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UCD School of Agriculture and Food Science
BiOrbic (SFI Circular Economy Center)

Food Waste, Anaerobic Digestion and the Circular Economy

Food and the Circular Economy

Institute of Food and Health, University College Dublin

30th March 2023



Ajay Menon, Ph.D.



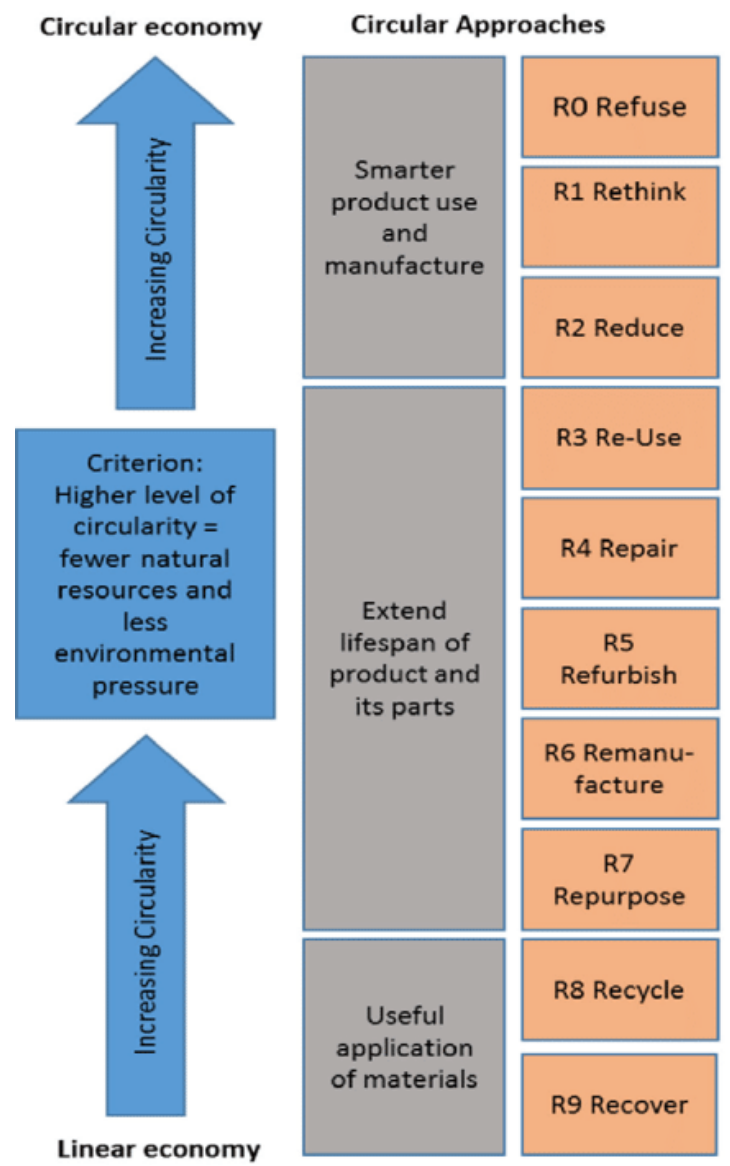
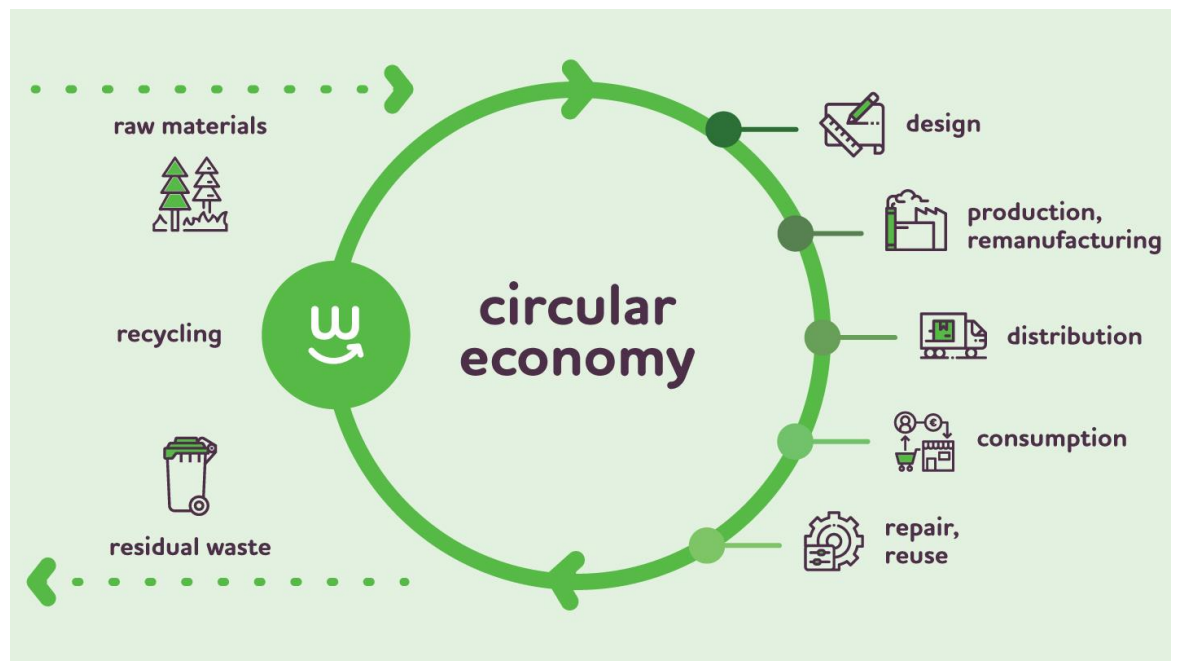
PhD: Optimisation of Phase Separated Thermophilic Anaerobic Digestion of Food Waste,
Nanyang Technological University (School of Civil and Environmental Engineering), Singapore

