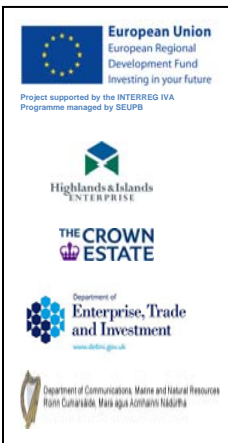


Overview of local project partners role in BioMara

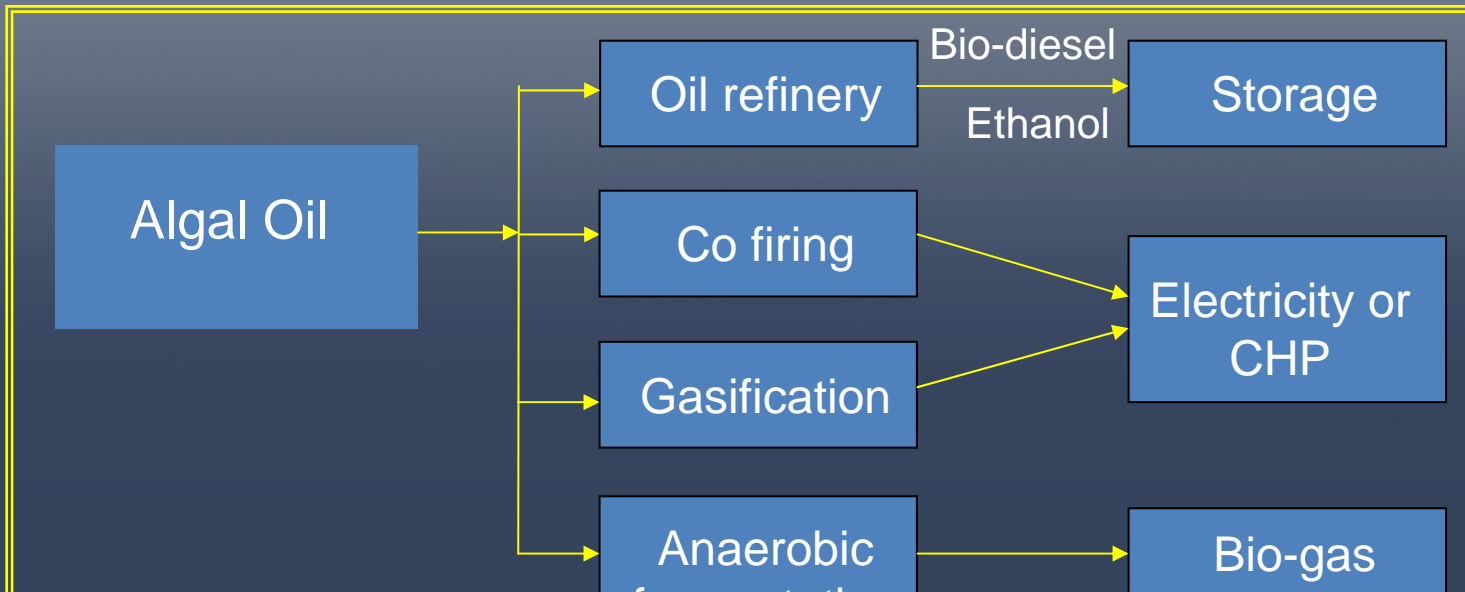
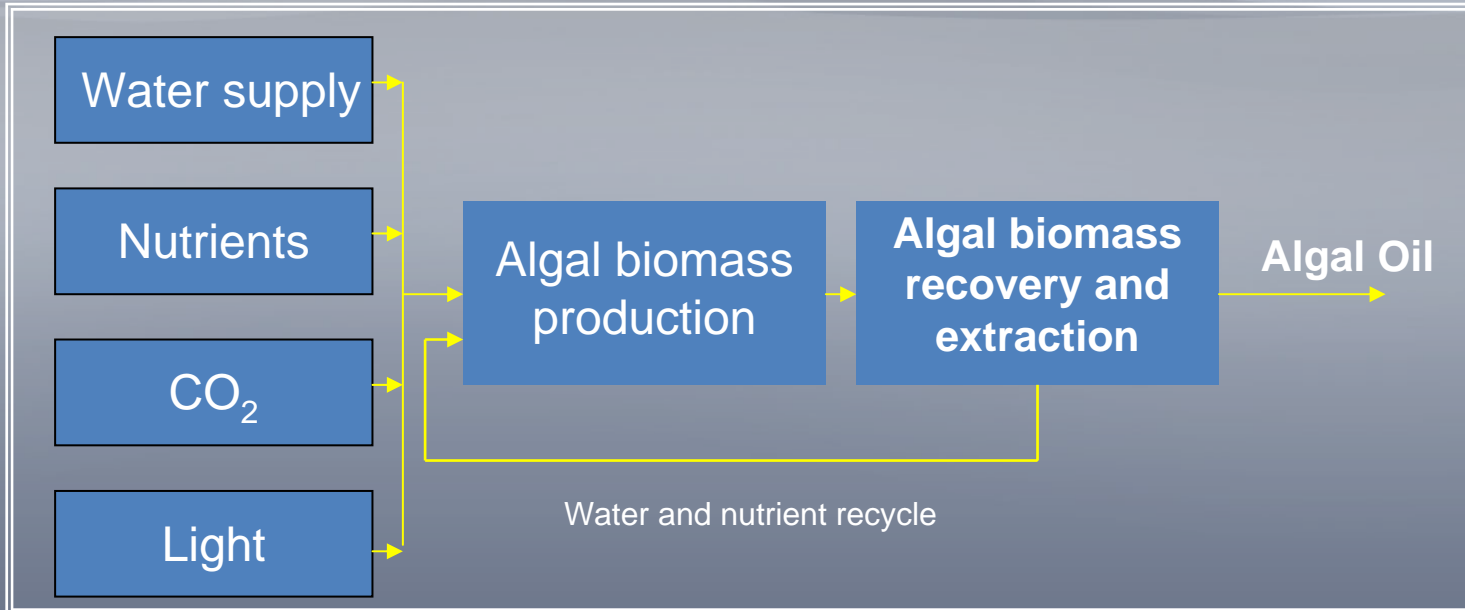
Professor Neil J Hewitt
Director, Centre for Sustainable
Technologies
University of Ulster



