Preliminary findings: life cycle data on GHG emissions of NZ biodiesels

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Overview

- Sustainable production of biofuels
- Carbon accounting basics
- EECA project brief
- Project method
- Implications for biodiesel production in NZ
- Wrap up

High level indirect effects of biodiesel are key to its success

1. Energy security
   - Diversity of energy supply, and energy independence if domestically produced
2. Macroeconomic benefits
   - New markets for agricultural sector
3. Engine Benefits
   - Solvent effects keep engines running cleaner
4. Fewer greenhouse gas (GHG) emissions

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Lower GHG emission intensity than conventional diesel?

- This is a generalisation.
- The volume of GHG emissions depends on the type of feedstock, the method of production and the boundary of studies to measure emissions
  - E.g. clearing forest for feedstock production land is a major source of GHG emissions which can lead to biodiesel having a higher emission intensity than conventional diesel

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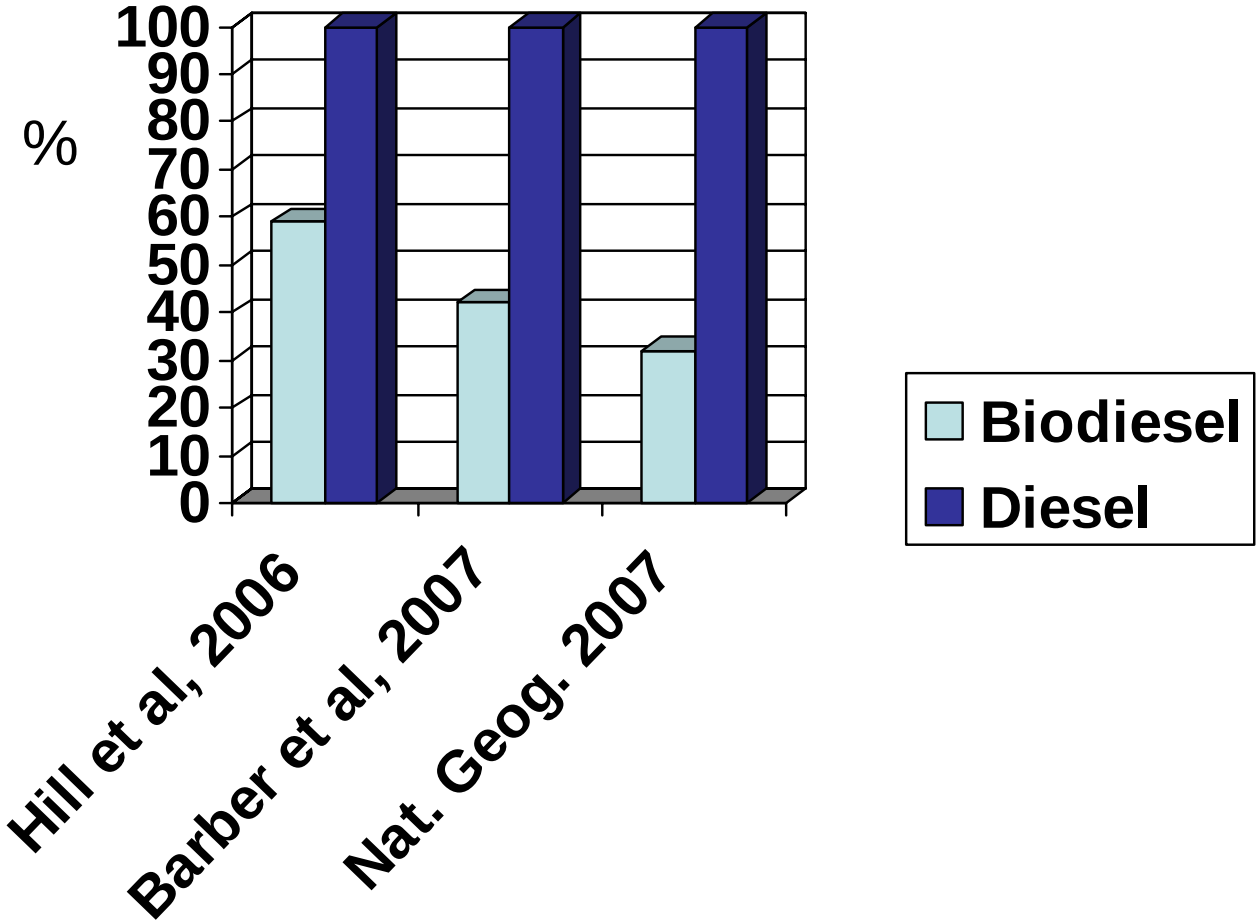
Variance in GHG reductions for biodiesel



How do we know which biodiesels produce fewer GHGs?

