



An Introduction to



agrecalc

*Mitigating the climate  
impact of farming*

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# Overview

- 1. Farming Challenges**
- 2. What is Agrecalc?**
- 3. Our impact**
- 4. Plans for Development**



# The Challenge

Unprecedented pressures on the agri-food sector

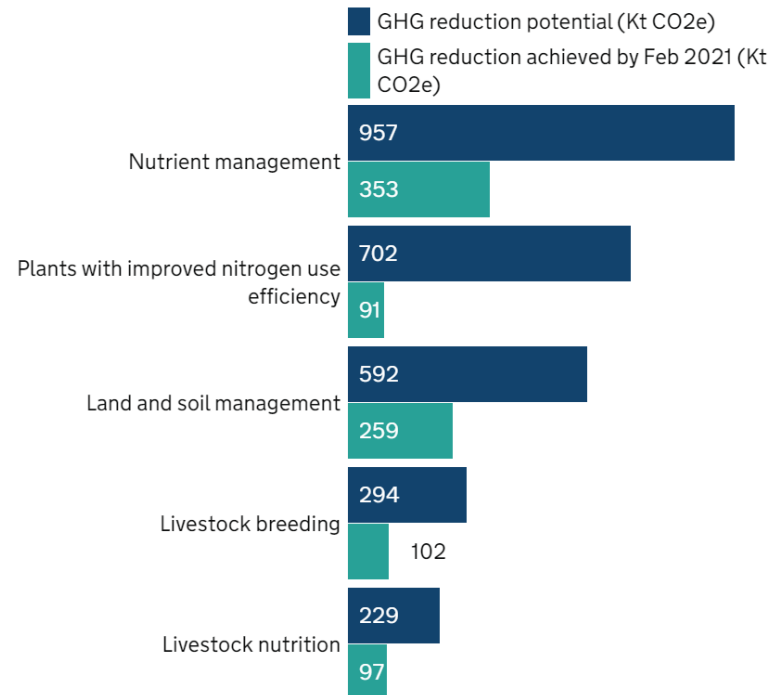
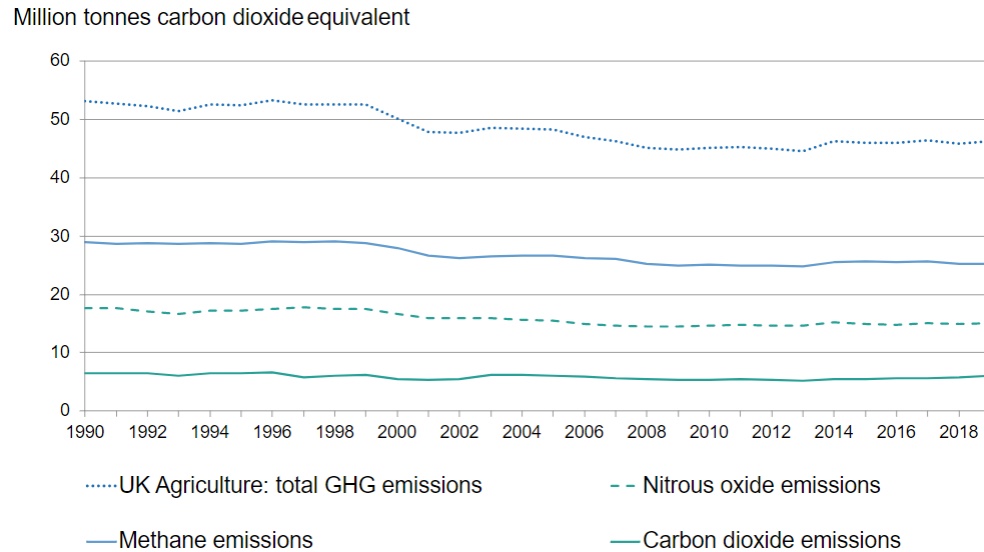


# UK Legislative Targets

- **Carbon targets** – UK net zero by 2050
  - In Scotland by 2045
- “Emissions must be reduced by 45% by 2030 ... still need a giant leap on climate ambition”
  - António Guterres, UN Secretary-General, COP 27, Nov 2022



