

Analysis of waste streams and their life cycle impact in food manufacturing industries

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Research background & aim

Food manufacturing is a complex process in which vast amounts of wastes and by-products are generated. This project aims to develop evidence-based whole-system change to recover unavoidable food supply-chain wastes and by-products and use them to produce new food products.

Case studies

Beer, potatoes, peas and citrus fruits are the four food sectors analysed in the project.

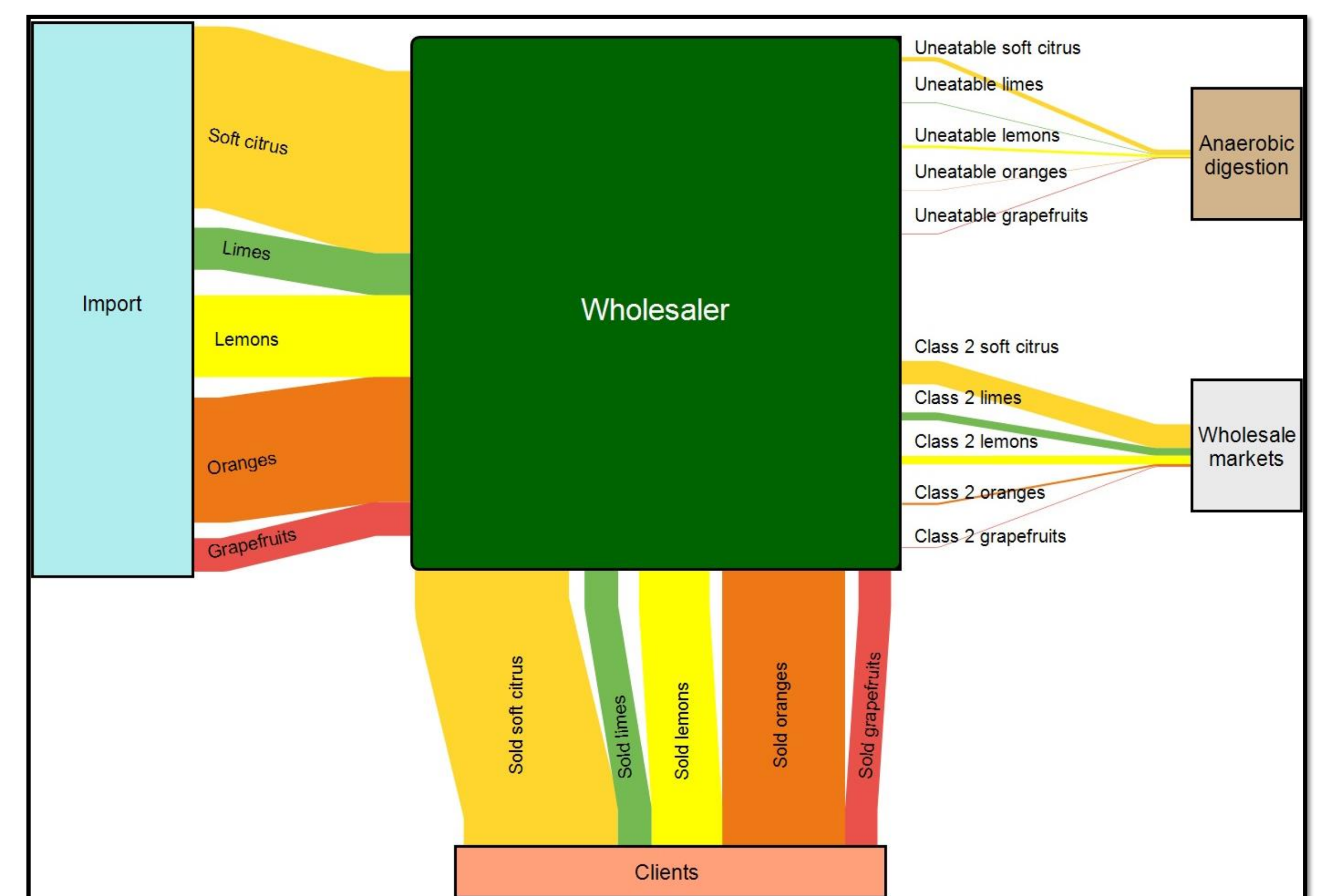
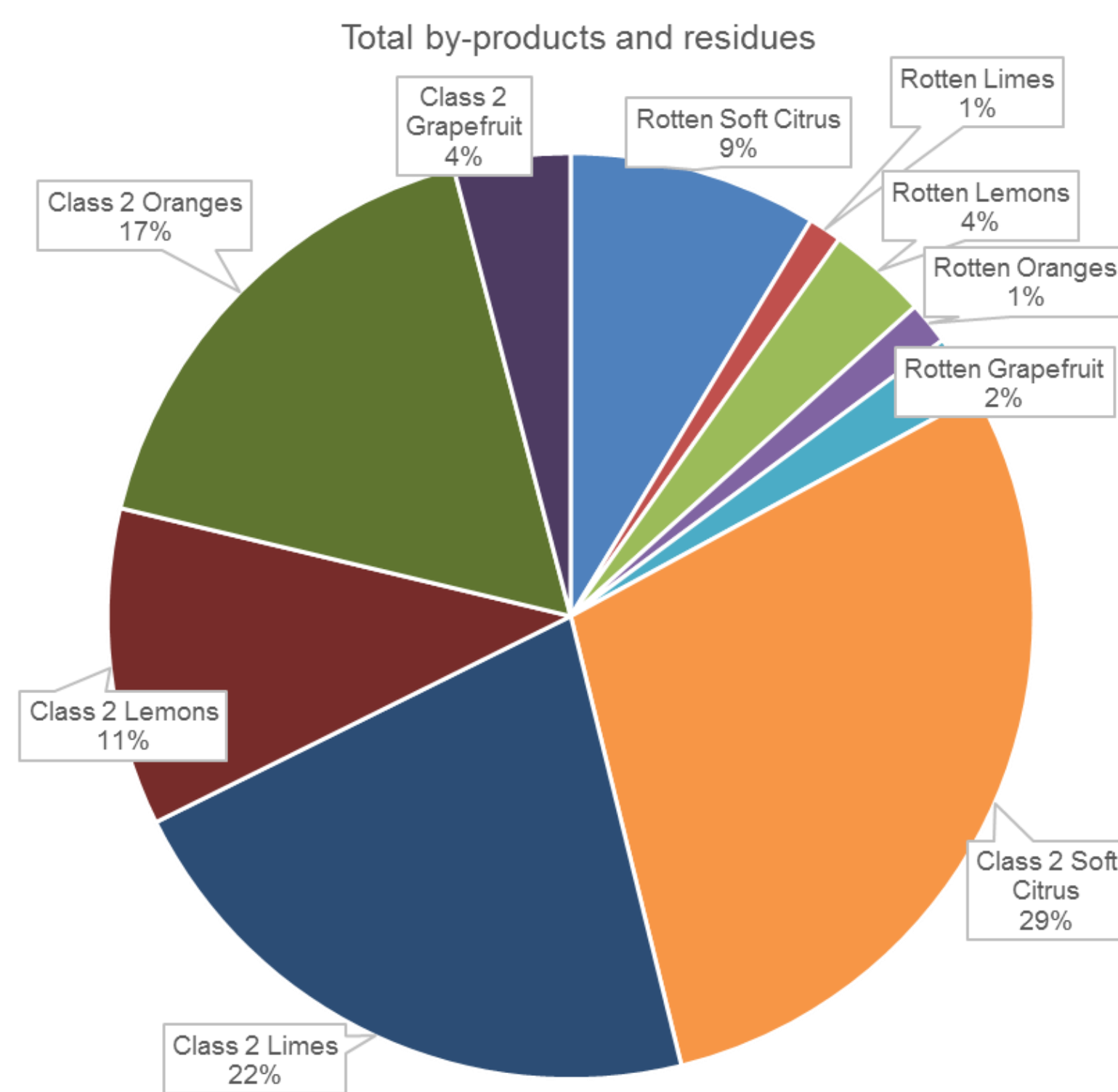


