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EUROPEAN FOOD CHAIN SUPPLY TO REDUCE GHG EMISSIONS BY 2050

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Background to the project, what has been achieved, why do we need to decarbonise

13 August 2025

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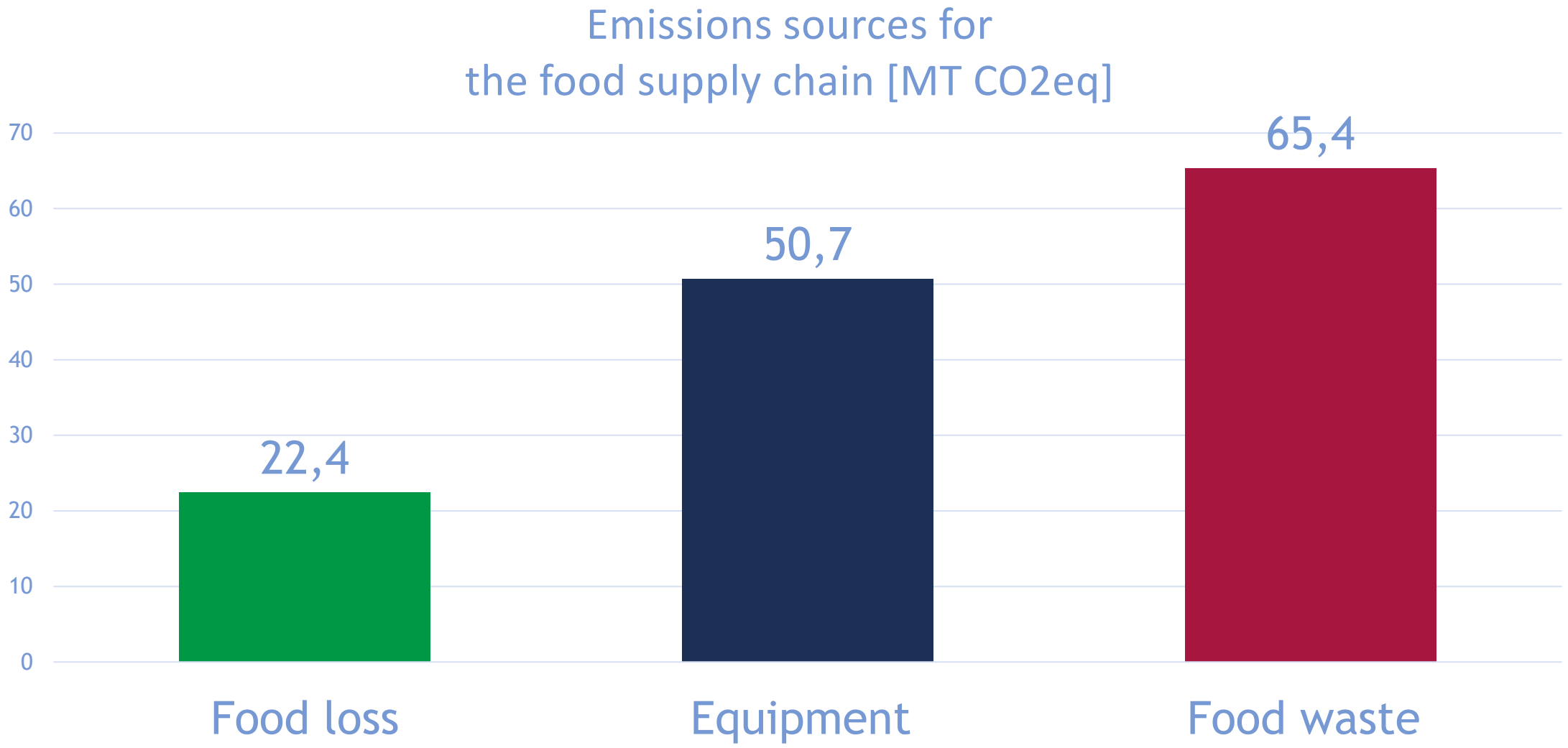
This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 101036588.