Figure 1.2 Greenhouse gas emissions from UK agriculture



**“The ambition in the agricultural sector and the focus on voluntary measures remains concerning. Agriculture will need to make a greater contribution to meeting emissions targets...” CCC**

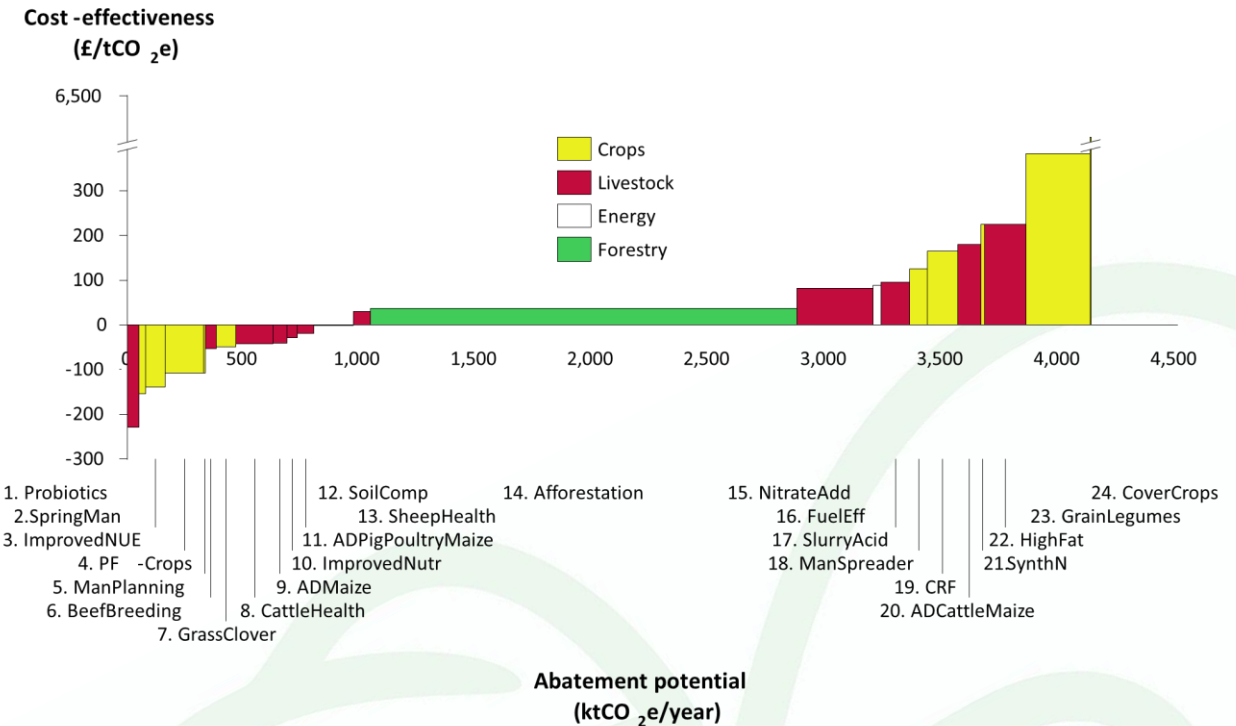
(UK Agri-climate report, 2021)

# Farm level GHG mitigation

## Mitigations must be:

- Practical
- Cost-effective (or supported by Government)
- Easy to implement
- Improve farm production efficiency
- Benefit both the farmer and the environment (“win-win”)