Coordination Centre:
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E: biomara@sams.ac.uk
W: www.biomara.org

Algal Biomass Production



Centre for Renewable Energy at Dundalk IT

About us:

- Applied Research Centre
- Focus on wind energy, energy storage and bioenergy

Contact:

Dr Paul MacArtain

Centre for Renewable Energy at Dundalk IT

www.credit.ie

+353 (0)42 9370574

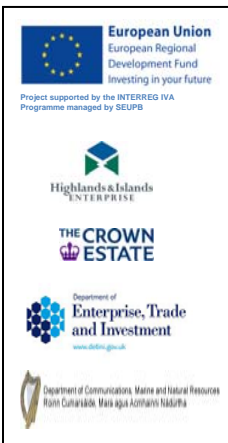


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Role in Biomara

- Oils characterisation
- Biodiesel testing facility
- Extraction and characterisation
- Anaerobic digestion
 - Small scale batch reactor
 - High throughput reactor
- Bioethanol
- Cross border community, business and local involvement through educational activities



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Institute of Technology, Sligo

Background

- 5280 full and part time students, 486 staff
- Track record in environmental science (first environmental degree in the State)
- Centre for Sustainability
- Other active env. research collaborations with UCD, TCD, NUIG, UL, UU, University of Melbourne, Johns Hopkins, Kerry County Council

Role in BioMara

- Scaling up of the AD and fermentation technologies
- Evaluating the performance of a number of seaweed species in bespoke bench scale digesters
- Trials on methane production

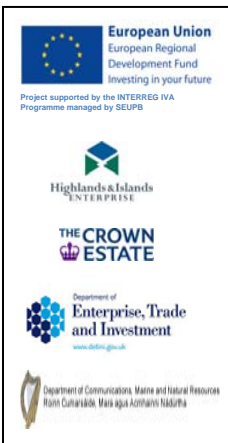


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Role in Biomara

- Optimising pretreatment to maximise energy yields and techniques to produce methane and other simple hydrocarbons
- Impacts of mechanical and physical pretreatments to separate polysaccharide rich phases from phases containing microbially inhibitory compounds
- Assessment of bioactivity of resulting phases to identify value added components.
- Development of downstream processing
- Assistance in other packages as appropriate