Why do we need to decarbonise?

- Food systems responsible for 1/3 of all greenhouse gas emissions
- High diversity and mainly small and medium size enterprises
- Cooling and heating is essential for preserving food, but also generates GHG emissions



Plots using FAO data 2019

…an EU-call on reducing GHG emissions…

… and what followed

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Funded by the European Union

Start: 2021 October

End: 2025 September

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- Goal: reduce GHG emissions in the food value chain
  - Thermal processes: cooling, freezing, heating
  - Increasing energy efficiency (integration, utilising surplus heat, thermal energy storage etc)
  - Reducing CO_2 emissions heating (gas -> heat pumps)
  - Natural refrigerants (introduction, improving systems)

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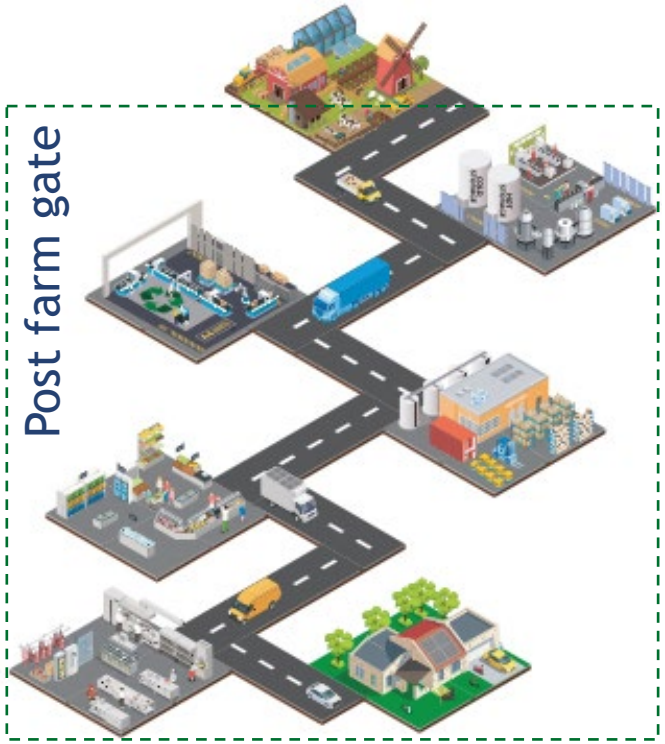
- 30 partners
  - 12 countries