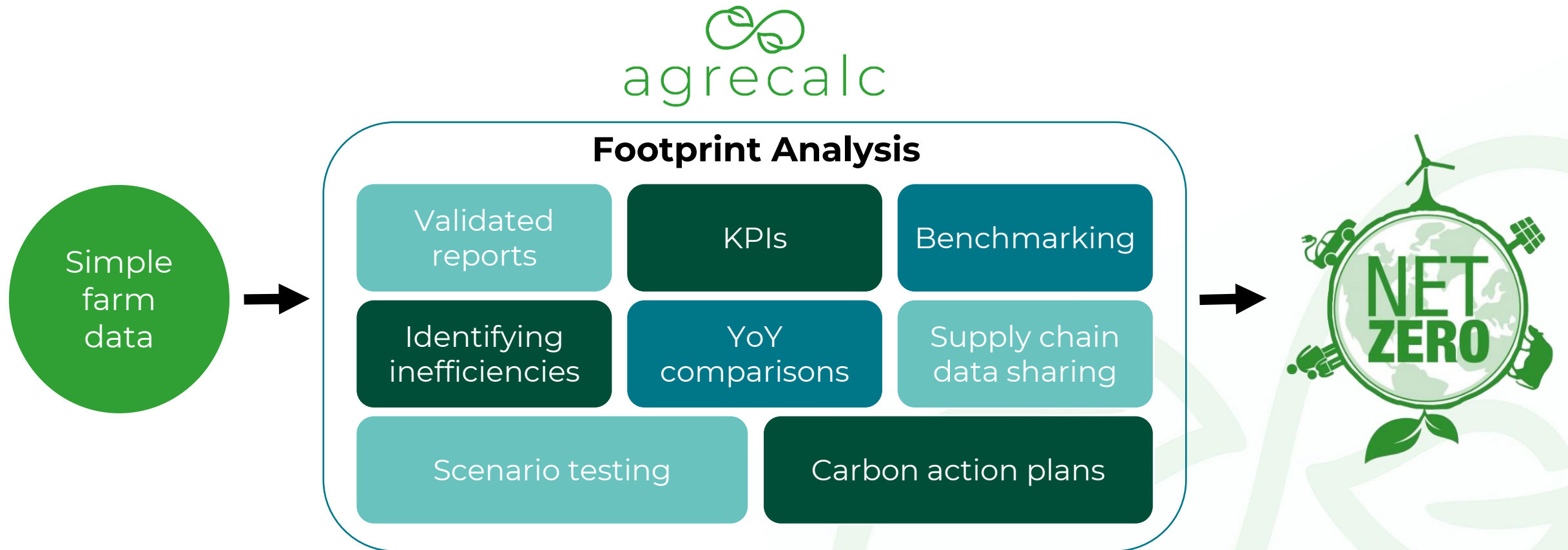
Requires best available data, understanding of that data and the system, implementation, management and active review