- Two key issues:
  1. How to measure GHG emissions?
  2. How to inform regulators and the public?
- These questions are part of a wider discussion around environmental claims of products

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Environmental claims of products

- NZ Commerce Commission draft guidelines for carbon claims
- MED Eco-verification work programme
- Environmental Choice specifications
- Waste Minimisation Act 2009
- EECA initiatives
  - Energy efficiency labels

Legislation and Policy on sustainability of biofuels

- International
  - EU Directive on biofuels + proposed directive on renewable energy
  - UK Renewable Fuels Transport Obligation (UK RFTO)
  - Proposed German Biomass Sustainability Ordinance
- New Zealand
  - Repealed Biofuels Sales Obligation
  - Minister of Energy's statements around a consistent tax exemption for 'sustainable biofuels'

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How to measure GHG emissions?

- Measuring supply chain carbon is complex
- Carbon accounting is a fast developing field
  - Greenhouse Gas Protocol (WRI, 2004)
    - organisations
  - PAS 2050 standard (BSI, 2008)
    - goods and services
  - ISO 14064 standards – targeted at organisations but can be adapted to goods and services

BSI

ISO International Organization for Standardization

The Greenhouse Gas Protocol Initiative
The foundation for sound and sustainable climate strategies

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Measurement principles for supply chain carbon footprint

- Relevance
- Completeness
- Consistency
- Transparency
- Accuracy

Steps to measure carbon emissions

1. Define the supply chain boundary
2. Collect data on activities which result in emissions
3. Convert activity data into emission data using emission factors
4. Results
5. Interpretation

Clear communication:
- assumptions
- boundaries

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EECA project brief

- Develop default values for GHG emissions in the NZ biodiesel supply chains
  - Used cooking oil
  - Tallow
  - Rapeseed oil
- Work supports requirements of New Zealand Energy Efficiency and Conservation Strategy
- Principles of project:
  - Scientifically robust
  - Practical
  - Internationally consistent
  - Key results easy to understand by public

Why develop default values?

- Too expensive to expect each supplier to undertake whole process themselves
- Consistent approach between suppliers is needed for comparability
- Consistency with international approaches improves access to markets
  - E.g. UK RFTO

