

Climate solutions in the chemical sector: *An avoided emissions case study*

Clariant is a specialty chemical company producing a catalyst for low-carbon methanol production in Denmark.

→ Up to 41,000 tCO₂eq avoided

per year, based on the total output of the e-methanol plant.



1.44 kg CO₂eq.

is avoided per kilogram of e-methanol sold. (which production is enabled by Clariant's catalyst)

Source: Clariant

Capturing avoided emissions

— assessment details

→ **Functional unit:**

- For industrial applications: kg of methanol.
- For maritime and land transport applications: kJ of fuel.

→ **Impact emissions avoided:**

- For industrial applications: 0.62 kg CO₂ eq.
- For maritime applications: 1.64 kg CO₂ eq.
- For land transport applications: 1.63 kg CO₂ eq.

→ **Time period:** Year-on-year

→ **Scope:** Catalyst sold to European Energy's e-methanol plant in Kassø, Denmark.

→ **System boundaries:** The full lifecycle emissions of Kassø's e-methanol and the products substituted downstream (bunker fuel and land transport 33% each, conventional methanol 34%).

Use this document to support your understanding of avoided emissions calculations and disclosure as outlined in the WBCSD Guidance on Avoided Emissions:



The reference scenario

- **Industrial applications:** The chemical and plastics industries use methanol as a feedstock. They typically produce it from fossil fuels, through steam methane reforming (SMR) of fossil gas or coal gasification. In the EU, where European Energy's e-methanol plant (using Clariant's catalyst) is based, fossil gas-based SMR is the most likely method.
- **Maritime and land transport applications:** Maritime vessels operate mostly on heavy fuel oil (HFO), and heavy transport typically on diesel, both of which have high carbon emissions.

In both applications, the extraction and conversion of the raw material creates CO₂ emissions.

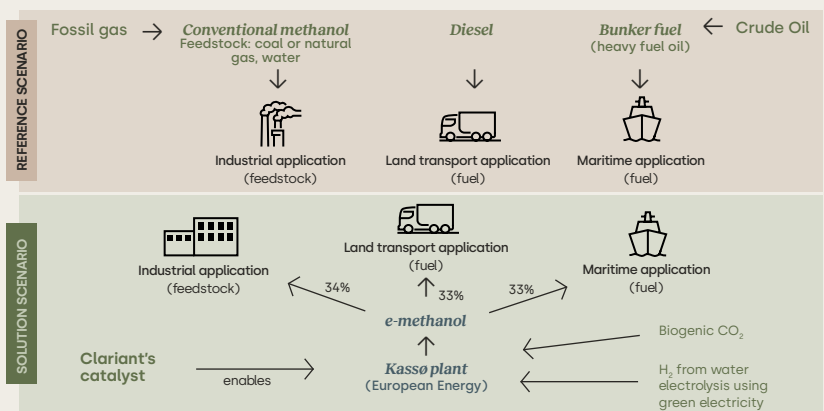
The low-carbon scenario

- Clariant provides a catalyst to the e-methanol production plant (operated by European Energy in Kassø, Denmark) that converts feedstocks into e-methanol with low carbon emissions of 0.18 kg CO₂eq/kg. The method involves using biogenic CO₂ supplied by Tønder Biogas and low-carbon electricity generated by the adjacent 304-MW Kassø Solar Park.
- Approximately 33% of the e-methanol European Energy produces is used as a shipping fuel, replacing heavy fuel oil, while other 33% is used in heavy transport to replace diesel. The remaining 34% is used in the chemical industry as a substitute for conventional methanol.



How it works

System boundaries



In the maritime and transport applications, the solution reduces the scope 1 and scope 3 (raw materials) of transport companies.

WBCSD avoided emissions eligibility gates

- Gate 1: Climate Action Credibility
- Gate 2: Climate Science Alignment
- Gate 3: Contribution Legitimacy

What share of Clariant's revenue does this solution represent?

The catalyst application described here represents only a small share of Clariant's total revenue. Although the 'Catalysts' business unit accounts for 21% of overall revenue, demand for e-methanol production catalysts remains limited. This reflects the fact that global e-methanol volumes account for only 0.25–0.5% of total methanol production.

Environmental and social side effects

Producing e-methanol requires a large amount of renewable electricity, so it is important to monitor competition for decarbonized electricity with other uses.

Third-Party Verification

The avoided emissions assessment has not been verified by a third party. An external consultant conducted the life cycle assessment of e-methanol produced at Kassø and the assessment is ISCC-certified.