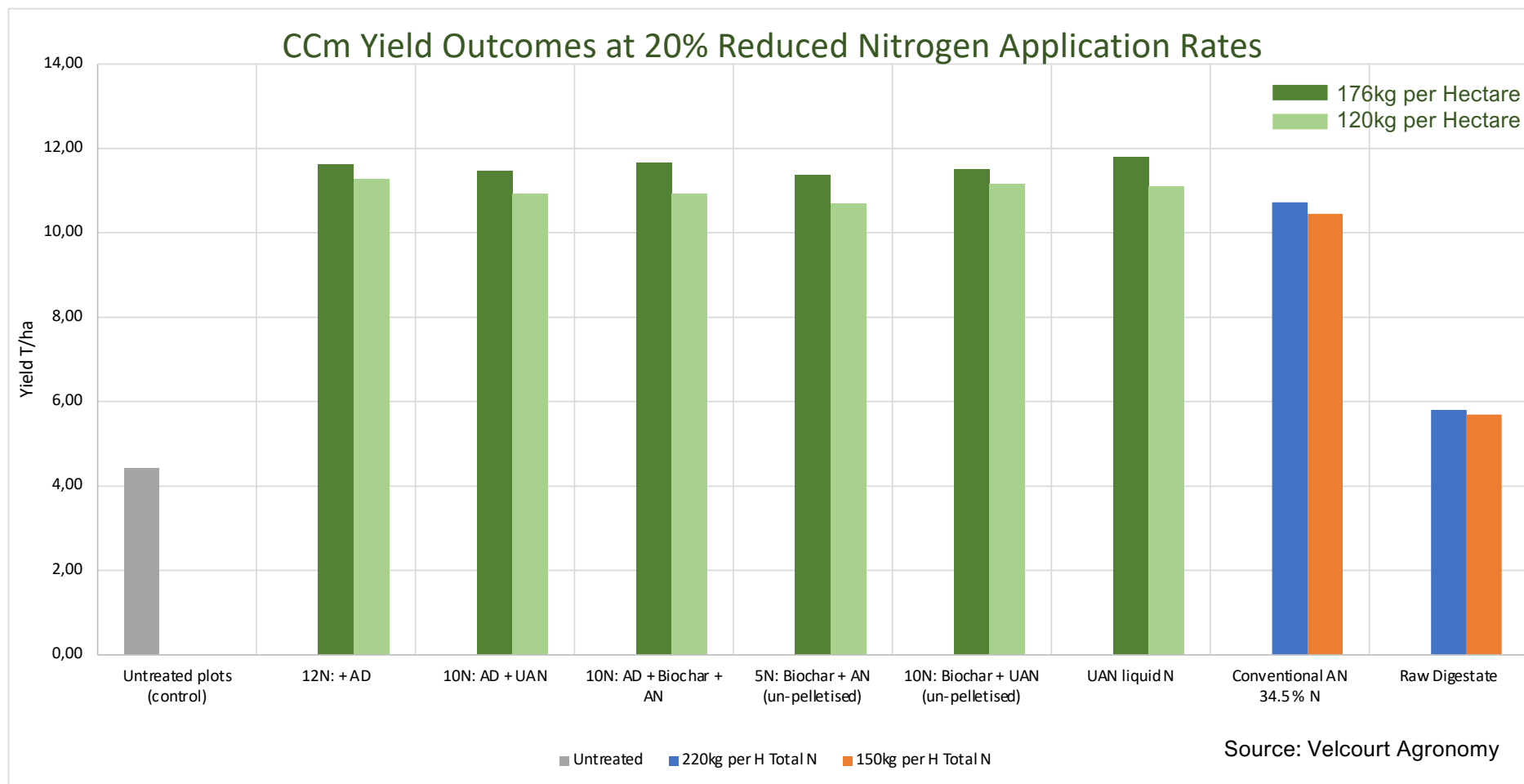


- Reduced run off and leaching
- Slowed release profile
- Return of Carbon to the soil
- Promotion of soil health
- Reduction in ammoniacal break-down rates

