



AVIATION CO₂ REDUCTIONS



STOCKTAKING SEMINAR

TECHNOLOGY · OPERATIONS · SUSTAINABLE AVIATION FUELS



Clean energy

Maria Fiskerud

Cluster manager for the Swedish innovation cluster Fossil-free aviation 2045 – Research Institute of Sweden





Creativity
Collaboration

Some examples from our Pioneering for CO₂ reduction

Goals

Fossil-free aviation
2030 Domestic
2045 International

Early users of SAF

- 2014 KSD, BGO, TRD
- 2015 KSD
- 2016 KSD, ARN, OSD, BMA, OSL
- 2017 KSD, GOT, MMX, KLR, OSL, BGO
- 2018 ARN, BMA, GOT, VBY, LLA, KLR, VXO, HAD, OSL, BGO
- 2019 ARN, MMX, OSD, UME, GOT, KLR, VXO, HAD

SAF Collaborations

- 2013 Nordic Initiative Sustainable Aviation
- 2018 Fossil-free aviation 2045

First delivery of SAF in the world

- 2016 OSL ...using the hydrant infrastructure at the airport
- 2016 ARN ...using the same infrastructure as Jet A-1 from harbor to wing

Co-financing

- 2015 Fly Green Fund
- 2016 Swedavia do all their business travel with SAF
- 2016-2018 Co-financing between Avinor, AirBP, SAS, KLM and Lufthansa at OSL
- 2018-ff Public procurement started for SAF by Swedavia, Energy company (Jämtkraft) and Kalmar municipality
- 2019 Airliners offers travelers to buy SAF for their trip – SAS, BRA

Government support

- 2018 Swedish Roadmap towards fossil free aviation
- 2019 BioJet investigation in Sweden
- 2020 Electric aviation investigation in Sweden
- 2020 Fossil free aviation investigation Nordic Ministry Council
- 2020 Norway introduces a SAF drop-in mandate
- 2020 Nordic ministry discuss Nordic solutions for SAF and Electric aviation

Electric aviation

- 2018 Electric aviation in Sweden (Sweden's innovation agency project)
- 2018 Avinor and the Norwegian Civil Aviation Authority to develop a program for introduction of electrified aircraft
- 2019 Nordic Network for Electric Aviation (Nordic Innovation project)
- 2020 Infrastructure for electric aviation introduced at airports
- 2025 HEART Aerospace airplane Heart ES-19 will fly

Hydrogen aviation

- 2019 Enable H2 (CleanSky project) GKN and Chalmers

Together with our CO₂ reduction friends!

Fossil free aviation 2045



Nordic Network for Electric Aviation



We want to be CO₂ reduction pioneers!

- The Nordic countries are the 12th economy in the world if we combine our economies
- We have sustainable feedstock, for example forest residue that we don't use today
- We have clean electricity that could be used for Power-2-X, hydrogen and electric aviation
- 16 airports have used SAF
- Infrastructure and test areas are implemented for electric aviation



Innovation cluster

Fossil-free aviation 2045

Aviation Fuels

Feedstock type	Conversion process
Forestry residue	Any ASTM certified process

Founded by **SAS, Swedavia** and **RISE** to **support action** to reach the Swedish aviation industries goals: Fossil-free domestic flights 2030 and all flights, both domestic and international fossil-free 2045. The cluster is the meeting place and network for **collaboration** and increased **consensus**, to **accelerate the transition**. We want to be a cluster that leads to **action**. Innovations projects lead by the cluster are both **technical and market driven**. Technical driven - hydrogen, SAF bio and power-2-X and electric aviation. Market driven - co-financing, policy, green investments. **A diversity of stakeholders:** Authorities, academia, the aviation, process, and tourism industry, business- and leisure travelers.
<https://www.fossilfreeaviation.com/>



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	CO₂ reductions per flight	>80 %
	Level of finance required	8,5/17 M SEK
	Timeframe	2045
	Main challenges	Get everyone to work towards the same goal

Nordic Network for Electric Aviation (NEA)

Technology

NEA is a platform where Nordic stakeholders come together to accelerate the introduction of electric aviation in the Nordic countries. Consortium of 6 countries/15 project members.

Work packages:

- (1) Standardize electric air infrastructure in the Nordic countries
- (2) Develop business models for regional point-to-point connectivity between Nordic countries
- (3) Develop aircraft technology for Nordic weather conditions
- (4) Create a platform for European and global collaboration**

<https://youtu.be/pPQ5AmD1Yjl>



	CO₂ reductions per flight	100%
	Level of finance required	4/12 M SEK
	Timeframe	2025
	Main challenges	Certification Global standard Policy

Thank You



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