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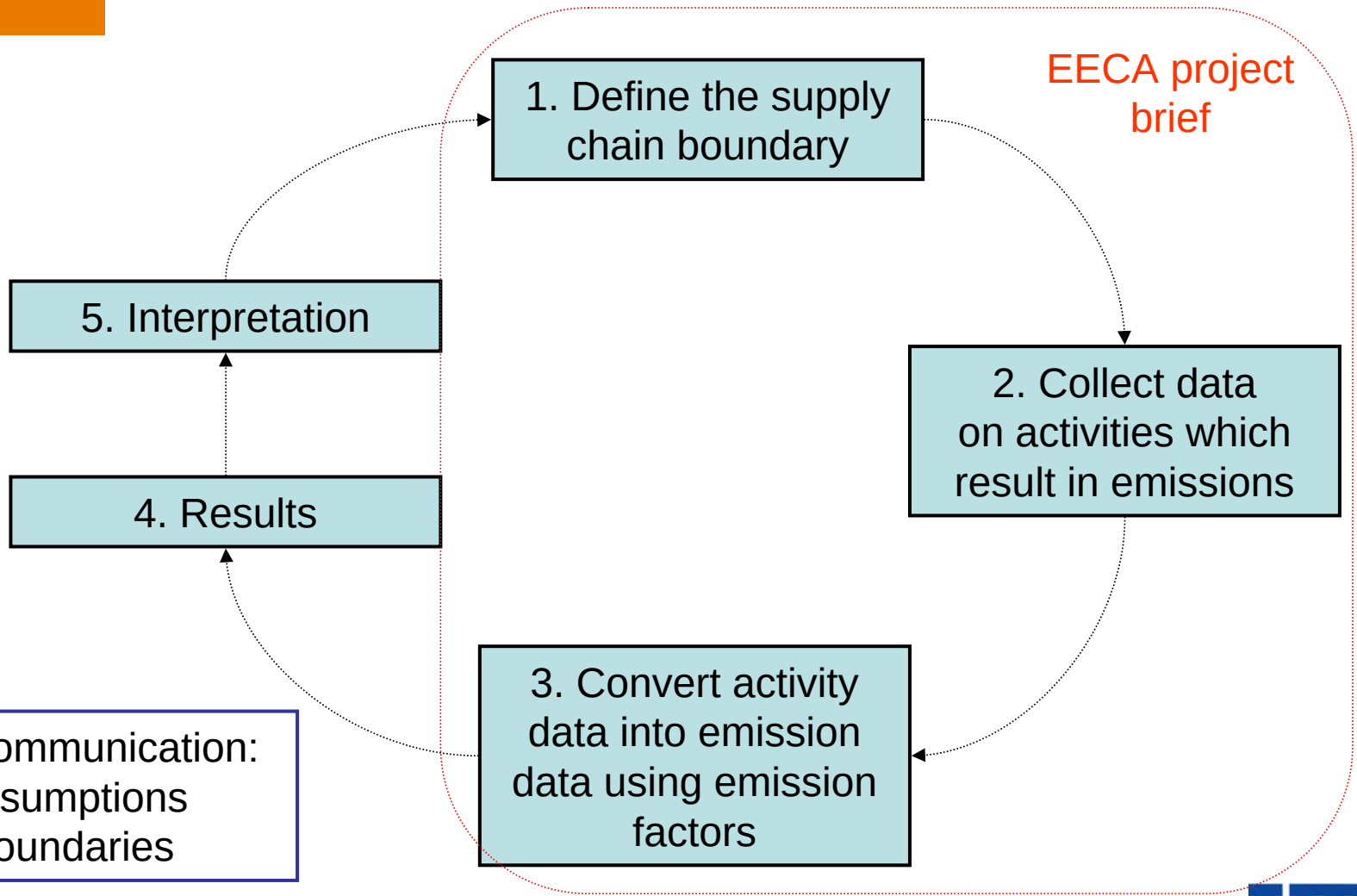
Steps to measure carbon emissions



Clear communication:
- assumptions
- boundaries

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Step 1. Supply Chain Boundaries

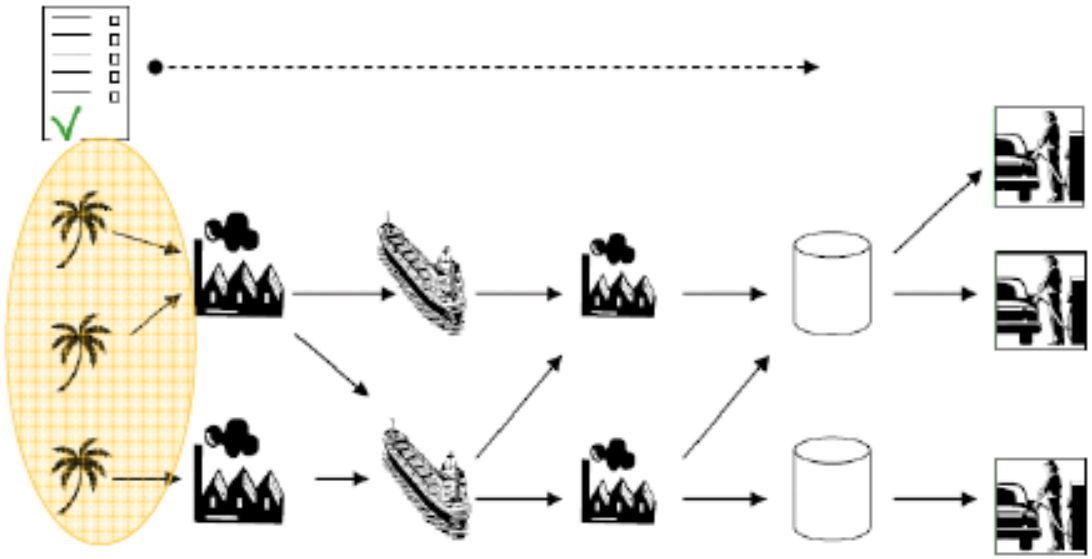

Figure 2-1 Proposed initial scope of sustainability reporting: focus on feedstock cultivation.

