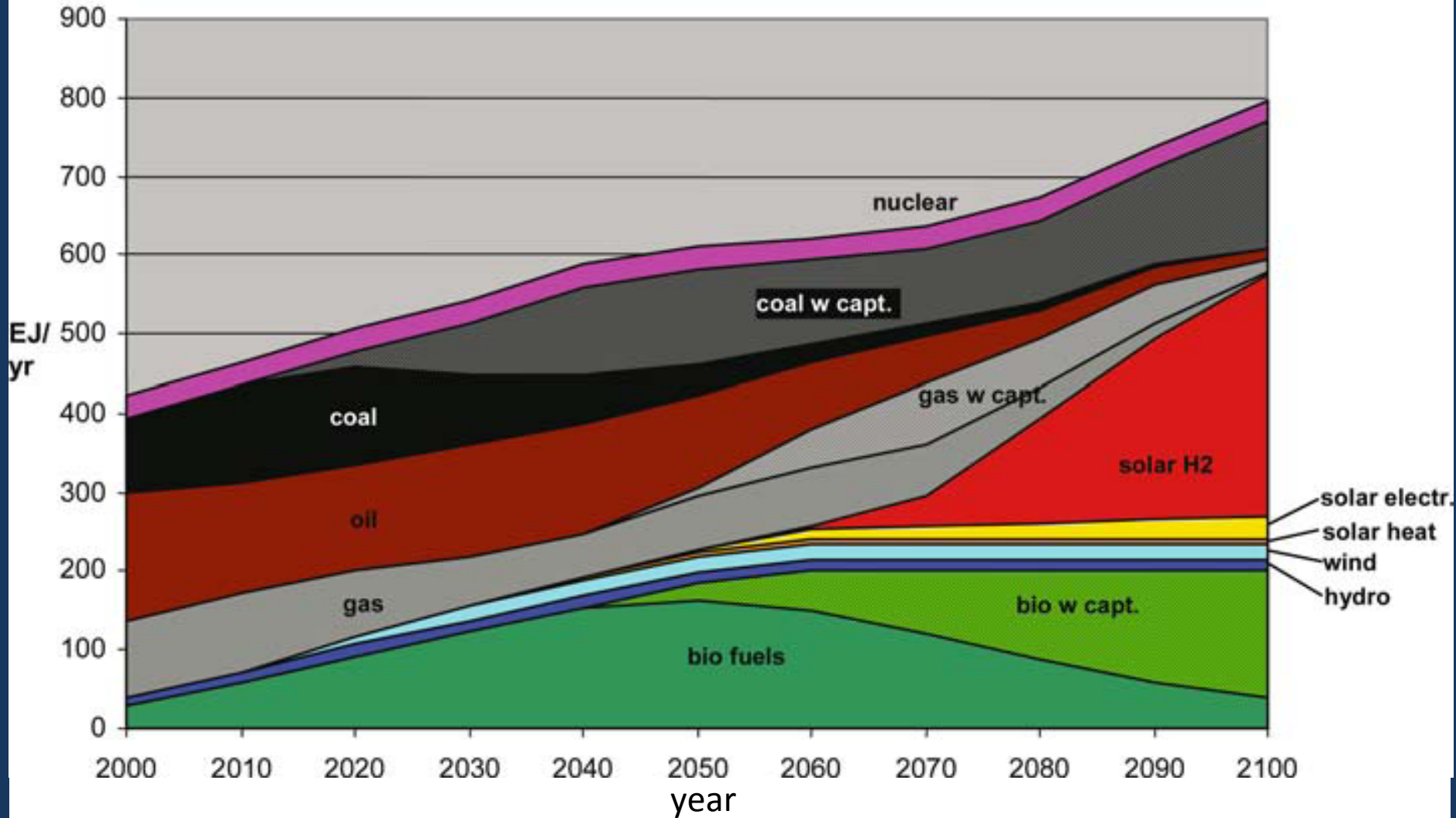


Sustainable Fuel and Energy - anaerobic digestion of algal biomass

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Energy supply, 350 ppm scenario capture from fossil fuels and biomass



from Azar *et al*, 2006, *Climatic Change* 74, 47 – 79.