Research Fellow, School of Agriculture and Food Science, UCD/BiOrbic

Assistant Professor, UCD/GDIC (From May 2023)

Research Focus: Biological solutions for converting organic wastes into resources

Specific Focus: Value Extraction from Food Waste, Integrating AD into Circular Economy



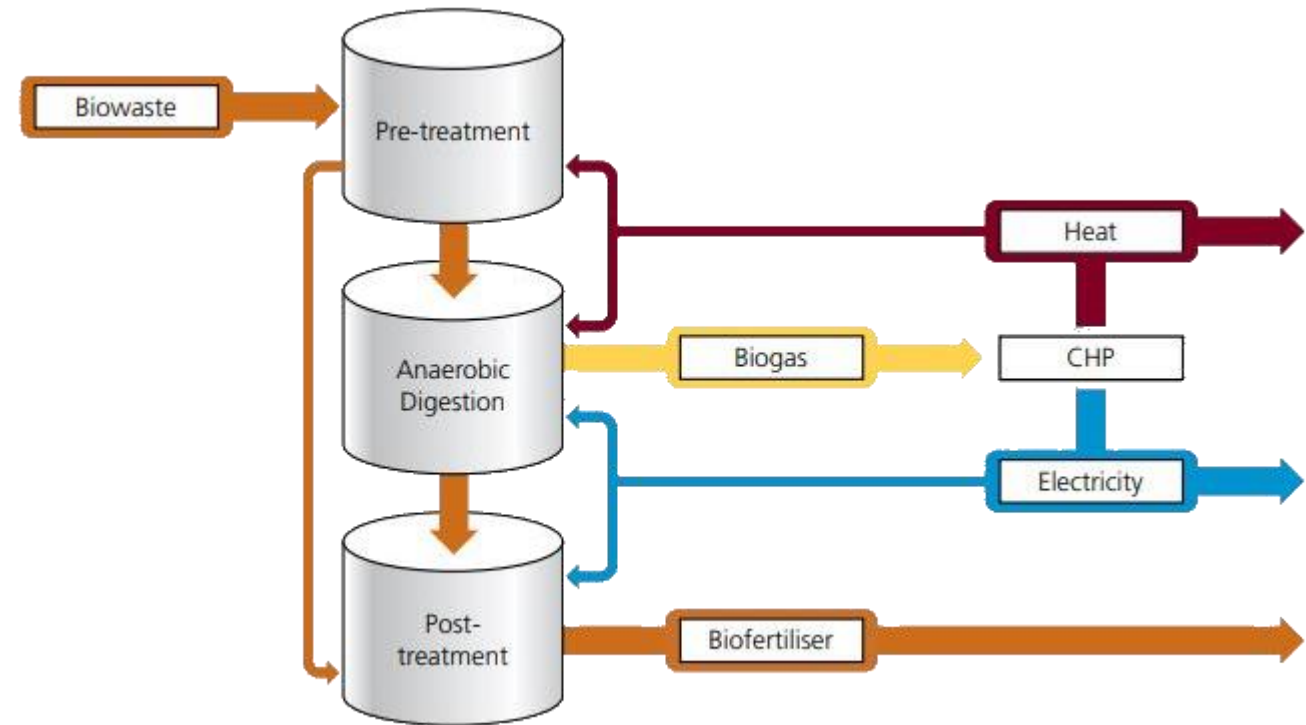
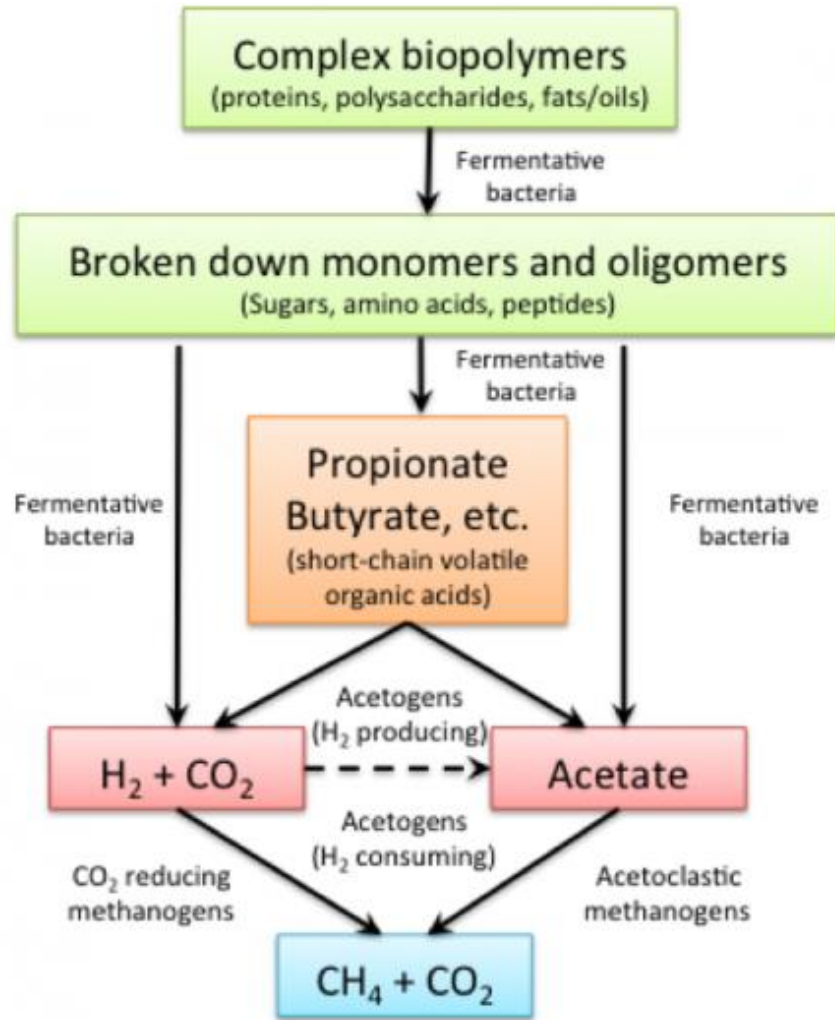
FW is any food that is discarded or lost along the supply chain, from production to consumption.