Figure from Dehue et al, 2008

Step 1: Boundaries

- Identify the stages of production (process)
- Identify all inputs and all outputs
- There can be many outputs
- Allocate the amount of input to each output depending on the proportion of physical or economic worth that it occupies
- Inputs which are allocated to non-biofuel outputs can be credited

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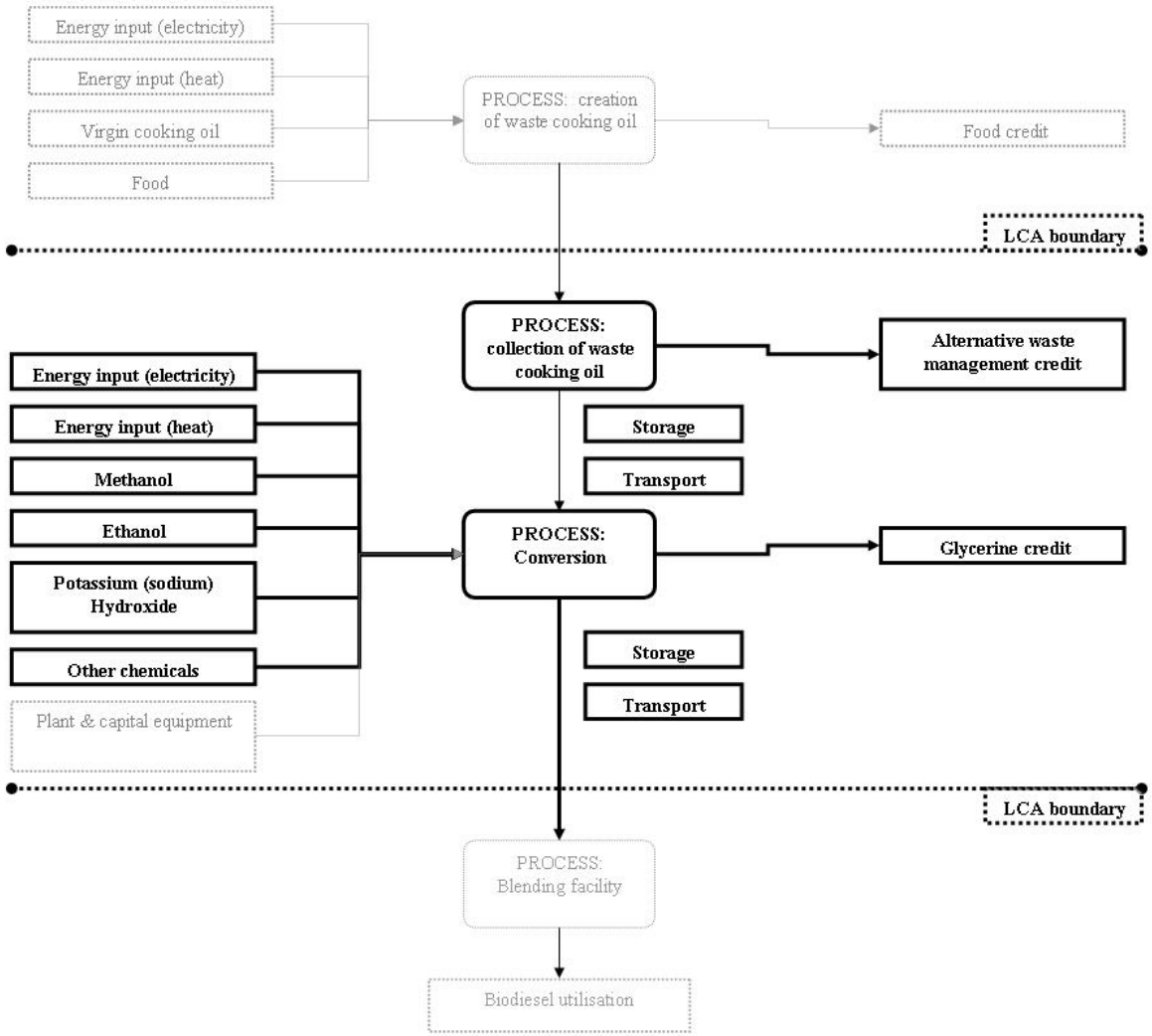
Step 1. Boundaries: used cooking oil