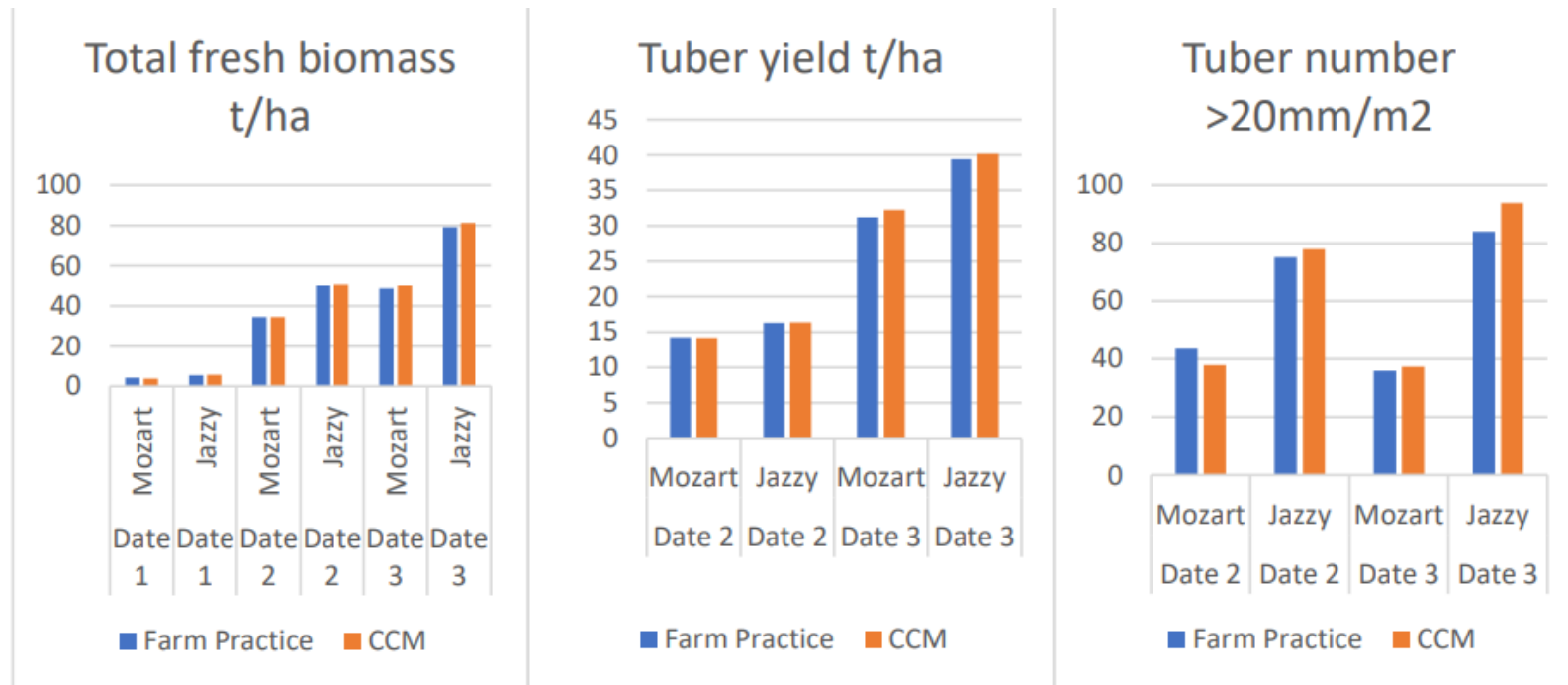
Figure 2: The decomposition of the soil enrichment materials at Gloucestershire and Shropshire over 20 years



