METHANOL

FLEXIGREEN®

METHANOL

eFLEX

Casale's efficient loop for e-Methanol

CASALE

We are a global partner
in the chemical industry,
offering **integrated technologies,**
engineering, contracting
and construction solutions
for over a century.

Our mission

Contribute to shape a new sustainable planet with our plants for the production of fertilizer, methanol, hydrogen, melamine and derivatives, and help our customers creating value respecting the environment.

We are a global company front leader in the energy transition: a key player in the sustainable transformation of the chemical and energy industry, from a social, economic and environmental point of view.

Our values

INNOVATION PEOPLE CARE **PROFESSIONAL EXCELLENCE**
QUALITY **SAFETY** ETHIC **SUSTAINABILITY**

METHANOL

eFLEX

E-methanol, also known as electro-methanol, is a remarkably low-carbon chemical produced by converting CO_2 (biogenic or captured from other processes) with green hydrogen generated through water electrolysis powered exclusively by renewable electricity. Alongside bio-methanol, derived from biomass sources, the rapid advancement of technology is swiftly positioning these processes as environmentally friendly sources of such vital base chemical.

Capacity

- Up to **2500 MTD** on a single line

Performances

- Methanol plant specific consumption of H_2:
  less than **2170 Nm³/MT**
- Methanol plant specific consumption of CO_2:
  less than **750 Nm³/MT**
- Methanol plant specific electrical power consumption:
  less than **0.250 kW/MT** (*)
  (*) sections such as electrolyzers and carbon capture units, upstream methanol loop, are excluded

Benefits

- Low energy consumption
- Close cooperation with first class catalyst manufacturers
- Reduced CAPEX
- No steam import for distillation

Casale technical assets

- IMC® methanol converter

Enviromental Impact

Total CO_2 emissions to atmosphere, per ton of methanol produced:

- **less than 0.06 MT/MT (*).**

(*) associated to the equivalent carbon intensity methanol plant purges and by-products

PROCESS OUTLINE

COMPRESSION

The fresh H_2 from the electrolyzers and the CO_2 recovered are mixed with the hydrogen rich stream coming from Hydrogen Recovery Unit (HRU) and compressed in the make-up compressor stages. The recycle gas from synthesis loop is added in the compressor's last stage up to required pressure for methanol synthesis.

METHANOL SYNTHESIS

The compressed stream is routed to the converter feed/effluent heat exchanger where it is heated up to converter inlet temperature using the hot synthesis converter effluent.

The preheated feed gas enters the highly efficient Casale IMC® converter (Isothermal Methanol Converter). A notable feature of this patented design is its array of proprietary, hollow heat-exchanging plates. These plates serve the essential function of removing the reaction heat by generating medium-pressure steam through a circulation of hot boiler feedwater within the plates. The paramount advantage of this configuration lies in its ability to maintain the catalyst temperature at a nearly constant level, closely aligned with the optimum value for methanol synthesis.

REACTION HEAT RECOVERY AND METHANOL SEPARATION

The hot converter effluent is firstly routed to the feed /effluent heat exchanger, then to the distillation's topping column reboiler and finally to the trim condensers where the final condensing temperature is reached.

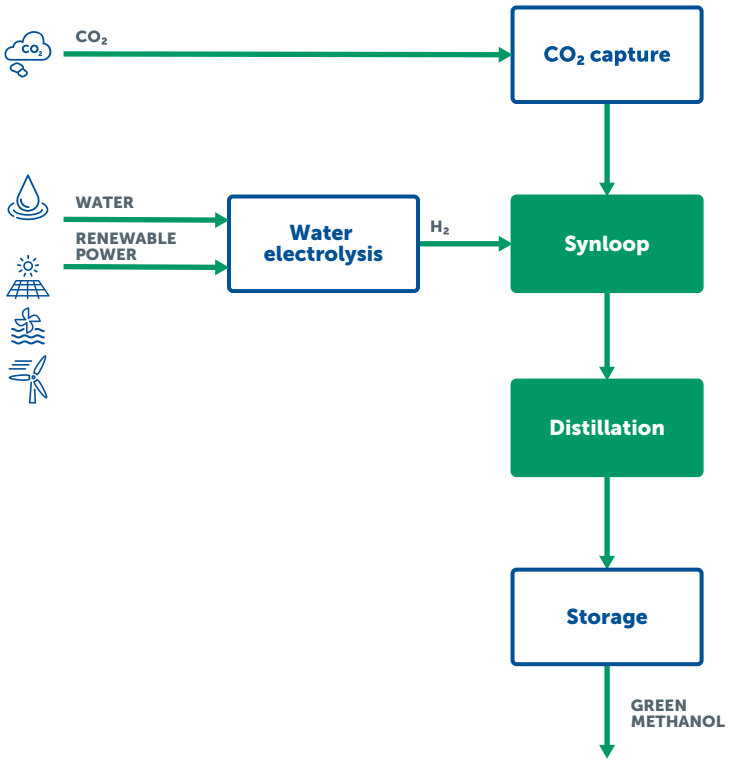
The crude methanol is separated in the high-pressure separator, then is let-down to the low-pressure separator where the dissolved vapors are washed by a stream of water and methanol from purge gas washing column. The crude methanol is directly sent to the distillation section. From the top of high-pressure separator, the vapors containing non-converted reactants are mainly recycled back to the synthesis loop through the syngas compressor circulator.