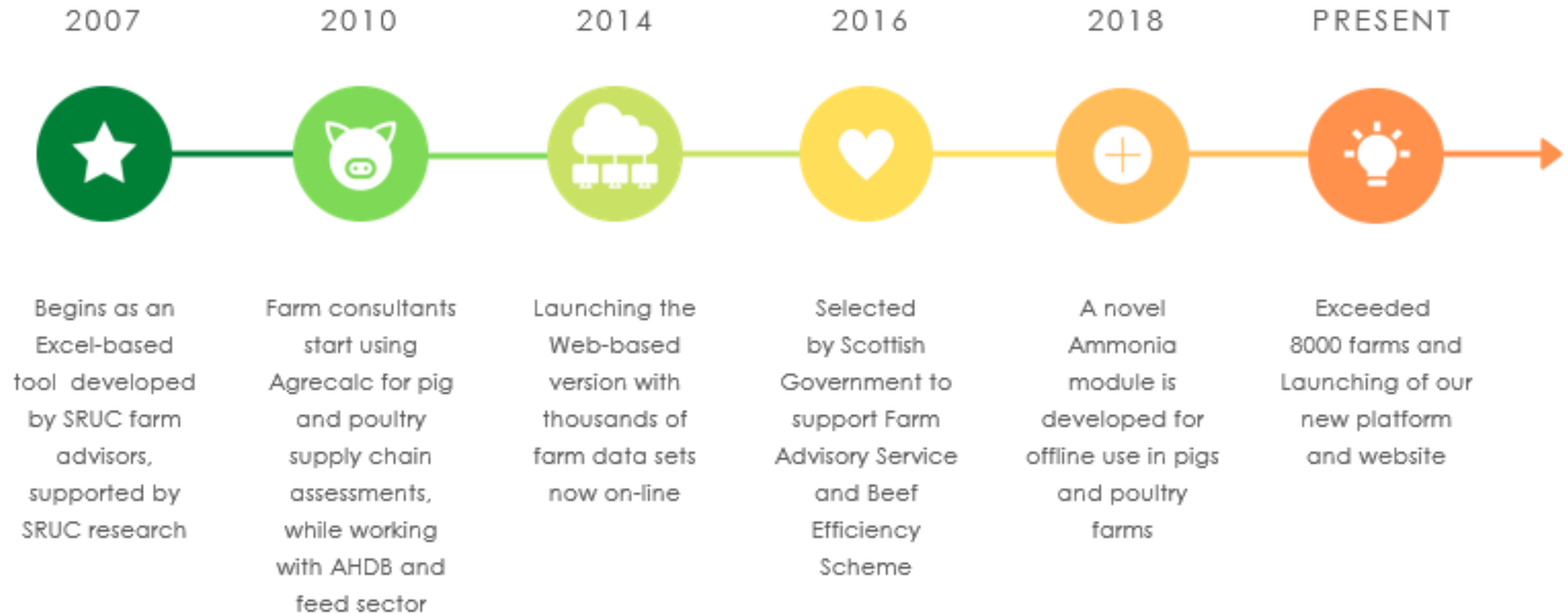
Eory et al. (2015) UK MACC, CCC

**We need to establish carbon, other environmental indicators and performance baselines**

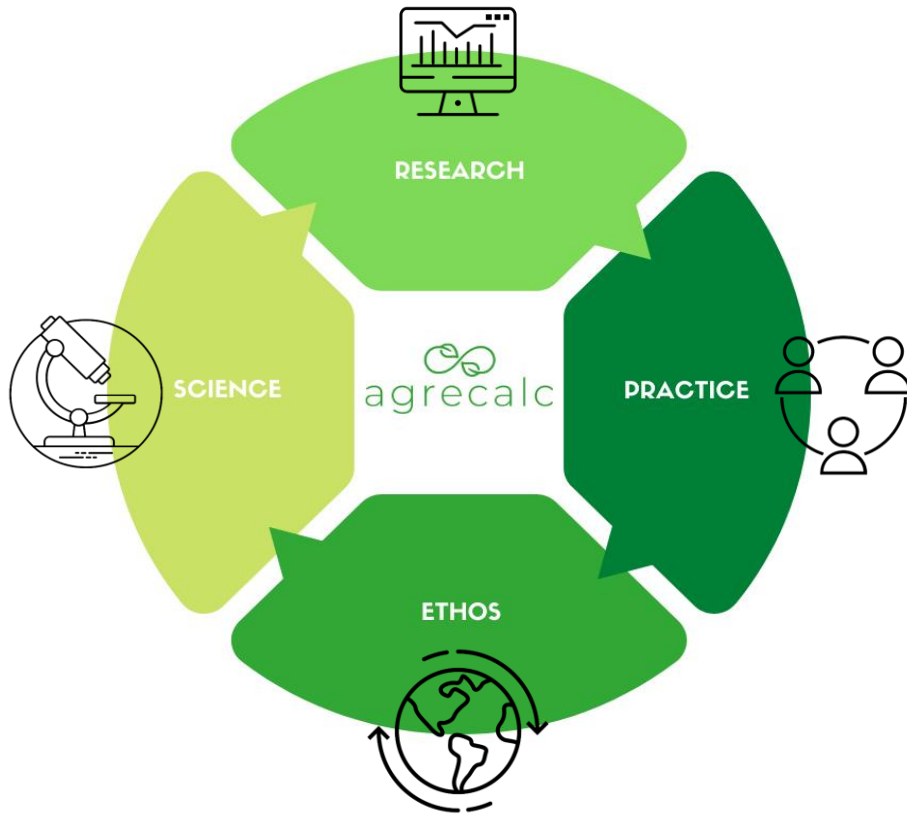
**Agrecalc** is a modelling tool that provides farmers with a clear, confident journey towards net zero