# Sustainable Fertilisers – 2021 Trial Summary

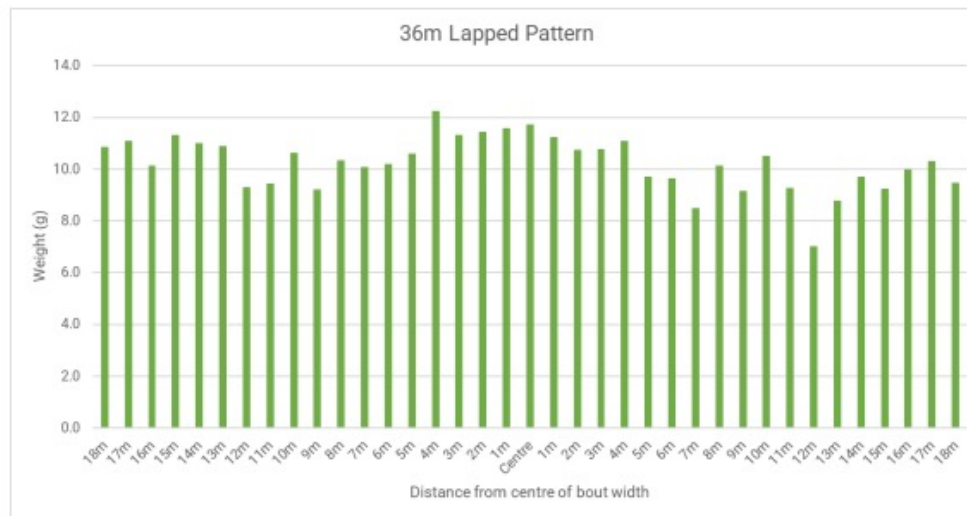


## 2021 Trial Summary – Potatoes NIAB WWF



CCm Fertilisers were applied at an N rate 15% less than AN

## Pellet Spread Kvernland Exacta 1t/Ha



### Lapped pattern

The weight of material that would be collected across the full bout width, using a to and fro driving pattern.

For the desired spread width of 36m a CV of 10.1% was attained.

## Pellet Spreading Tray tests 1t/Ha

**Comments: Final spread pattern successful.**



18m

0m

18m

Coefficient of Variation measures the accuracy of the spread pattern. For fertilisers a CV of 15% (as recommended in EB13739-2) should be attained in field conditions. <10% Excellent, 10%-15% Good, 15%-20% Poor, >20% Unacceptable.

There is no CV Pass/Fail for NSTS requirements.



## CURRENT PRODUCTION CAPACITY



Farm-based AD – Bagley Biogas

Product Development Plant - Swindon



Wastewater-based AD – Severn Trent (Minworth)



## Benefits

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*CCmGrowth*<sup>®</sup> products are:

- Low Carbon manufacturing route
- In field reduced emissions to air
- In field reduced leaching losses
- In field reduced N application rate

*CCmGrowth*<sup>®</sup> products contain:

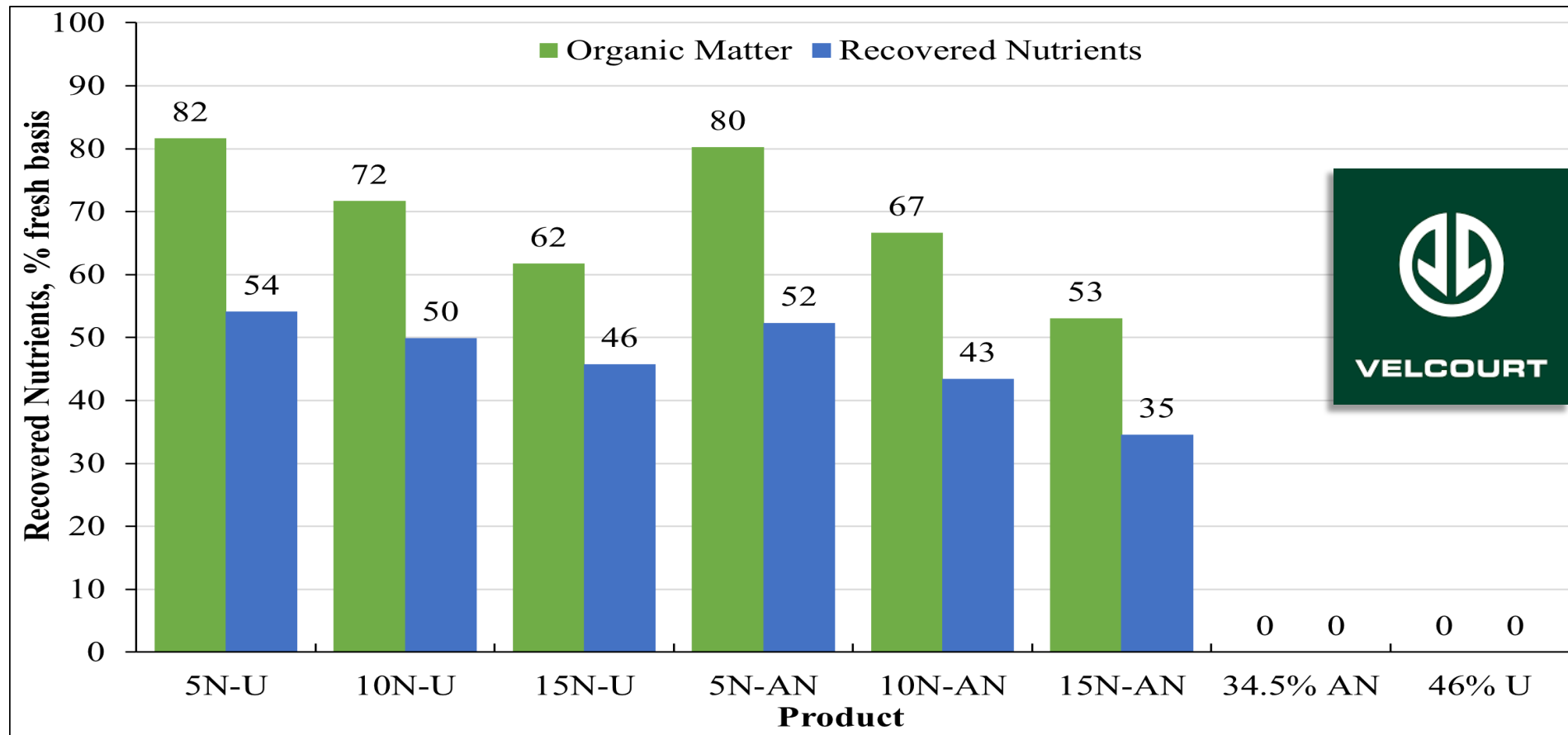
- A wide range of macronutrients N, P, K, S,
- A wide range of micronutrients and organic materials
- The additional organic components that improve soil health and reduce nutrient run-off and volatilisation