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QUESTOR Centre, Queen's University of Belfast

About us:

- Multidisciplinary Environmental Research Centre
- Focus on industrial and applied research
- Active areas: water, wastewater, waste, energy

Specifically:

- Biorenewable energy: anaerobic digestion; bioethanol production; biomass pretreatments; supercritical extraction processes; catalytic fuel production and energy storage
- School of Chemistry and Chemical Engineering / QUESTOR Applied Technology Unit



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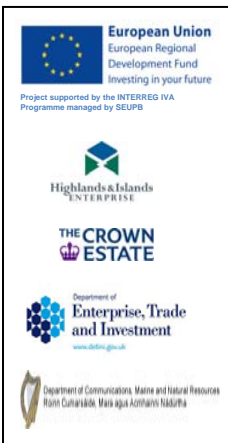
Role in Biomara

- Development of stakeholder groups (Ireland) and management interactions and engagement
- Examination of downstream processing needs
 - Testing, pilot plants, scale up
 - oil extraction and processing, ethanol separation, management of residues, value added sidestreams
 - Feasibility and cost; latest methods



University of Ulster

- Centre for Sustainable Technologies
- About us
 - Energy Research Centre with over £6.5M ongoing externally funded research
 - Biomass (Oilseeds/nuts and Gasification), Solar Thermal, Solar PV, Heat Pumps, Glazing, Carbon-Capture, Energy Storage (Thermal & Electrical), Thermal Comfort, low carbon buildings
 - Techno-economic assessment



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Role in Biomara

- Techno-Economic Assessment

Costs for algal biomass production:

