ENOSIS — INDUSTRIAL BIOMETHANATION TECHNOLOGY

Waste CO_2 and H_2, turned into pipeline-ready renewable gas.

Enosis' ENOBIO reactors combine biogenic CO_2 with renewable hydrogen to produce e-methane — a renewable molecule chemically identical to natural gas, ready to flow through existing gas infrastructure.

>98%
CH_4 PURITY

Pipeline-grade
GRID INJECTION & LIQUEFACTION READY

RFNBO
CERTIFICATION-ELIGIBLE

Low to negative CI Score
WELL-TO-TANK

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Enosis turns CO_2 and waste into pipeline-ready renewable gas — no new pipes, burners, or vehicles required.

Renewable electricity is abundant but intermittent. The gas grid is vast, storable and dispatchable — but still overwhelmingly fossil. Enosis closes that gap: ENOBIO reactors combine biogenic CO_2 with renewable hydrogen to produce e-methane, a molecule chemically identical to natural gas.

Cut emissions at the source

Recycle biogenic CO_2 into a renewable fuel instead of venting or flaring it.

Displace fossil gas immediately

A drop-in fuel: zero new infrastructure, zero new appliances, zero stranded-asset risk.

Turn surplus power into storable gas

Convert curtailed wind and solar into e-methane that can be stored, transported and dispatched.

Valorize waste with nowhere else to go

Sludge, end-of-life wood, plastics and solid recovered fuel become feedstock instead of landfill.

The molecule that makes renewable power storable.

E-methane turns renewable electricity into a fuel the world already knows how to store, transport and use. Produced by combining renewable hydrogen with biogenic CO_2, it is chemically identical to natural gas — it flows through the same pipelines, fills the same storage caverns, ships in the same tankers, and fires the same turbines and boilers that consumers already use on a daily basis.

It also supports electrification directly. Wind and solar output is intermittent and often peaks when demand doesn't: converting the surplus into e-methane captures power that would otherwise be curtailed, and stores it in a form that holds its value for weeks or months.

Capture surplus power
High wind & solar output converts into e-methane instead of being curtailed.

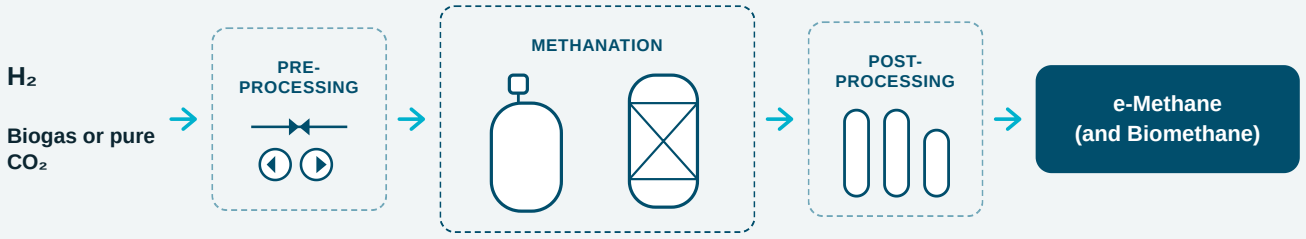
Store across seasons
Holds its value for weeks or months in existing gas storage infrastructure.

Deliver to hard to abate sectors
Heat, transport and industrial feedstock that cannot easily and/or cost-effectively be electrified.

Every tonne of e-methane produced also captures almost three tonnes of CO_2 in the process — turning an unavoidable emission into carbon-neutral fuel, delivered through existing infrastructure and relying on biogenic waste streams.

One reaction. Two feedstock routes.

Each ENOBIO unit combines one molecule of biogenic CO_2 with four molecules of renewable hydrogen to produce one molecule of e-methane — eligible for certification as a Renewable Fuel of Non-Biological Origin (RFNBO).



Simplified process flow. Each ENOBIO unit runs a twin-reactor methanation train — a stirred reactor followed by a polishing column — bracketed by pre- and post-processing.

ENOBIO B Series

RAW BIOGAS → E-METHANE

Raw, non-upgraded biogas — a mixed CH_4/CO_2 stream — is fed directly into the reactor with renewable H_2. The CO_2 fraction is converted to e-Methane before injected to the grid with the biomethane.

ENOBIO C Series

bioCO_2 → E-METHANE

A concentrated CO_2 stream — typically separated during biogas upgrading, or from another source such as an industrial process — is combined with renewable H_2 to produce e-methane for grid injection.

REACHING GRID-INJECTION QUALITY

Pre-processing
Pressure & feed conditioning

→

Methanation
Core biological conversion

→

Post-processing
Purification to grid spec

Thirteen reactor sizes, one technology.

The ENOBIO range scales from small distributed installations to large centralized plants, sized to match available biogas or CO_2 feedstock and electrolyzer capacity.

>98% CH_4 purity **15 bar** Operating pressure

All reactors are designed to deliver low to negative carbon intensity (CI) e-Methane.

