

Technical Brief: Functional Prototype 1

Athens, Greece

Responsible



Partner



Capture and Utilisation of CO₂ from a biofuels biorefinery that include biomass combustion, ethanolic fermentation and anaerobic digestion via autotrophic algae growth

Production Line

Ethanol Fermentation
Biodiesel Production
Anaerobic Digestion

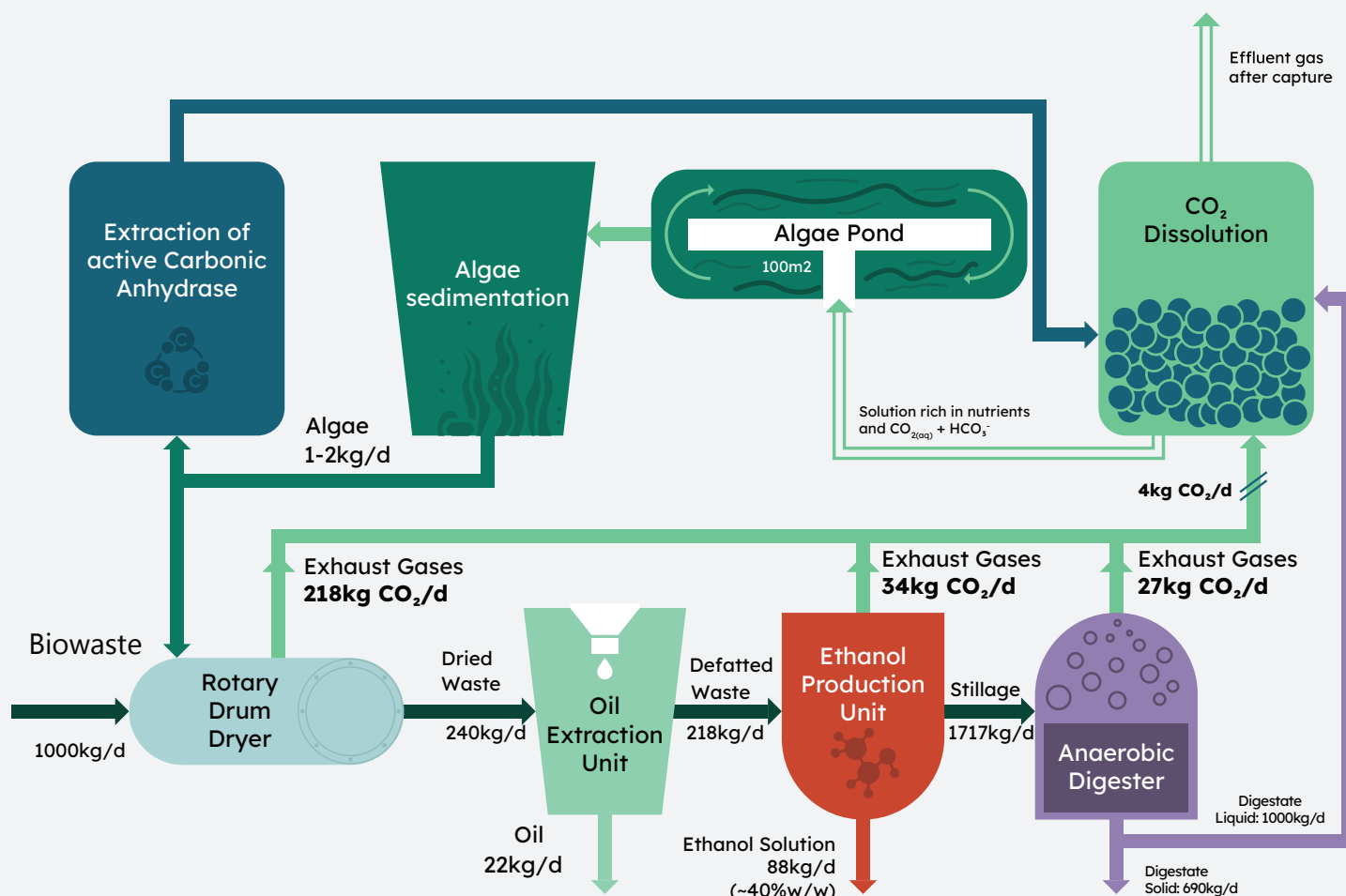
Biogenic Gas CO₂

End-Product

Bioethanol
Biodiesel
Biomass

Technologies

Enzymatic Capture of CO₂
Autotrophic Algae Cultivation



Performance Indicators

CO₂ capture efficiency target	≥ 85%
Microalgae Growth Target CO ₂ uptake Biomass	20-40g CO₂/m²/day 10-20g dry weight/m²/day
Bioenergy efficiency 1 (%BE₁) Energy content of produced biofuels Energy input in the whole system	81.66%
Bioenergy efficiency 2 (%BE₂) Energy content of produced biofuels Energy content of initial feedstock	81.67%
Biomass resource utilization (%BR) kg products kg initial feedstock	86.45%

Targets

- CO₂ Dissolution (orange unit): Using digestate (green tank), potassium carbonate (K₂CO₃), and carbonic anhydrase (CA) enzymes to dissolve CO₂ into an aqueous medium.
- Algae Cultivation: The CO₂-enriched solution is used in 4 raceway ponds (right side) to grow microalgae.
- Biomass Valorization: Algal biomass is harvested using sedimentation tanks (middle tanks) and then processed in the biorefinery to produce biofuels and extract CA for reuse.

Technical sketch