# A brief history of Agrecalc



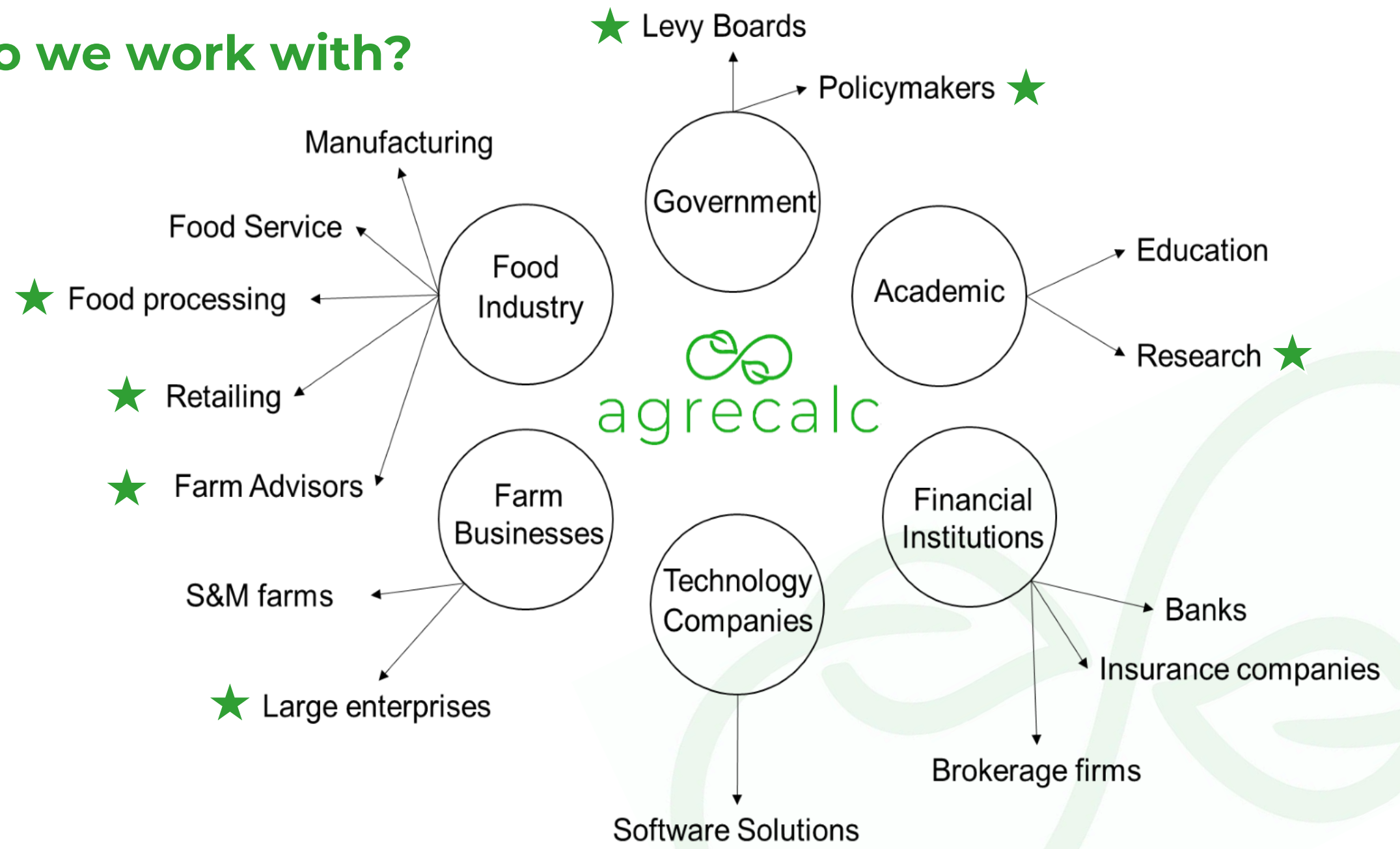
# Agrecalc = Science + Research + Practice



- **IPCC:** internationally accepted authority on climate change, publish international GHG reporting guidelines.
- **SRUC researchers:** translate IPCC science into comprehensive models, which are incorporated into our carbon calculator.
- **SAC consultants:** provide guidance and transfer frontline research to farmers and organizations who can put it to use.