A stream of purge gas is removed from the recycle gas to control the inerts' concentration top of the column is sent to the HRU unit to recover as much as possible the hydrogen. The recovered hydrogen is recycled ack to the synthesis gas compressor suction.

DISTILLATION SECTION

The crude methanol is refined in two stages. In the first stage, the light ends are removed. In the second stage, heavier ends and water are removed to reach the refined methanol's the desired quality (grade AA).

Distillation layout is generally optimized depending on energy availability at site and relevant constrains. The distillation section can be designed to avoid any steam import.



PLANTS FOR
A NEW PLANET.
SINCE 1921.

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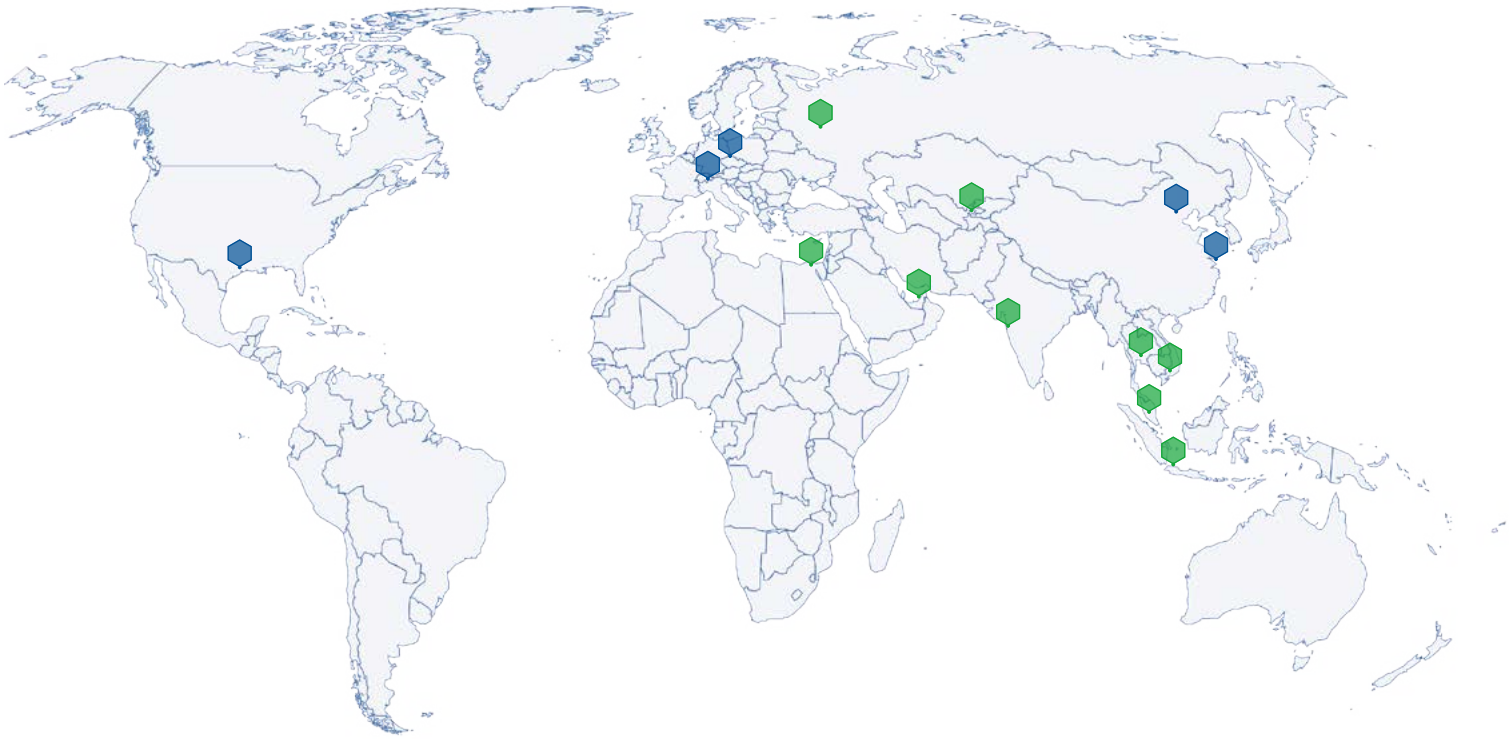
Casale in the world



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