Tallow & Rapeseed

Step 2. Collect data on activities

- Survey provided to biodiesel producers and supply chain representatives
- Followed up with phone calls
- Data collated into spreadsheets – preserve confidentiality
- Default values derived

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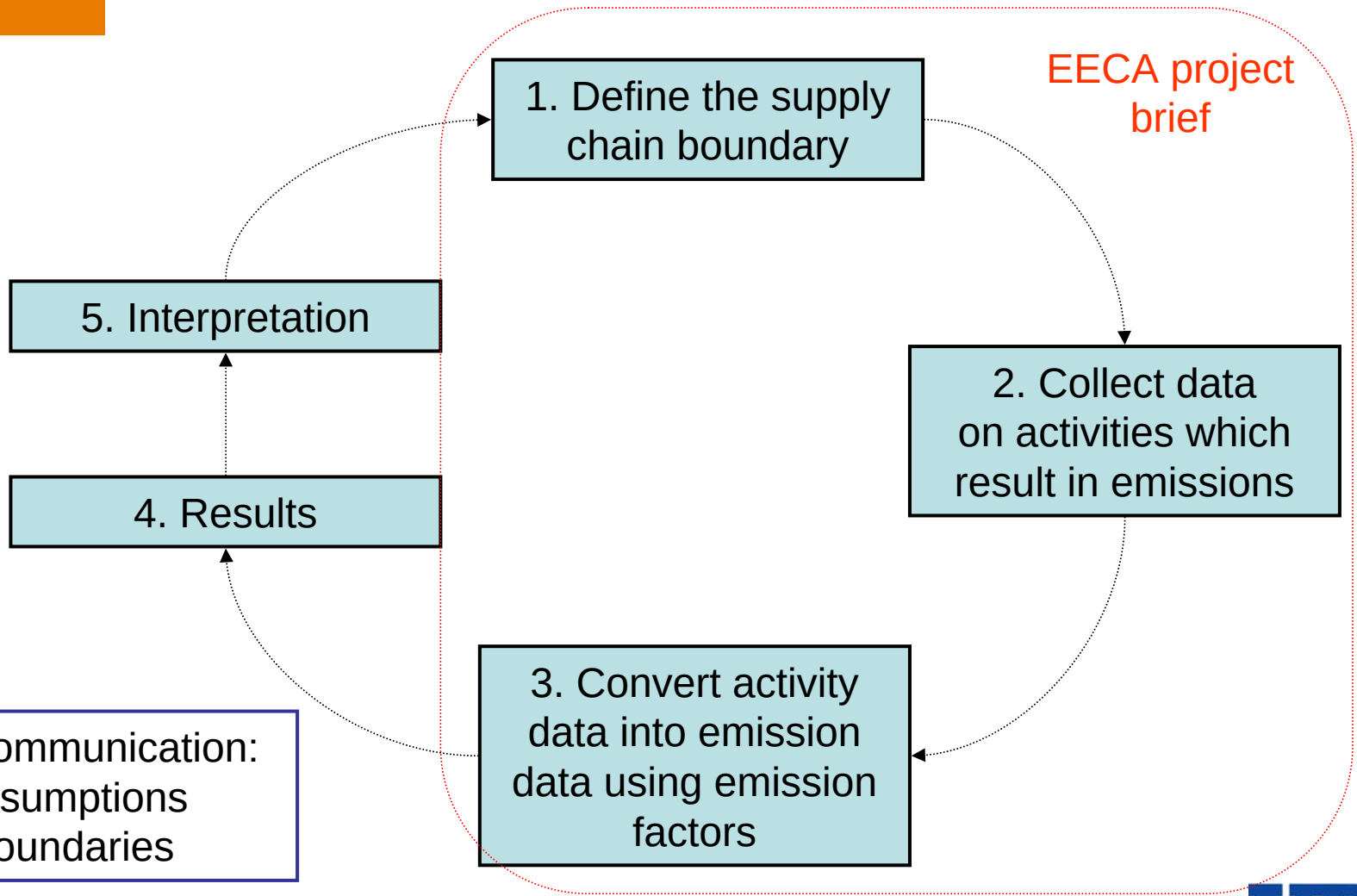
Step 3. Convert activity data using emission factors