Sources: <sup>1</sup>[WWF "Climate Positive"](#); <sup>2</sup>[United Nations/IKEA](#); <sup>3</sup>[Fast Company](#);

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## POTENTIAL IMPROVEMENTS

### CURRENT LEVELS OF RECOVERED MATERIALS

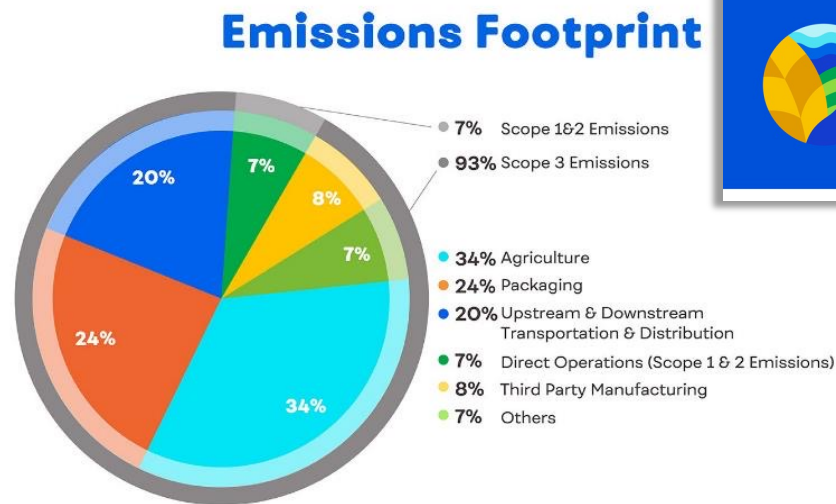


## SCOPE 3 REDUCTION



### CORPORATE IMPACT – PEPSICO CASE STUDY

- Scope 3 Carbon emissions (2021) – PepsiCo 93% of total emission (62 million tons).
- PepsiCo's retained consultants have validated CCm's GHG reduction capability as between 69% and 85% when compared to conventional fossil-fuel derived fertilisers.
- Impact: Within a decade, >10m ton CO<sub>2</sub> annual reduction in PepsiCo International's Carbon emissions.
- More than 20% of their group-wide Scope 3 GHG emissions.



2021 CO<sub>2</sub>e Emissions  
63 million tonnes  
Scope 3 – 93%

Thank You



First Low Carbon Harvest  
using CCm Plant Nutrients  
August 2015