ENOBIO B Series — conversion of raw biogas to biomethane and e-Methane

Model	Raw biogas inlet flow (Nm³/h)	Approx. electrolyzer required power (MW)*	Total production (GWh/yr)**
B50	50	0.5	4.6
B120	120	1.2	11.1
B240	240	2.3	22.1
B470	470	4.6	43.3
B650	650	6.3	59.9
B890	890	8.6	82.0
B1280	1280	12.4	117.9

ENOBIO C Series — conversion of bioCO_2 to e-Methane

Model	CO_2 inlet flow (Nm³/h)	Approx. electrolyzer required power (MW)*	Total production (GWh/yr)**
C50	50	1.1	4.6
C100	100	2.2	9.2
C220	220	4.7	20.3
C370	370	8.0	34.1
C500	500	10.8	46.1
C920	920	19.8	84.8

* Electrolyzer power is approximate and depends on electrolyzer yield; for the B Series, based on an assumed inlet composition of 55% vol. CH_4 / 45% vol. CO_2 for raw biogas. ** Total production is based on plant availability of 95%.

Gas quality & performance specifications.

Inlet and outlet gas quality requirements, and expected consumption and performance figures across the ENOBIO range.

Biogas or CO_2 — inlet gas quality

COMPONENT	VALUE	COMMENT
Nitrogen, N_2 [%mol]	< 0.2%	For grid injection purposes only.
Oxygen, O_2 [%mol]	< 0.2%	For process and grid injection purposes.
Hydrogen sulfide, H_2S [ppmv]	< 100 ppmv	Maximum H_2S tolerance.
VOCs	< 100 ppmv	Other values on demand.
Ammonia gas, NH_3	< 20 ppmv	Other values on demand.
Water vapor [relative humidity]	0 to 100%	—
Temperature (°C)	0 to 45°C	Other values on demand.
Pressure [mbar(g)]	+0 to +100	—

e-Methane — outlet gas quality

COMPONENT	VALUE	COMMENT
Methane, CH_4 [%mol]	> 98%	—
Carbon dioxide, CO_2 [%mol]	< 1%	—
Hydrogen, H_2 [%mol]	< 2%	Lower, if required.
Oxygen, O_2 [%mol]	< 0.1%	—
Water vapor [dewpoint]	< -15°C pressure dewpoint	—
Hydrogen sulfide, H_2S [ppmv]	< 3.5 ppmv or 5 mg/Nm³	—
Nitrogen	Same as inlet	—
Higher calorific value [kWh/Nm³]	10.80 to 11.07	Typical range.
Temperature (°C)	20 to 35°C	—
Pressure [bar(g)]	+0 to +11	Fits downstream pressure in this range.

Consumption & performance

FEATURE	VALUE	COMMENT
Electrical consumption	0.7 kWh/Nm³ eCH_4 (CO_2) 0.94 kWh/Nm³ eCH_4 (biogas)	Based on biogas quality: 55% CH_4, 45% CO_2.
Hydrogen consumption	0.36 kg(H_2)/Nm³ eCH_4 or 32.5 kg(H_2)/MWh	High heating value (HHV).
Availability	95%	Operating time excluding planned maintenance.
Liquid effluent production	1.6 L/Nm³ eCH_4	—
Liquid effluent composition	Suspended solids < 10,000 mg/L COD < 25,000 mg/L BOD_5 < 20,000 mg/L Total nitrogen < 4,000 mg/L	Peak values.

Where ENOBIO fits.

- Convert CO_2 & enrich biogas
- Treat syngas from waste
- Treat industrial effluents
- Store electricity

An ENOBIO methanation unit, installed and running in the field.

Track record

- **Denobio** — first industrial-scale biomethanation installation coupled to an agricultural methanization unit, with grid injection.
- **Bimotep** — design and operation of a mobile biomethanation unit for on-site field testing across gas production sites (CO_2, biogas, syngas).
- **Demetha** — design and operation of a pre-industrial biomethanation prototype coupled to a territorial methanization unit.
- **Plainenergie** — first project in Europe combining local authorities, public laboratories and industrial partners to convert non-valorized local waste into grid-injectable gas.
- **Minerve** — engineering support for France's first Power-to-Gas demonstrator, led by AFUL Chantrerie.

ABOUT ENOSIS

Enosis — turning CO_2 and waste into renewable gas.

Enosis — from the Greek for “union” — is built on a simple conviction: the energy transition is won by connecting systems that today run in isolation — waste and energy, power grids and gas grids, biology and industry.

Founded in Toulouse in late 2014, Enosis develops and industrializes biomethanation technology that turns CO_2 and renewable hydrogen into e-methane — pipeline-ready renewable gas, produced right where waste streams and clean power already meet.

Active in France, Spain, Denmark, Canada, Sweden, Finland, with offices in Toulouse, France, and Aarhus, Denmark.

Let’s turn your CO_2 into renewable gas.

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