

# Green Farm

## On-Farm Anaerobic Co-digestion of Pig Manure and Food residues

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# Agenda

- Drivers for Anaerobic Digestion
- Barriers to Anaerobic Digestion
- Food Residues and Manure Co-digestion
- Project Aims
- Results Thus Far
- Future Work



# Anaerobic Digestion- Regulatory Drivers in Ireland- Greenhouse Gas Mitigation

- Average EU contribution of agriculture is 9%.

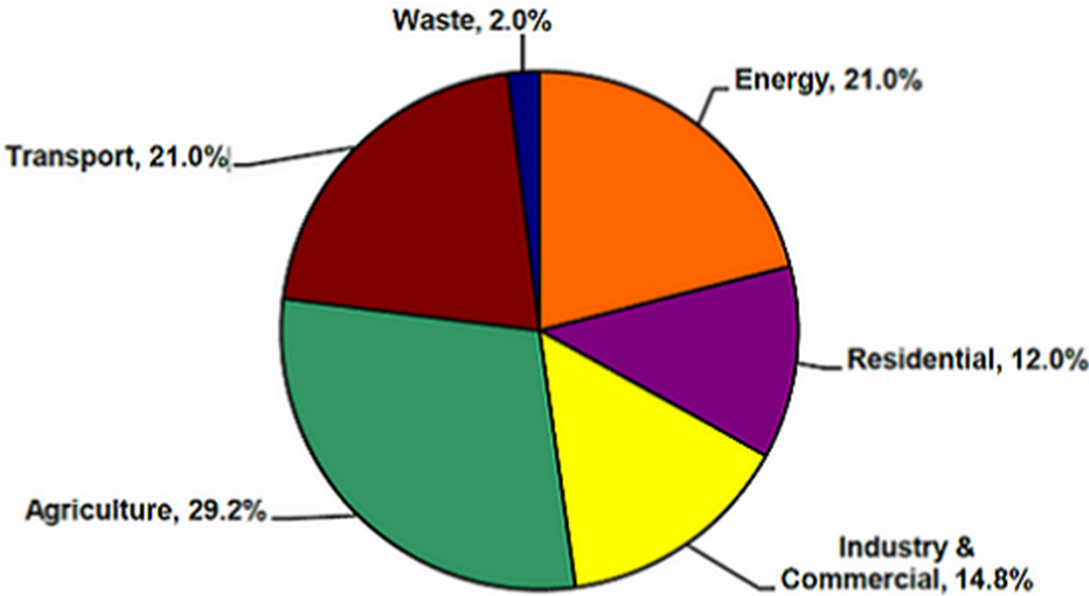
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# On Farm Anaerobic Digestion-Barriers Thus Far

- REFIT Ireland 15c kWh vs ROCs in N. Ireland 28c
- Complex planning process
- Low methane yield from manure alone
  - Digestion of manure and other agricultural feedstocks (co-digestion) to increase methane yields investigated.
  - Mixing silage with manure increased methane yields; silage too expensive.



# Manure and Food residues Co-digestion

Food residues -high biogas yield-unstable

Manure- low biogas yields- excellent buffer

Co-digestion results in significantly higher methane yields

Additional revenue stream for farmers in the form of gate fees

- Reduce GHG emissions from Agriculture
- Increase renewable energy provision
- Non-landfill management route for food residues



# Green Farm Project

Assess the economic and environmental viability of the concept of on-farm anaerobic co-digestion of pig manure and food residues

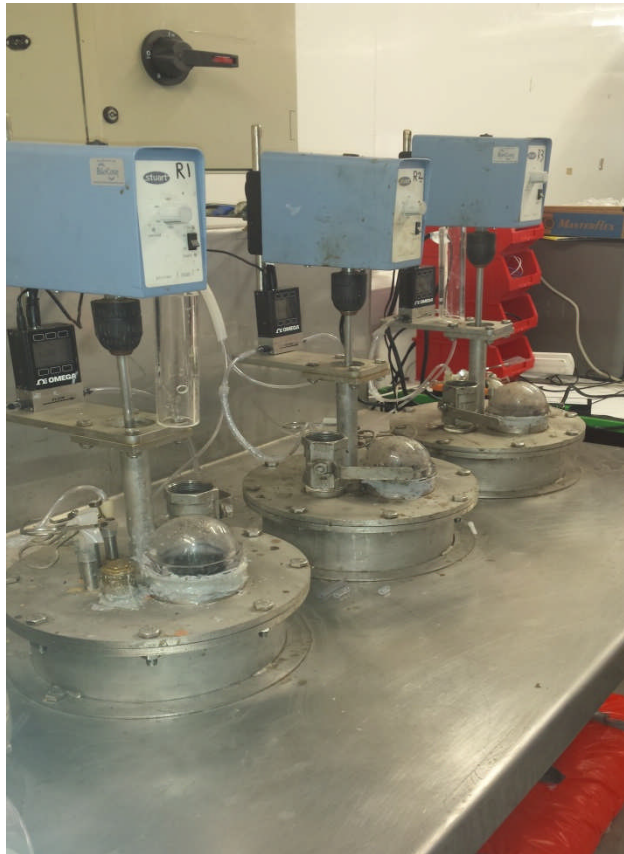


# Progress Thus Far

- Batch experiments to assess methane generation rates of food waste and pig manure to find what mix is best
- Semi continuous 10L digesters operating in lab in order to identify best operating conditions
- Digestate being analysed for pathogen removal rates, heavy metal content, chemical composition