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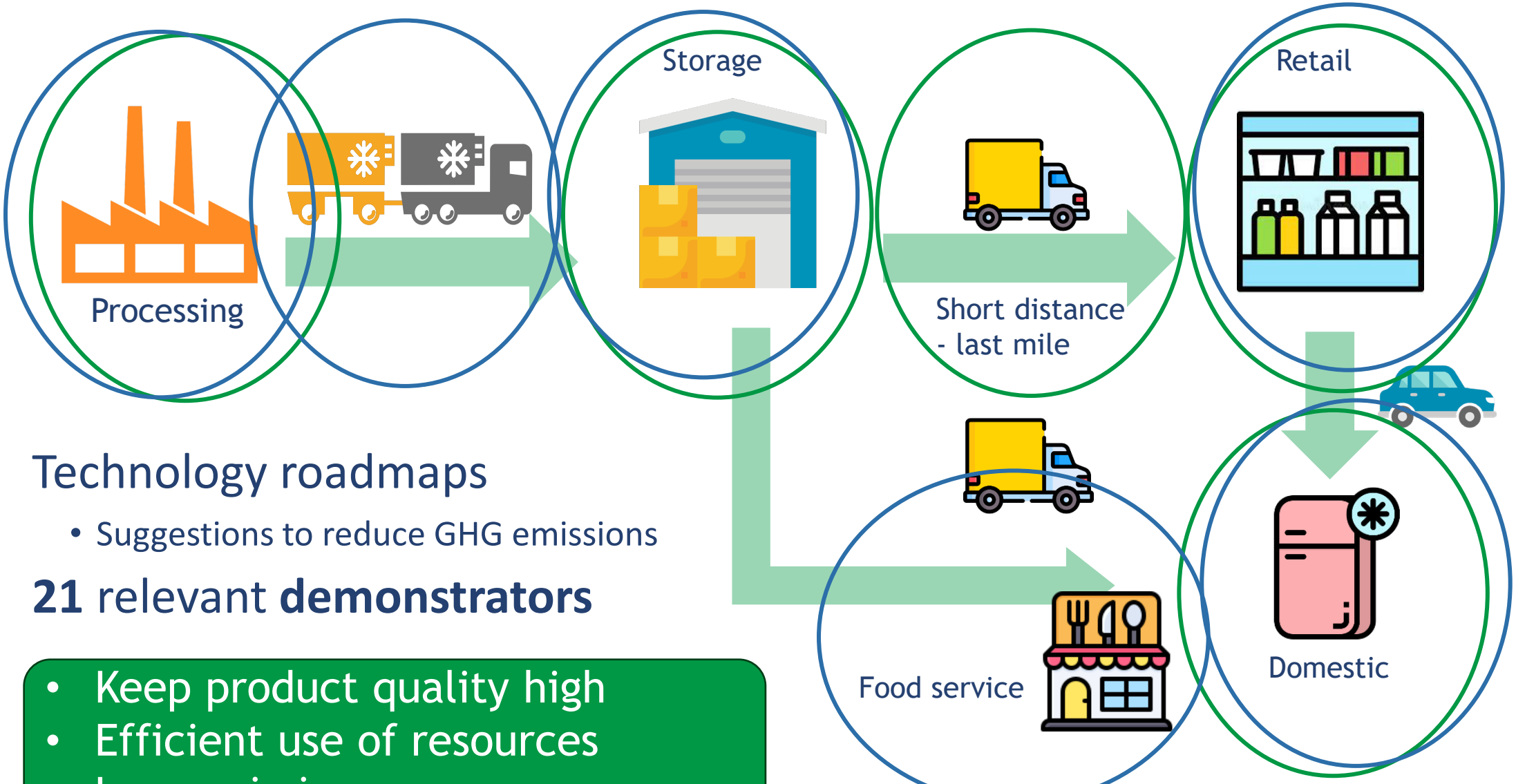
Work Package structure

- **WP1 – Baseline (1990) current (2019) and future (2030 and 2050) carbon emissions**
- **WP2 – Technology roadmaps and models**
- **WP3 – Energy, behaviour, finance**
- **WP4 – Integration of heating, cooling, AC, thermal symbiosis and energy storage within and between sectors**
- **WP5 – Smart data systems**
- **WP6 – Demonstrations of best technologies for key products and cross sectors**
- **WP7 – Policy, strategy, advice to achieve targets**
- **WP8 – Communication, dissemination, and exploitation**
- **WP9-WP11 – Management and cooperation**