Land cost

Total capital investment and engineering cost

Water supply and water treatment

Nutrients and system

CO2 supply system

Energy and power consumption

Contingency

Discounted cash flow rate

Annual insurance cost

Annual operating cost

Annual maintenance cost

Other production cost

Tax rate on taxable Income

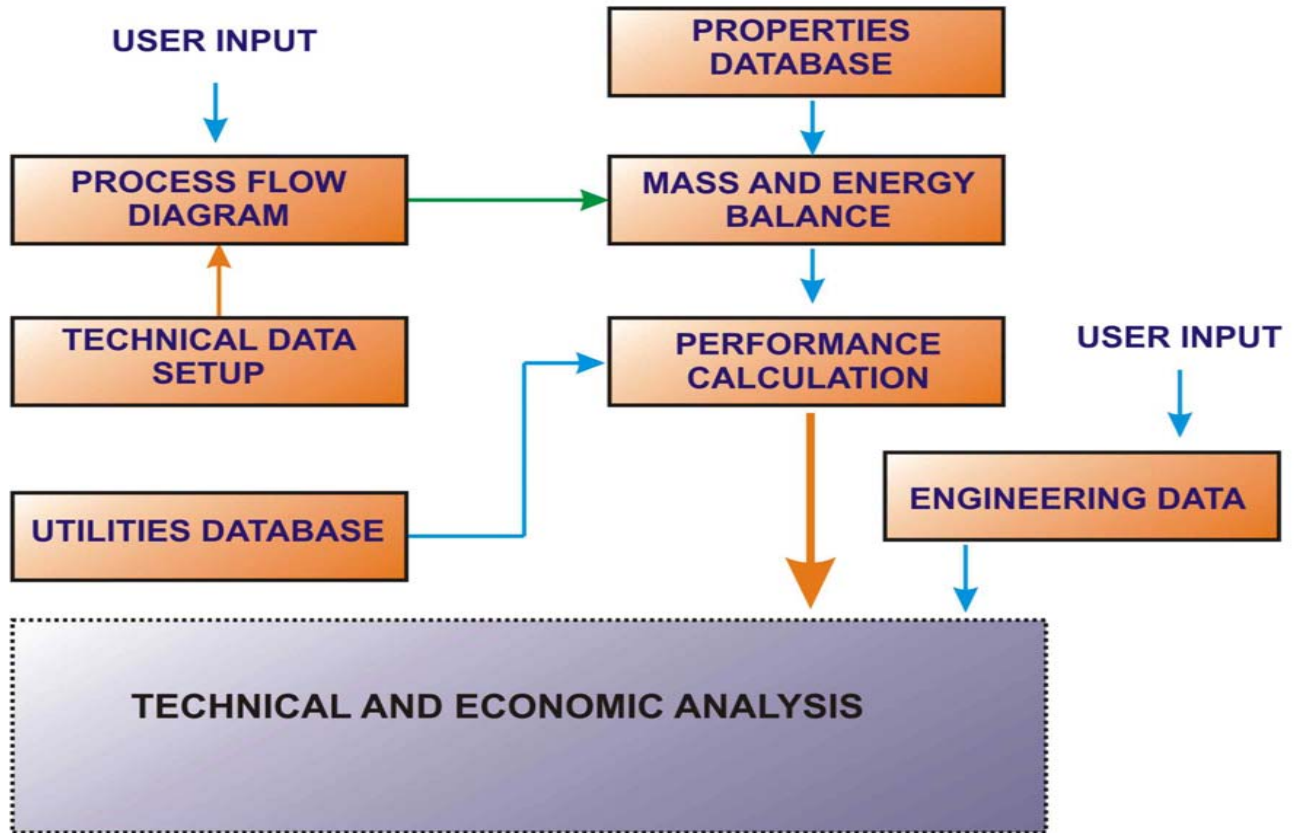


Cost per kg of algal oil \Rightarrow biodiesel €/L

ethanol



“ECLIPSE” Techno-Economic Analysis



European Union
 European Regional Development Fund
 Investing in your future
Project supported by the INTERREG IVA Programme managed by SEUPB

Highlands & Islands ENTERPRISE

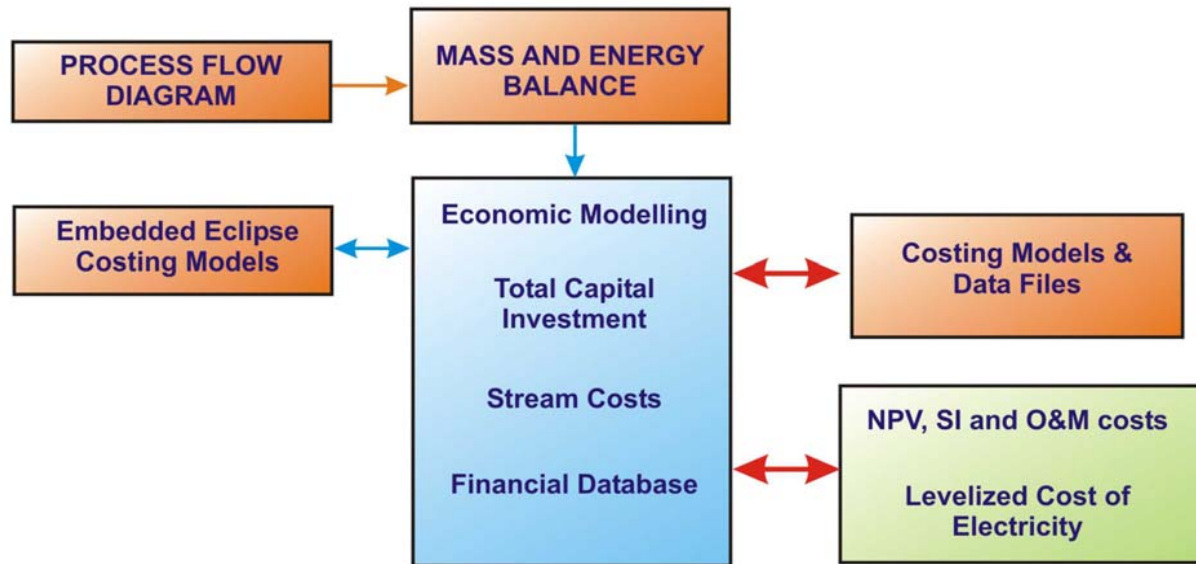
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Department of Enterprise, Trade and Investment
www.deti.gov.uk

Department of Communications, Marine and Natural Resources
Roinn Chultúir, Mara agus Acmhainní Nádartha

“ECLIPSE” Techno-Economic Analysis

ECONOMIC MODELLING




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Initial Techno-Economic Review

