

The ALIUM® CCV Platform

SYKLEA's microalgae platform turns industrial CO₂ into oil, oxygen and water, and every tonne into revenue.



ALIUM® is an integrated Carbon Capture and Valorization (CCV) process. It combines flue gas conditioning, heat exchange, biological CO₂ capture and conversion, post-treatment and valorization in one modular industrial installation. It treats the entire flue gas stream, not only CO₂: NO_x, SO_x, carbon monoxide, aldehydes, VOCs and particulates are handled in the same system.

At the core of ALIUM is SYKLEA's No Water Technology™. Microalgae grow on vertical supports in a controlled humid environment instead of open ponds or liquid photobioreactors, with less water handling and lower energy requirements. Plates are stacked on 8 levels, giving 960 m² of active surface for every square metre of footprint.

The platform serves two markets: combustion and industrial flue gases from furnaces and boilers, and pure CO₂ streams from fermentation, biogas and biomethane. Each installation is sized from the customer's own emissions, starting with an on-site containerized pilot and ending with a deployment dossier and a budgetary estimate at ±15% accuracy.

SYKLEA operates laboratories in Bordeaux, France, and Vineland, New Jersey, with its US entity based in New York.

From CO₂ to cash

\$260 to \$610

potential gross revenue per tonne of CO₂, from oil sales plus the US 45Q tax credit.¹

High capture density

138.24 kg of CO₂ captured per m² of surface footprint per day, thanks to vertical stacking of active surface.

Cleaner flue gas

Treats CO₂ together with NO_x, SO_x, CO, aldehydes and VOCs, moving industrial sites toward net zero emissions.

Modular by design

Containerized units and four combinable modules (CARBONEA, NOXYNEA, AQUANEA, MONONEA) tailored to each site's streams.

1. Potential gross revenue before costs, for oil at about \$850 to \$2,270 per tonne plus a 45Q credit of \$60 to \$85 per tonne of CO₂. Subject to product route, market and tax eligibility.

CO₂ capture performance

Reference value ²	138.24 kg CO ₂ /m ² footprint/day
Active surface	960 m ² per m ² footprint
Plate configuration	60 double-sided plates/m ³ , 8 levels
Technology	No Water Technology™, supported microalgae

Inputs

CO ₂ sources	Combustion and industrial flue gas; fermentation, biogas, biomethane
Energy	≈ 400 kWh/t CO ₂

Outputs and revenue

Oil yield	1 t per 4.3 t CO ₂
Oxygen	≈ 0.8 t/t CO ₂
Water recovery	240 m ³ /day per 100,000 Nm ³ /h of flue gas
Oil sales, gross ³	\$200 to \$530 per t CO ₂
US 45Q tax credit, potential ³	\$60 to \$85 per t CO ₂

Potential gross revenue **\$260 to \$610 per t CO₂**

Flue gas treatment

Compounds treated	CO ₂ , NO _x , SO _x , CO, aldehydes, VOCs, acids, particulates
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Sizing examples

	10,000 t CO ₂ /yr	250,000 t CO ₂ /yr
Energy	4,000 MWh/yr	100,000 MWh/yr
Site footprint	≈ 200 m ²	≈ 5,000 m ²
Oil produced	≈ 2,300 t/yr	≈ 58,000 t/yr
Potential gross revenue ³	\$2.6M to \$6.1M/yr	\$65M to \$150M/yr



Flue gas in, value out

Process stages

- 1 Gas conditioning: removal of particulates and pollutants
- 2 Heat exchange: cooling and water-vapour condensation
- 3 CO₂ capture and biological conversion
- 4 Post-treatment: recovery, separation, refining
- 5 Storage and valorization: sale or reuse on site

Modules

CARBONEA	CO ₂ conversion
NOXYNEA	NO _x / SO _x treatment
AQUANEA	Wastewater, water reuse
MONONEA	Residual CO conversion

Deployment path

Flue gas assessment and strain selection, then a containerized pilot connected to the customer's gas stream. Measured yields feed a full industrial design study and a budgetary estimate at ±15% accuracy, followed by installation, commissioning, test run and remote-monitored operation.

Qualification

Technology Qualification plan for algae carbon capture underway with DNV for SYKLEA USA operations, following DNV-RP-J201.

2. Single reference unit for ALIUM CO₂ capture, based on current measured performance of 6 g CO₂/h/m² active surface.

3. Potential gross revenue before costs. Oil priced at about \$850 to \$2,270 per tonne (EUR 750 to 2,000 at 1.1355 USD/EUR). The 45Q credit is a US federal tax credit, shown before any transfer discount, and depends on eligibility and tax validation. Product routes and returns depend on the selected configuration and market demand.