Origins of the Anaerobic Digestion Technology

- In 1808, Sir Humphrey Davy determined that methane was present in the gases produced by cattle manure.
- In 1859, first digestion plant to produce biogas from wastes was built in a leper colony in Bombay, India.
- In 1895, the technology was developed in Exeter, England, where a septic tank was used to generate gas for the sewer gas destructor lamp, a type of gas lighting
- In 1920, Mr. Luo Guorui invented and built an 8 cubic metre Guorui biogas tank .



Building a biogas digester in Vietnam ALL IMAGES DW



Cambi Thermal Hydrolysis AD Plant



Pulper tank

4 x Thermal Hydrolysis Batch Reactors

Flash Tank

Anaerobic Digester

Existing Experience with Anaerobic Digestion

- Sewage Sludge
- Farm Wastes
 - Cattle & pig slurries
- Food Waste
- Industrial Wastewater
 - Beverage, paper, sugar processing
- Municipal Solid Wastes
 - BMW (CellMatt, Graphite Resources Ltd)
- Renewables
 - Wood, corn, rye grass,ALGAE (seaweed, microalgae)

Seaweed Anaerobic Digestion (SAD)

ITI Energy Scotland



Seaweed fouling on mussel ropes.

A single operation (Blue Shell Mussels Ltd) generates 1 tonne seaweed waste per week.

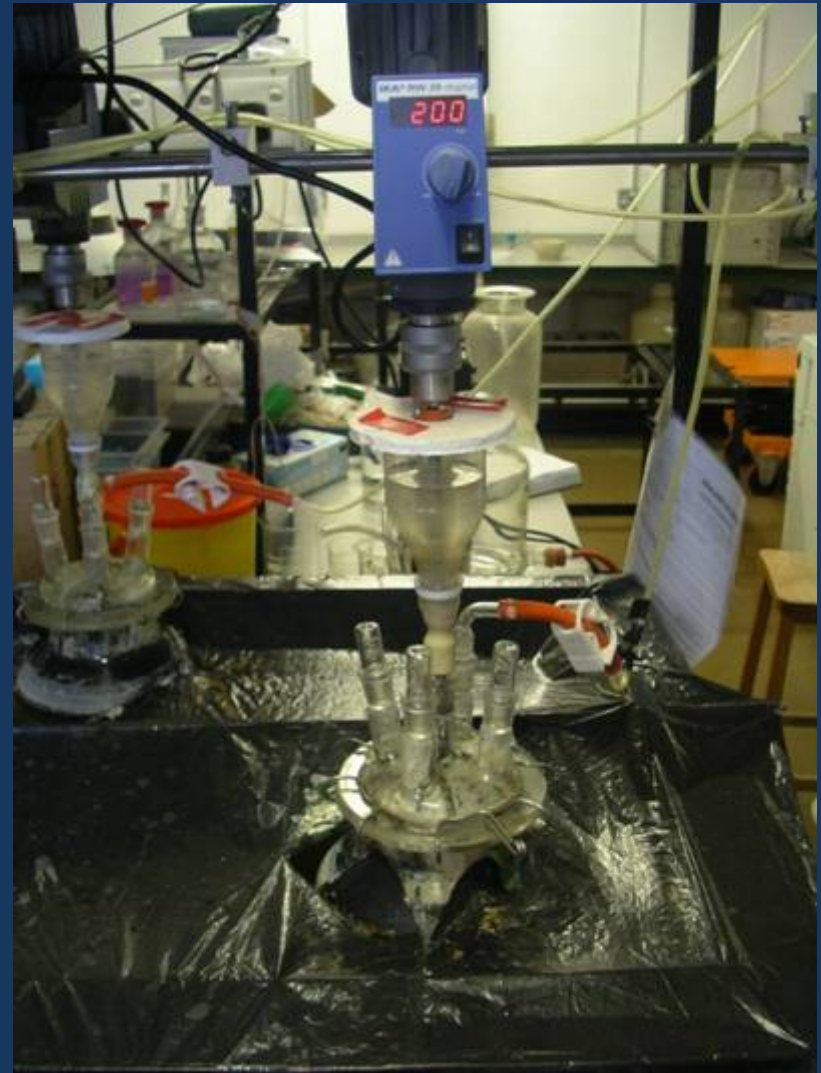


Fouling associated with fish cages and nets.