- Technological and non-technological methods and solutions

The food value chain



Technology roadmaps

- Suggestions to reduce GHG emissions

21 relevant **demonstrators**

- Keep product quality high
- Efficient use of resources
- Low emissions

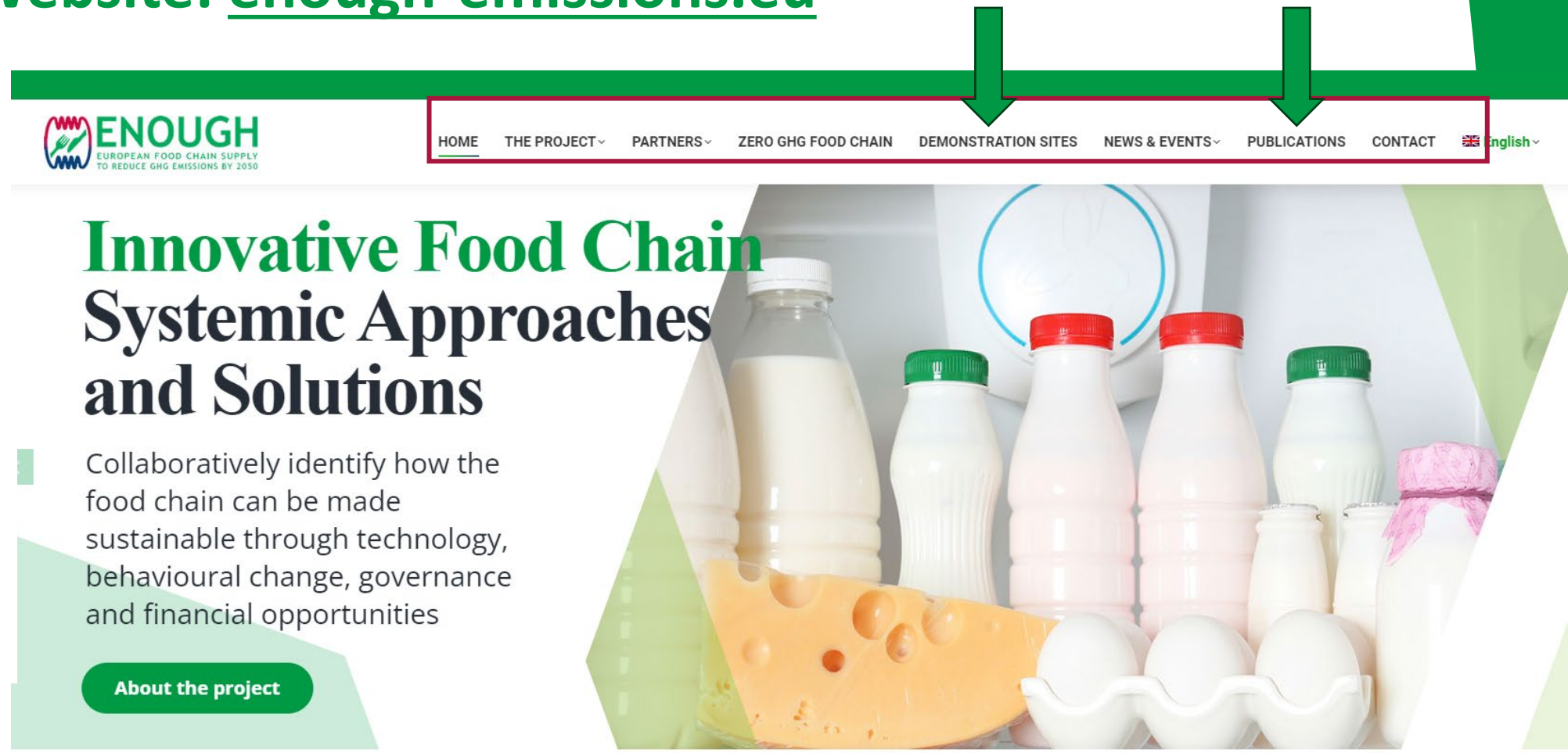
What have we learnt?

- Close academia–industry collaboration accelerates innovation
- Visibility across sectors increases reach and adoption
- Scientific excellence must be matched with viable business models and exploitation — without real-world value, results won’t survive
- Data sharing and transparency important
- Open dissemination on our website extends project impact

Next steps and future opportunities

- Wrap up & consolidate results – ensuring all findings are clear and accessible
- Complete deliverables – submission before end of September
- Publish key findings – special issue in International Journal of Refrigeration
- Pursue new funding – develop & submit proposals for next projects

ENOUGH Website: enough-emissions.eu



The ENOUGH project has set objectives to address and reduce the emissions of the food sector. Food systems are globally responsible for between 20 to 40 % of total greenhouse gas emissions

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THANK YOU !