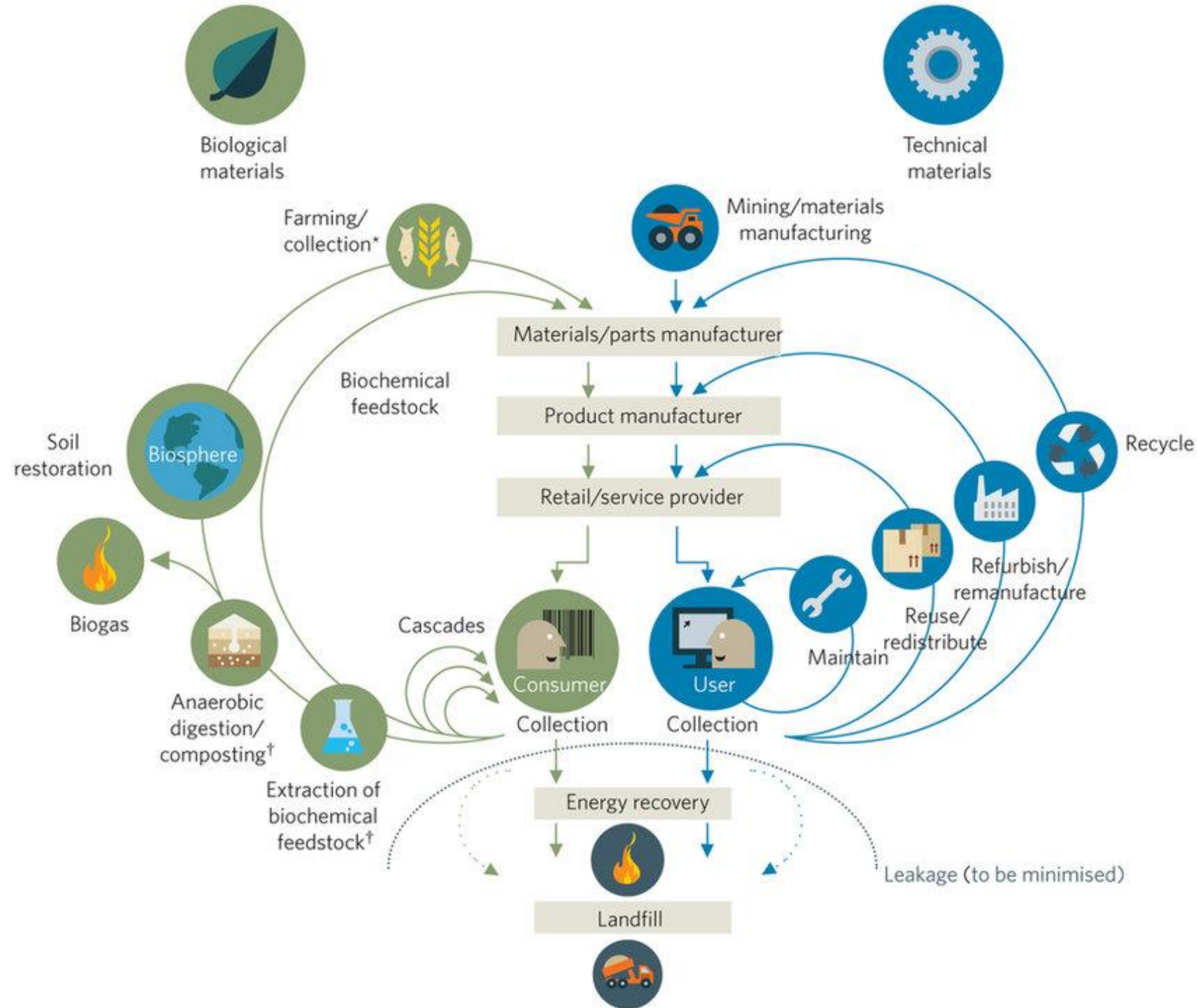
- 1/3rd of all food produced in the world is lost or wasted (FAO, 2019)
1.3 billion tons of food, worth roughly \$1 trillion
- This represents 8% of global greenhouse gas emissions
- Irish households, hospitality, and manufacturing waste an estimated 850,000 tonnes/a – loss of €700 million (EPA, 2019)
- Approx. one million tonnes of greenhouse gas emissions
- The Irish government has set a target of reducing food waste by 50% by 2030 (Department of Communications, Climate Action and Environment, 2018)