- An emission factor converts a unit of activity to a unit of emissions
  - E.g. Using 1 kWh of electricity results in 0.165kgCO_2e
- URS also collated information on some emission factors
  - Well-to-wheels emissions for conventional diesel and petrol in New Zealand
  - International shipping
  - Fertilisers and pesticides

Steps to measure carbon emissions



Clear communication:
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How to use default values

- Combine the default values to match your supply chain (or use own data)
- EECA supplies the carbon model and emission factors
- Calculate the GHG emissions intensity of your biodiesel

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Producers can use default or own data

- Producers are expected to follow default boundaries
  - Unless you can justify another boundary
- Producers have the option of using default values
  - You can use your own data if you want
  - Data must be robust and verifiable

Where to now for NZ producers?

- GHG emission intensity can be used to qualify biodiesel against international legislation or standards, or to inform sales pitches
- Default values can be used to explore optimising individual supply chains to reduce GHG emissions
- LCA Method can be used to consider other environmental effects of your supply chain
  - E.g. water consumption

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Summary messages

- EECA commissioned URS to develop default values for greenhouse gases emitted during production of biodiesel in New Zealand
- The method follows international best practice and is consistent with UK RFTO
- Industry benefits through better information on production and option to use default values
- The results are still to come

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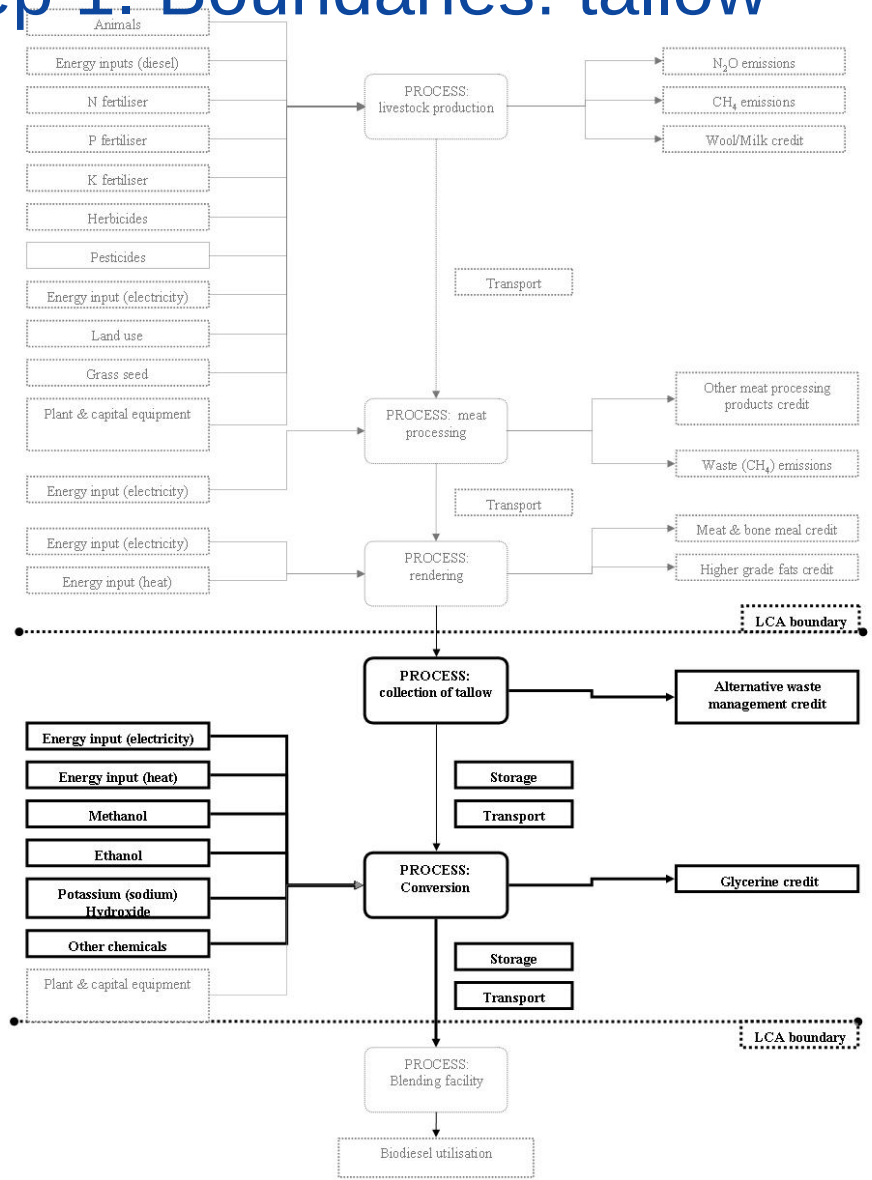
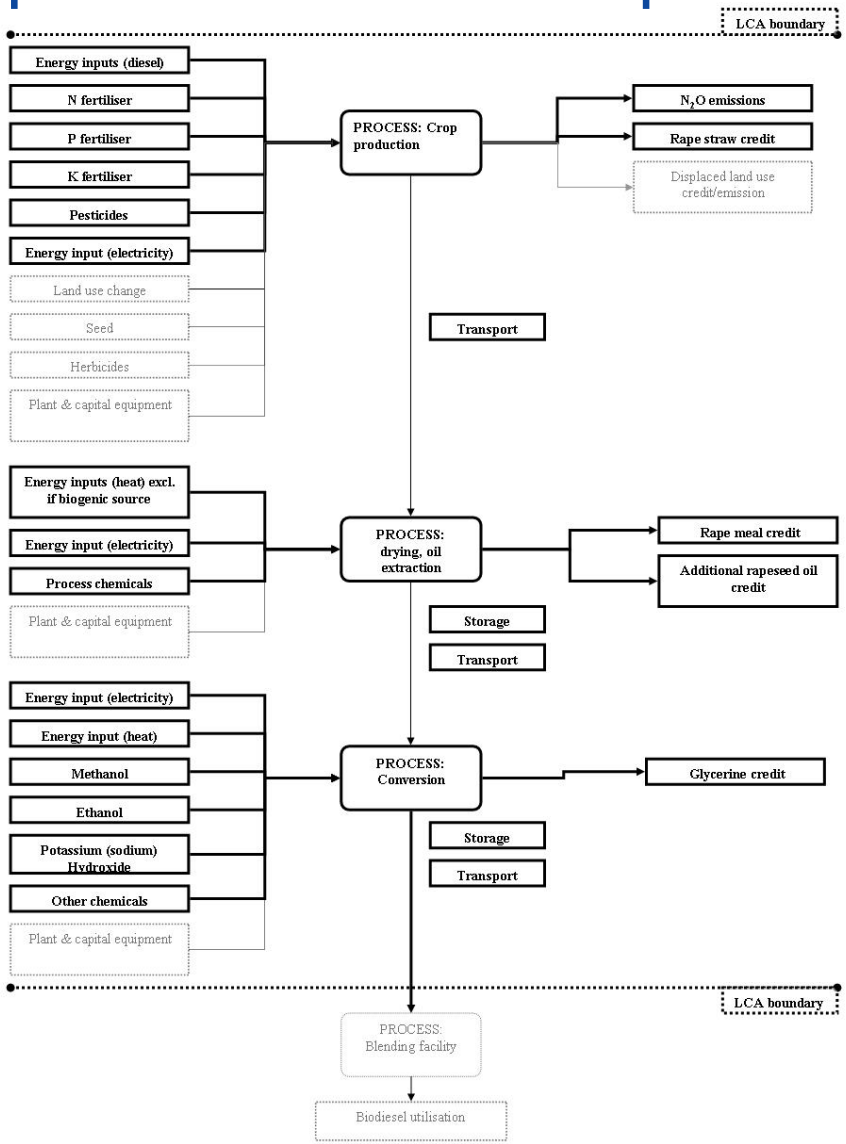
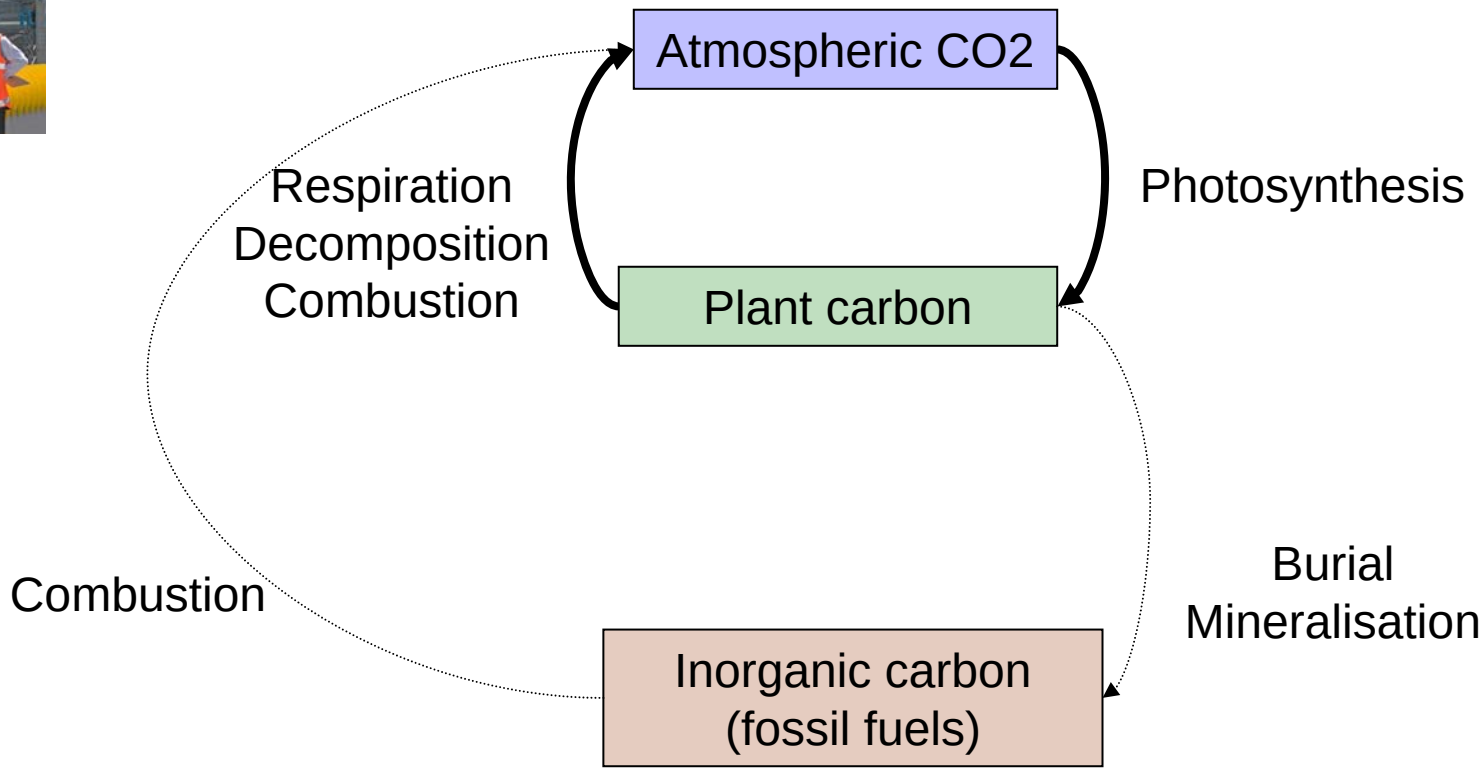
Step 1. Boundaries: tallow



Step 1. Boundaries: rapeseed oil



Simplified carbon cycle