



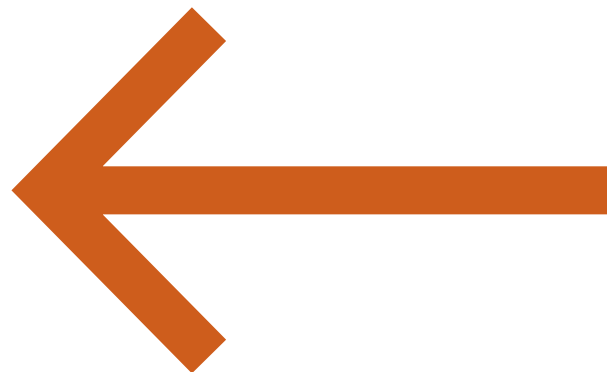
TOPSOE

TOPSOE CATALYSIS FORUM

SUSTAINABLE AVIATION FUEL (SAF)

September 12-13, 2023
Munkerupgaard

topsoe.com



FORUM PROGRAM

TUESDAY, SEPTEMBER 12

The Topsoe Catalysis Forum is organized as a two-day topical meeting. The first day is devoted to overview lectures which set the scene and form the basis for the subsequent discussions. On the second day, discussions and exchange of views will take place in three groups, each organized around a specific subtopic.

Participation is by invitation only. Besides the presenters, representatives from industrial collaboration partners are invited, but the majority of the participants are Topsoe staff. On the first day of the meeting, up to 70 participants will be present whereas around 50 will take part in the discussions on the second day. The meeting is held on a non-confidential basis.

09:00 – 09:10 **Welcome address, Jesper Nerlov, Topsoe**

PLENARY MORNING SESSION

Chair: Thoa Thi Minh Nguyen, Topsoe

09:10 – 10:00 **SAF policy & market outlook until 2050**

Tijmen van Loon, SkyNRG

10:00 – 10:50 **Catalyzing change in aviation: Future and current sustainable fuel pathways**

Joshua Heyne, Washington State University - Pacific Northwest National Laboratory

10:50 – 11:10 **Coffee break**

11:10 – 12:00 **Emissions and non-CO₂ effect reductions by burning SAF**

Patrick Le Clercq, German Aerospace Center (DLR)

12:00 – 13:30 **Lunch**

PLENARY AFTERNOON SESSION

Chair: Kurt Agerbæk Christensen, Topsoe

13:30 – 14:20 **The perspective of aircraft manufacturers on SAF**

Jean-Philippe Belières, Boeing Commercial Airplanes

14:20 – 15:10 **Modular Fischer-Tropsch technologies for decentralised SAF production**

Gael Corre, Karlsruhe Institute of Technology, KIT

15:10 – 15:40 **Coffee break**

15:40 – 16:30 **Alcohol to SAF from the perspective of a European producer**

Harald Dialer, HCS Group

18:00 **Conference dinner**

FORUM PROGRAM

WEDNESDAY, SEPTEMBER 13

08:45 – 09:00 Introduction to group discussions, Henrik Guldborg Pedersen, Topsoe

09:00 – 12:00 GROUP DISCUSSIONS

GRP. 1: Solid waste to SAF

Chair: Torkil Ottesen Hansen, Topsoe

- **Use of gasification in the low carbon future**
Theo Pretorius, SASOL
- **HTL to jet: The current state of play and how the next steps can look like**
Thomas Helmer Pedersen, AAU Energy
- **Opportunities for biomass fast pyrolysis in the production of SAF**
Wolter Prins, Ghent University

GRP. 2: Feedstocks for power to jet

Chair: Ole Frej Alkilde, Topsoe

- **Cost effective solutions for securing sustainable CO₂ supply for PtX initiatives**
Joel Flitton, Aker Carbon Capture
- **Direct Air Capture: a clean and unlimited source of carbon for e-fuels**
Marcus Temke, Carbon Engineering Ltd.
- **New nuclear and its role in e-fuels and SAF**
Nikolaj Ager Hamann, Seaborg

GRP. 3: Alcohol to jet

Chair: Linn Edda Sommer, Topsoe

- **Role of mixed olefin oligomerization in SAF**
Karthi Ramasamy, Pacific Northwest National Laboratory
- **Direct conversion of ethanol to butene-rich olefins over metal containing zeolites: Probing active site identities and reaction pathways**
James Shogren-Harris, The University of Alabama
- **CO₂ to methanol to jet fuel – Recent developments at KIT-IKFT**
Jörg Sauer, Karlsruhe Institute of Technology, KIT

12:00 – 13:00 Lunch

13:00 – 14:00 CLOSING SESSION

How to deploy SAF quickly and at large scale while managing all the risks?

Chair: Sylvain Verdier, Topsoe

Panelists: Tijmen van Loon, SkyNRG
Harald Dialer, HCS group
Gabriel Per Jonas Antberg, Topsoe

BACKGROUND

The TOPSOE CATALYSIS FORUM was created as a framework for an open exchange of views on catalysis in the fields of interest to Topsoe. The forum is conceived as a platform for discussions of new reactions and new principles of catalysis in an attempt to jointly look beyond the horizon. The Forum is held on a non-confidential basis to facilitate an open

debate and to enable all participants to make use of the information received during the meetings in their future work. The TOPSOE CATALYSIS FORUM works through individual contacts and annual meetings focusing on a single topic. The topic of the 16th TOPSOE CATALYSIS FORUM is:

SUSTAINABLE AVIATION FUEL

The demand for aviation fuel is expected to more than double by 2050 compared to pre-COVID levels. Considering the aviation industry already contributes about 1bn tons of CO₂ per annum, over 2% of the entire global amount, reaching zero emissions while meeting the growing demand for air travel is certainly a challenge – but it will also present opportunities.

While fuel efficiency, technological innovation and improved flight logistics will improve matters, they will fall significantly short of the emission reductions needed. Decarbonizing the aviation industry will require widespread adoption of sustainable aviation fuels (SAF) by 2050. With SAF providing approximately 0.1% to 0.15% of the total aviation fuel in 2022, we are still truly awaiting takeoff. The aviation industry is stepping up to the mark, with numerous proposals, commitments, mandates, and targets emerging from governments, industry bodies and policymakers. To reach these targets and lofty ambitions, the industry cannot but take a holistic approach, combining improved operational efficiency of airport and routes, advancements in aircraft design and technology, usage of sustainable aviation fuels, and market-based measures, such as carbon pricing

and offsetting. But it is not all self-driven – regulation and policy will also be crucial in emission reduction.

At Topsoe, we are part of a SAF ecosystem that must work together and collaborate across the value chain to accelerate progress in SAF production and adoption.

A successful transition to a low-carbon aviation industry needs collective effort to overcome barriers and accelerate both SAF production and adoption. Topsoe has decided to engage a substantial part of its R&D to pursue the SAF advancement via our skills within catalysis and technology development. At Topsoe, we are also actively engaging in partnerships across the aviation industry to drive change. This is why the topic of the 2023 Topsoe Catalysis Forum is SAF and important aspects of this topic will be addressed in depth such as:

- Which technologies can produce SAF now and will produce SAF in the future?
- Where will we get the feedstocks to produce e-jet?
- Which technologies can debottleneck the waste-to-SAF pathways?

Scientific committee

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