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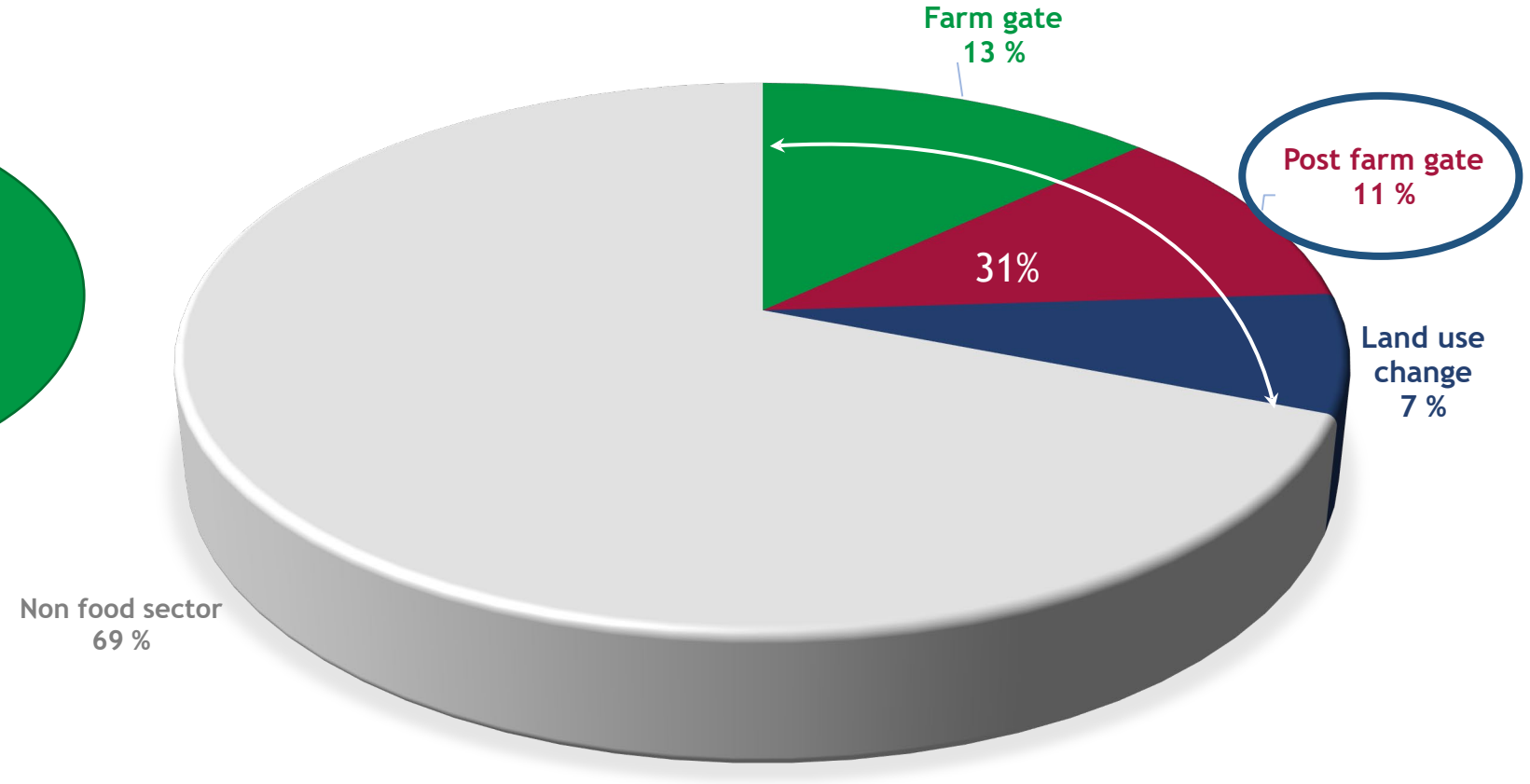
Global emissions 2019