# Who we work with?



# Principles of farm carbon modelling

INPUTS

PARAMETERS

OUTPUTS



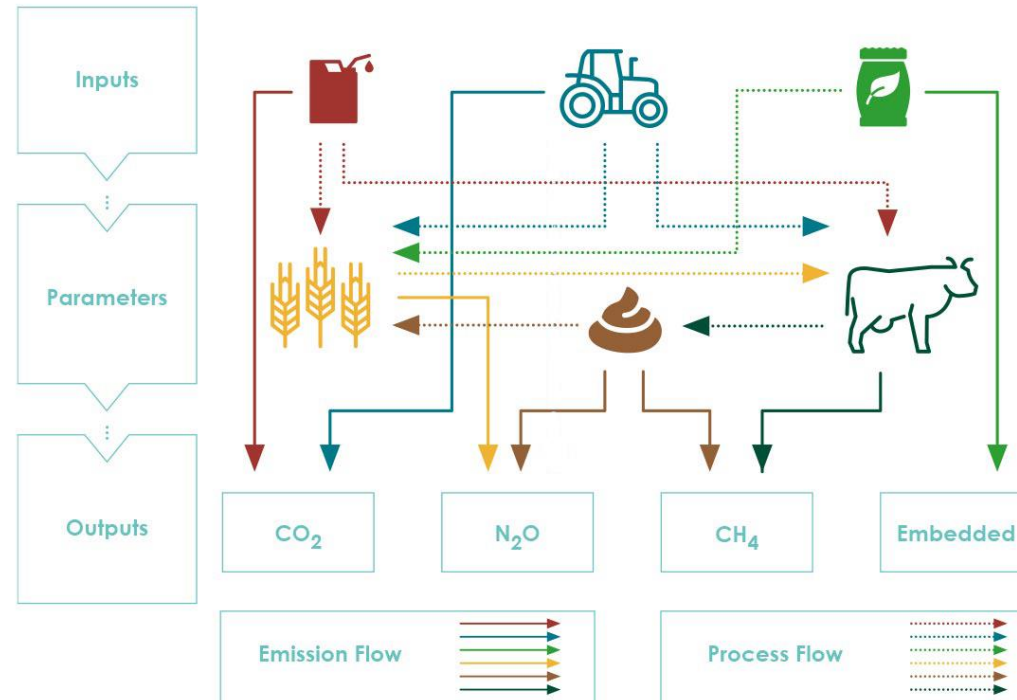
Land & Crops



Livestock



Energy & Waste



**Methane:** ruminant digestion and manures

**Nitrous oxide:** fertilizer application, manures

**Carbon dioxide:** energy use, inputs

**Carbon sequestration:** hedges, woods, soil

Aim is to account for emissions *resulting* from agricultural use of the land — not necessarily the same as emissions from land under agriculture!

# Case Study



GROSVENOR  
ESTATE



- 2,330 ha dairy farm
- >70,000L milk produced daily

**16%** lower emissions in 4 years across the dairy farm

## Improved outputs

- Higher milk yield:
  - Improved breeding & nutrition
  - Better home grown forage
  - Less lameness & mastitis
  - Improved housing
- More male cross calves: sexed semen

## Reduced inputs

- Less soya: low carbon feed by-products
- Lower fertiliser use: slurry sampling, precision application
- Lower grid electricity use: solar PV

# Scientific Development Roadmap

October

- Tier II nitrous oxide calculations from the UK National Inventory

New platform release

- Nitrification/urease inhibitors
- Transferred manures
- Enhanced pig/poultry inputs
- 3NOP feed additive (Bovaer)
- Anaerobic digestion of manures
- Scope 1/2/3 emission reporting

Further releases...

- GWP\*
- Agroforestry
- Peatland
- Woody Biomass
- Ammonia
- Geo-Spatial
- Feed ration module
- Nitrate feed additives
- Enhanced reporting
- Continuous horizon scanning!

# Soil Carbon



- Based on IPCC Tier I methodology (2019 refinement) + UK GHG Tier II
- Estimates SOC stock change from one year to next:



Coming soon:

- Organic soils
- User input soil test measurement data to 30cm depth
- Peatland module
- IPCC Tier II steady state model
- Tier II/III biophysical models?

# Woody Biomass



- Based on IPCC Tier I methodology (2019 refinement)
- Assumptions...



Coming soon:

- Enhanced linear features (hedgerows, riparian strips, shelter belts)
- Woodland Tier II methodology based on UK + research
- Agroforestry
- Tier II/III biophysical models?



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