# Reactors

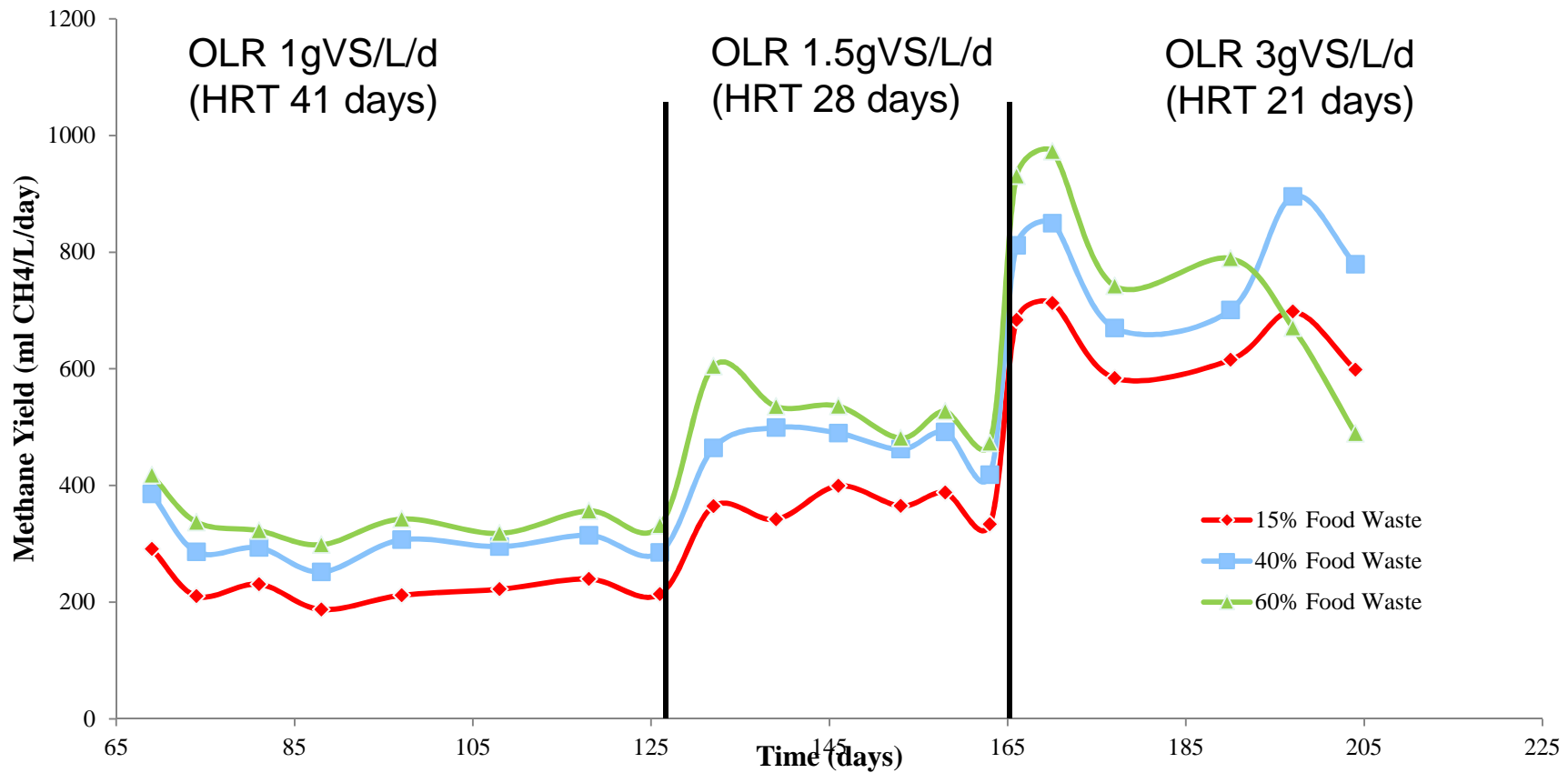


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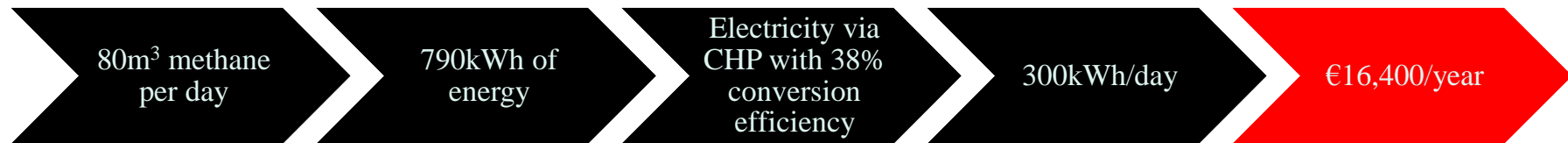


# Semi Continuous Experiment-Methane Yields



# Energy Yield Thus Far

- Maximum methane yield achieved thus far approx. 0.8L/L/d when mixing 60% food residues and 40% pig manure (volatile solids basis).
- For a small 100m<sup>3</sup> plant



- Economically feasible?



# Next Steps

- Identify optimal operating conditions for maximum gas yield
- Assess the effects of the pre-treatments required by the ABP regulations on gas yield and digestate quality
- Operate mesoscale reactor and develop mathematical model for predicting gas yields
- Assess how changing operating conditions affect microbial populations within digesters
- Assess overall feasibility of concept through life cycle analysis



# Questions

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AGRICULTURE AND FOOD DEVELOPMENT AUTHORITY