- Examples of System Choices



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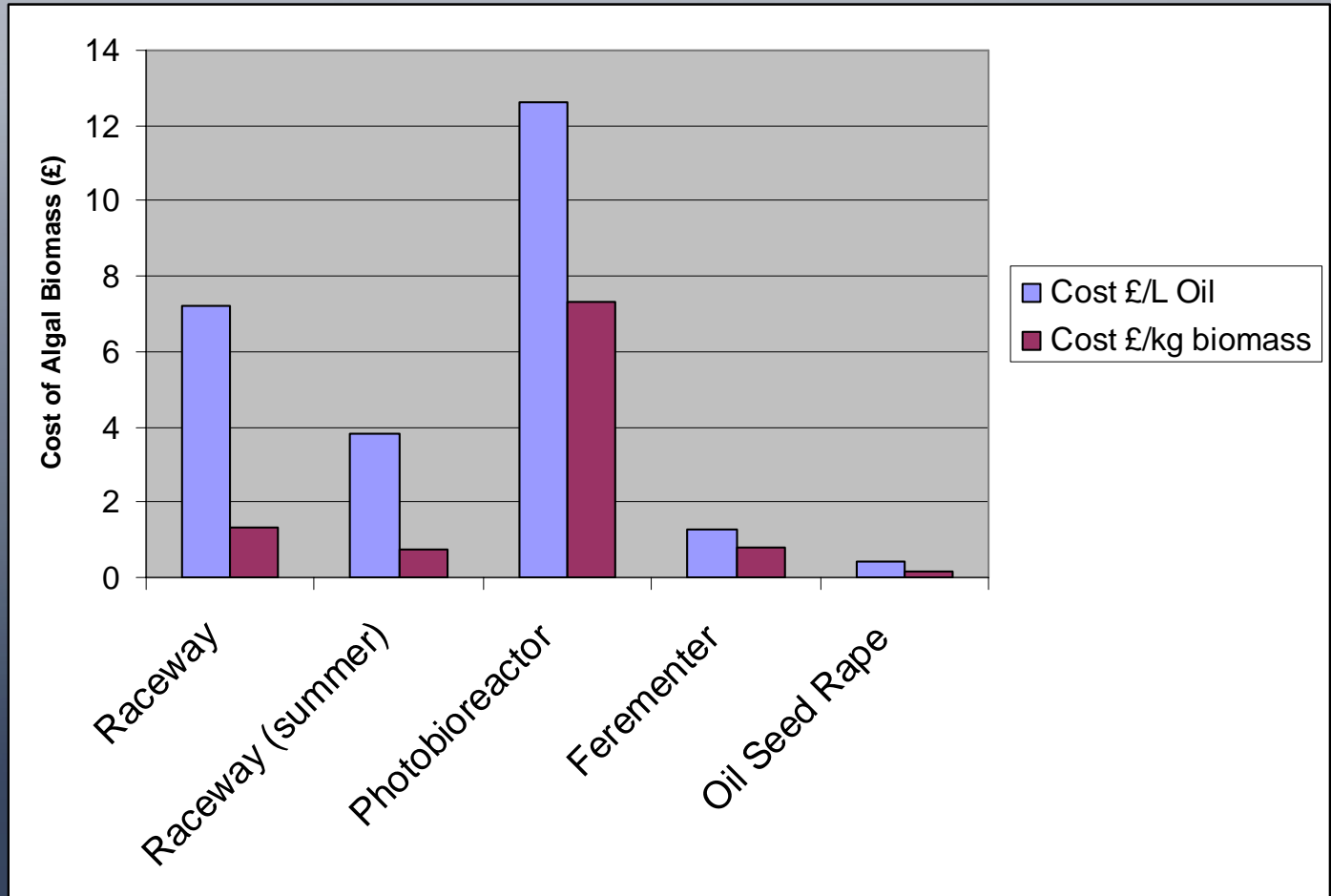
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Initial Techno-Economic Review



Initial Techno-Economic Review

- Conclusions based on current technology evaluation
 - Raceways require higher insolation and low labour costs than potentially available in Europe
 - Photobioreactors have very high capital costs at the moment
 - Fermenters appear competitive
 - Optimisation of biomass yields, oil content and use of CO₂ sequestration