Waste Flow Modelling

Research objective: to develop a comprehensive understanding and quantification of the amount of food being under-utilised in the industry through the outputs of waste flow modelling.

Current practices for waste disposal are being studied to propose key indicators and novel solutions to characterise unavoidable food supply-chain wastes and by-products.

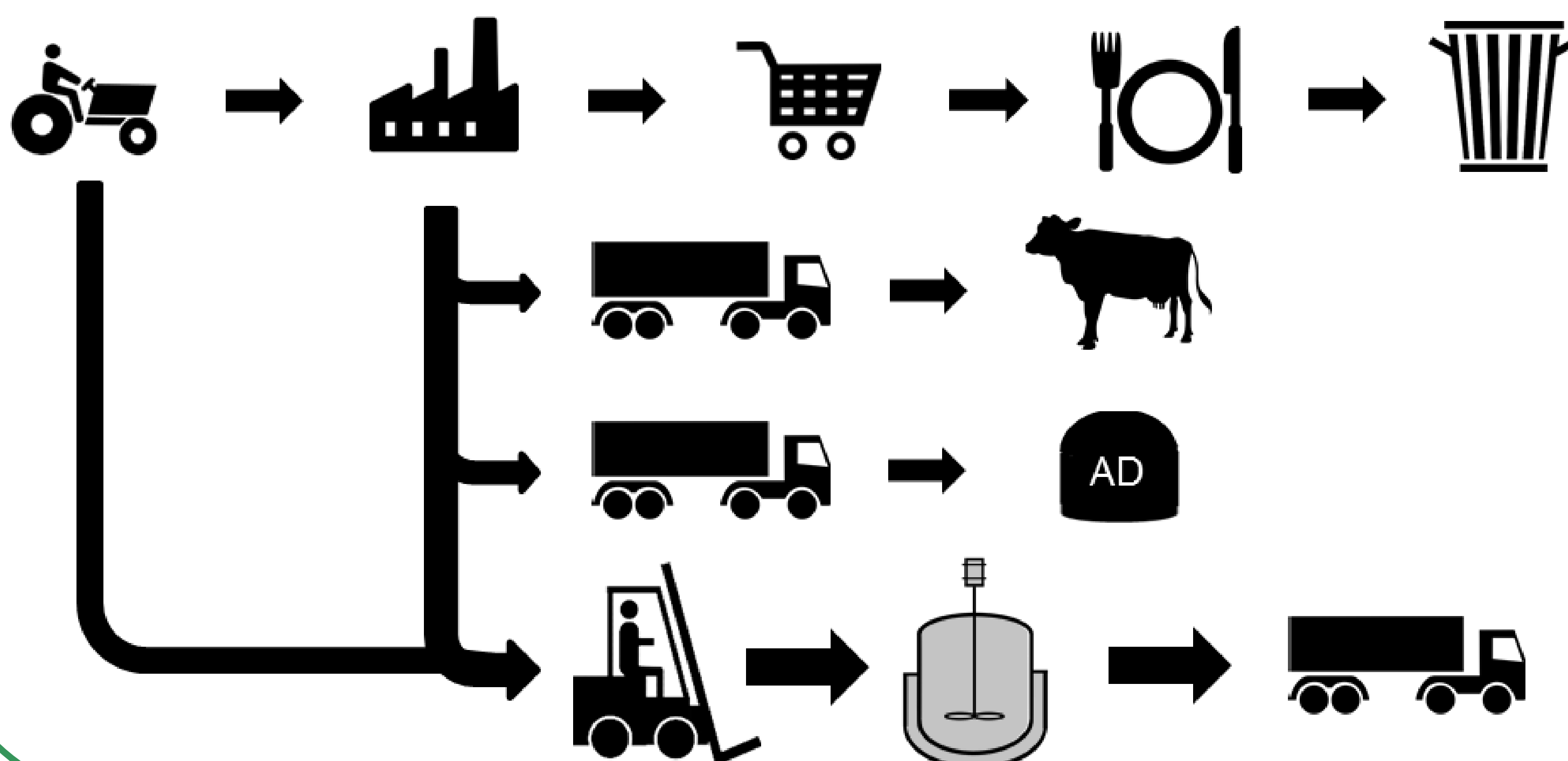
After analysing the reasons for waste generation, initial proactive whole-system solutions to eliminate waste are being proposed and examined, before developing reactive solutions for upgrading the remaining unavoidable waste.



Life-Cycle Assessment

Research objective: to assess environmental ramifications of industrial technologies and processes to treat food wastes and by-products.

The specific domain to assess is the set of industrial activities needed to extract a useful compound from a food waste or by-product with the aim of using it to create new food products. The environmental impact associated with these activities will be compared with existing waste management solutions, which are frequently animal feeding and anaerobic digestion. With this objective, SimaPro software is used to assess the main environmental impacts to air, water and soil.



Indicator	Example or unit	FWMS
Total emissions to air	m ³ /day	T, AD, C, TT
CO ₂	mg/m ³	T, AD, C, TT
CH ₄	mg/m ³	T, AD, C, TT
N ₂ O	mg/m ³	T, AD, C, TT
NO _x	mg/m ³	T, AD, C, TT
NM VOC	mg/m ³	T, AD, C, TT
Total organic carbon (TOC)	mg/m ³	T, TT
NH ₃	mg/m ³	AD, C, TT
SO _x	mg/m ³	AD, C, TT
HCl	mg/m ³	AD, C, TT
Dioxins, furans, PAH, PCBs	mg/m ³	AD, C, TT
H ₂ S	mg/m ³	AD, C
CO	mg/m ³	AD, C, TT

FWMS: food waste management solution
 T: transport
 AD: anaerobic digestion
 C: composting
 TT: thermal treatments with energy recovery

Initial results and conclusions

Initial results show that there are vast quantities of by-products and residues from the food industry which could be valorised and used to manufacture new food ingredients. An exhaustive study of the status quo of current waste management practices is needed, and when alternative waste management options are identified, an assessment of their environmental and economic performance will be necessary.