Food Waste is a Misplaced Resource!

Anaerobic Digestion



AD of Food Waste and Circular Economy



WAVA



WAVA

Disruptive technologies to valorise food Waste
into Value-added commodities

Lead: Dr Sushanta Kumar Saha (LIT)

Co-lead: Dr Ajay Menon (UCD)

Societal Impact Champion: Mr. Adam Lord (FSM)





Food Production

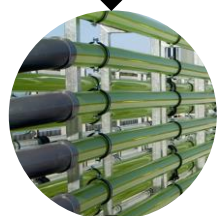


Food waste (FW)



High water usage
CO₂


Micro-algae production (PBR)
Emerging Technology for food production



Know-how

High volume, defined feedstock
Mixed FW

ANAEROBIC DIGESTION (AD)
Proven Technology for FW conversion to renewable energy

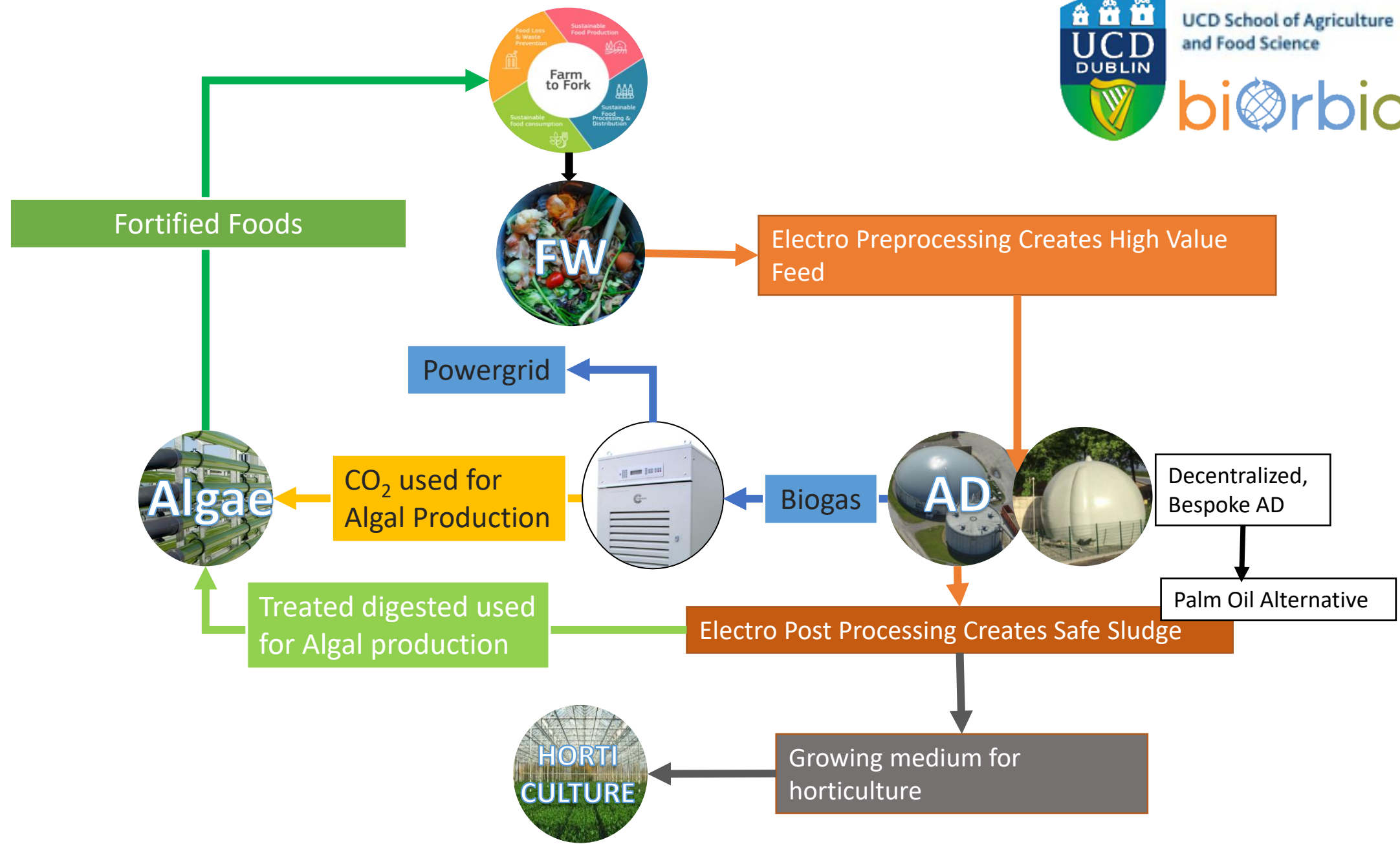


CO₂
Waste Sludge

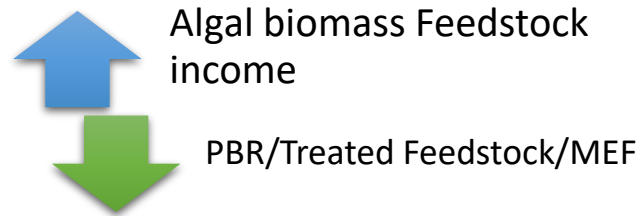
HORTICULTURE
Best bet for sustainable high yield production



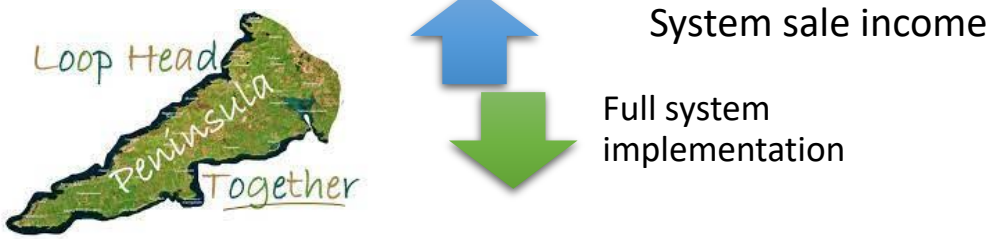
Growing medium



Large Scale



Small Scale



Return of investment Parameter	Unit	Value
NPV (Criteria: > 0)	€	3,087,004
Annual Equipment Cost	€/year	54,496
Annual Operation Cost	€/year	26064
Total cost	€	1,326,863
Annual net revenue	€/year	367,996
Payback period	year	3.6

Return of investment Parameter	Unit	Value
NPV (Criteria: > 0)	€	39,294
Annual Equipment Cost	€/year	11,596
Annual Operation Cost	€/year	306
Total cost	€	119,021
Annual net revenue	€/year	14,324
Payback period	year	8.3

SusBioME



Novel Treatment Technologies for Anaerobic Digesters and Fermenters

1

Energy Crisis

REPowerEU, RED III

2

Net Zero Future

CAP, Green Deal

3

Circular Regeneration

Vision 2050

Anaerobic Digestion is the most mature technology that addresses these issues

35-38% CAGR upto 2050, EU: 48,000 new AD-CHP plants, 15,000 new Biomethane plants

IRL 180 new biomethane plants by 2030

- Feedstock availability

- Operational efficiency

- Productivity

Boost Irish AD and FW valorisation, Climate Action goals, and Rural Regeneration

Fin.

Would you like to:

- Know more?
- Collaborate?
- Chat?

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LinkedIn