1/3 of total GHG emissions related to food systems



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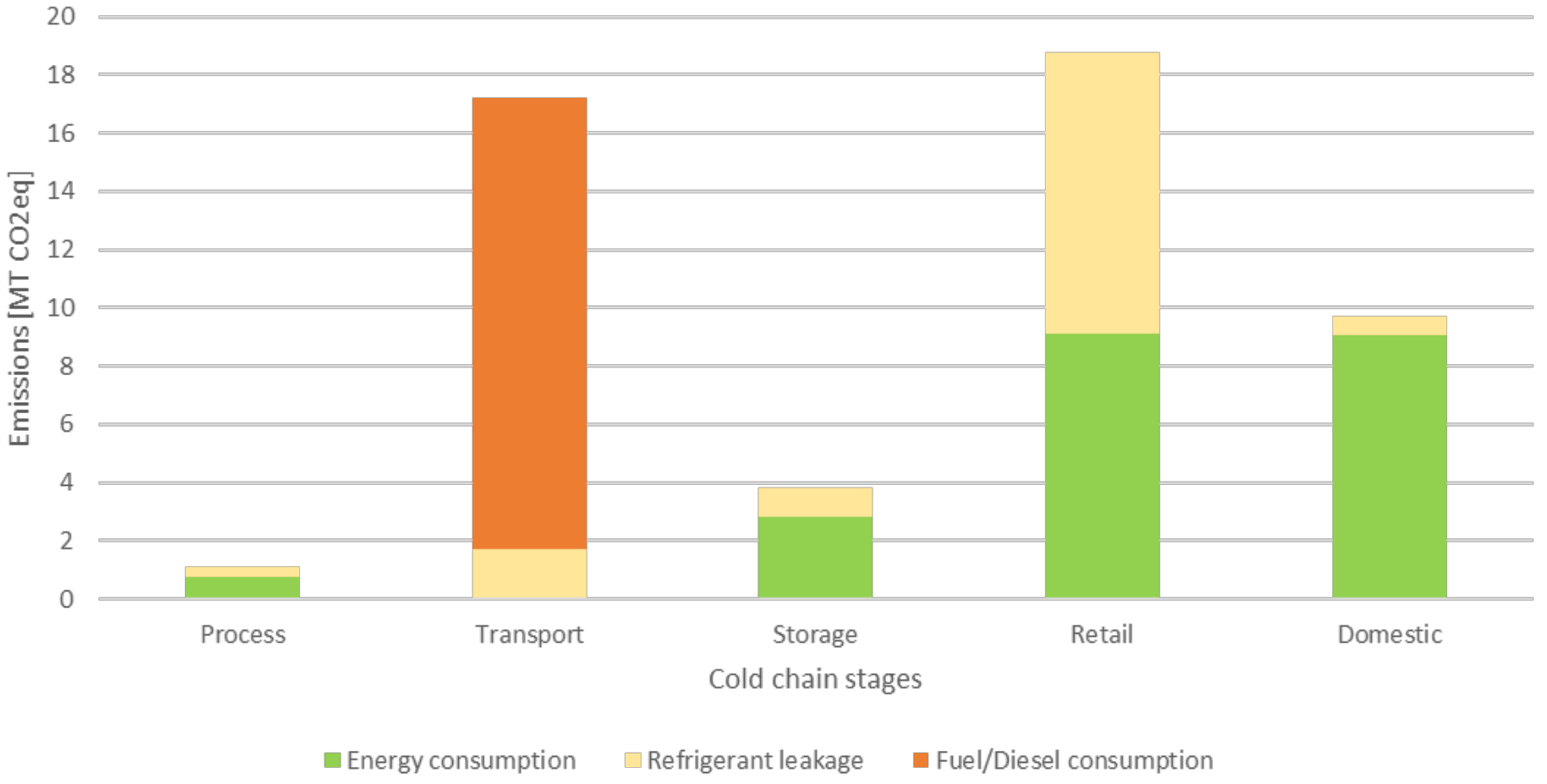

Source: The IIR informatory note : The carbon footprint of the cold chain 2021 and FAO data