Seaweed Anaerobic Digestion (SAD)

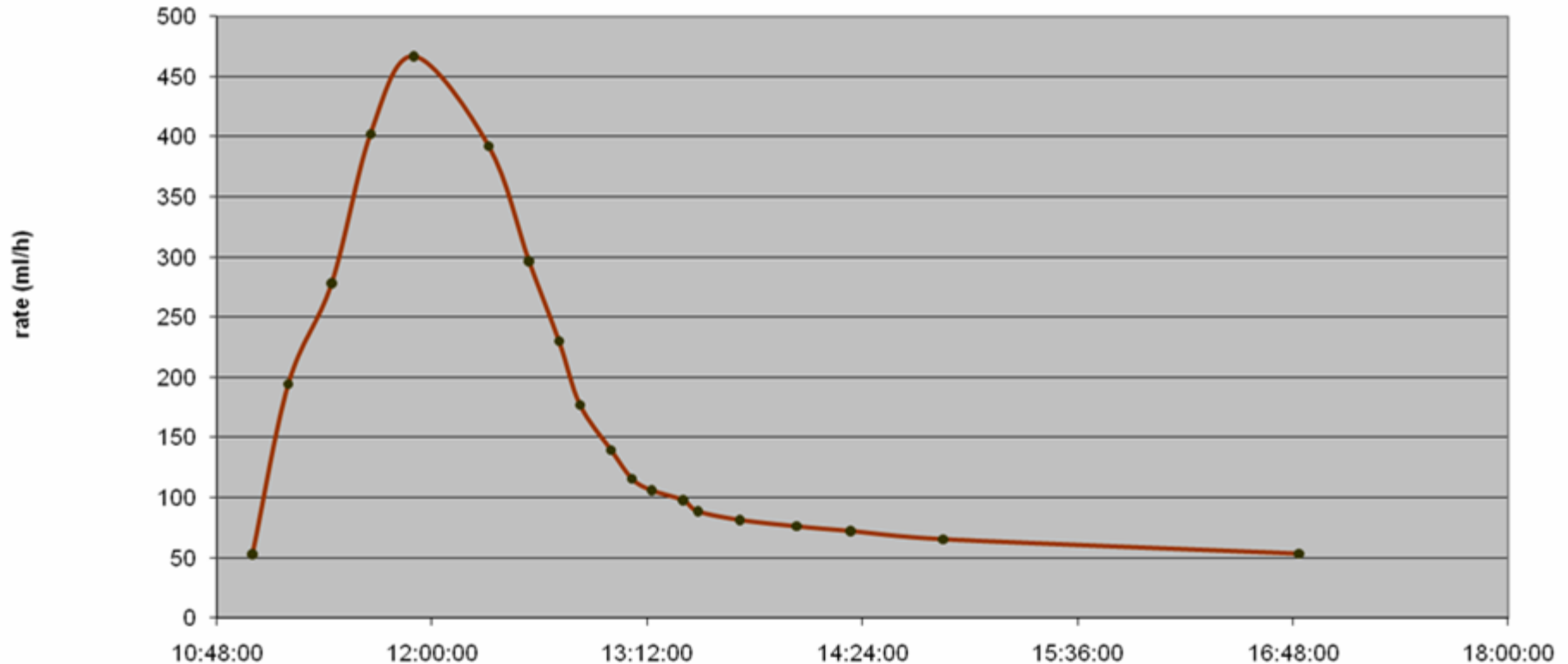
ITI Energy Scotland

- Macerated Kelp thallus (*Laminaria hyperborea*)
- 20d HRT, 5% solids
- CSTR mesophilic 37C
- Semi-continuous (fed batch)



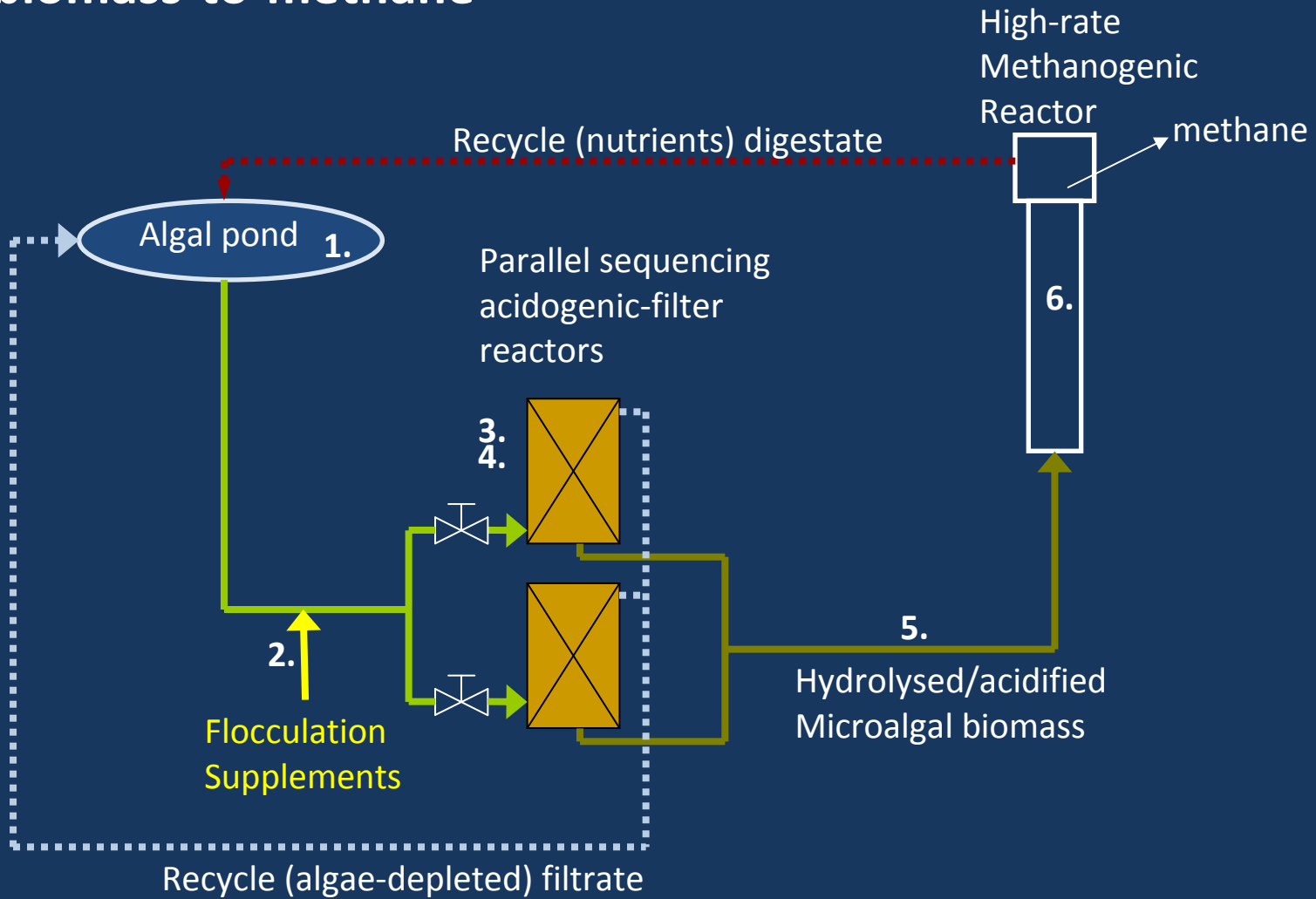
AD Seaweed (*Laminaria hyperborea*)

Biogas Rate or a single 5 g feed



New Project (Cawthron Inst., Natural Systems Ltd.)

Microalgal biomass-to-methane



Operating Phases

