



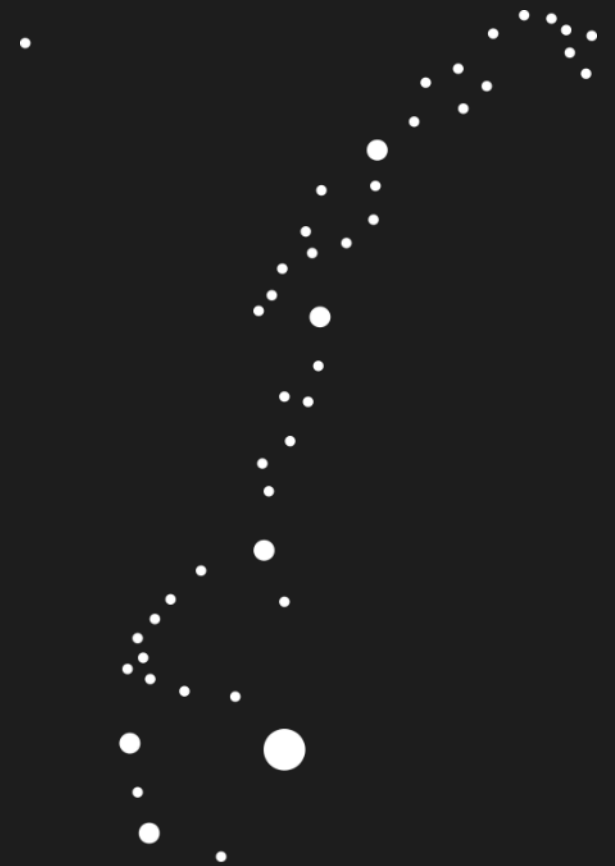
EXPERIENCE FROM INTRODUCTION OF AVIATION BIOFUEL AT OSLO AIRPORT

Nordic Energy Research Seminar: *Nordic Perspectives on the Use of Advanced Sustainable Jet Fuels for Aviation*

Oslo, 01 SEPT 2016

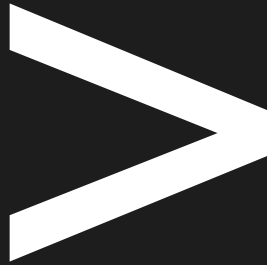
Olav Mosvold Larsen

- Avinor is responsible for Air Navigation Services (ANSP) and operate 46 airports in Norway
- Our modern society is totally dependent on aviation



WHY?

Traffic-
growth %



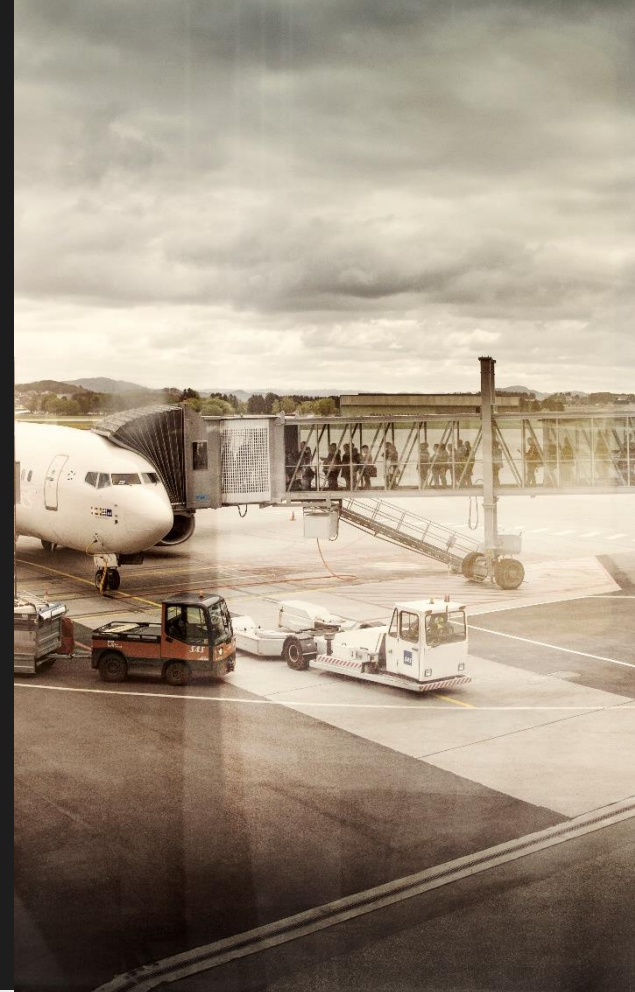
Emission
reductions %



**AVINOR'S INVOLVEMENT IS ETHICALLY SOUND
AND GOOD FOR BUSINESS**

LONG TERM APPROACH AND ACTIVITIES

- The Norwegian aviation industry have been looking into sustainable jet biofuel since 2007
- Biofuel certified for use in civil aviation since 2009
- Major study in 2011-2013. Conclusion: Possible, but risky
- Avinor to invest up to MNOK 100 in jet biofuels (2013-2022)
- Demoflights to the ZERO conference 11 NOV 2014
- Fruitful collaboration with AirBP and airlines
- KLM/Embraer OSL-AMS campaign Q2 2016
- Several ongoing R&D projects



1.25 MILLION LITRES JET BIOFUEL AT OSLO AIRPORT

- JAN 2016: OSL world's first hub to offer jet biofuel to all airlines on a commercial basis
- Cooperation with Air BP, SkyNRG, Neste and airlines
- Thousands of bio jet flights have been carried out
- This is the next step
- Delivered to the main fuel farm and distributed through the hydrant and dispenser system
- Important piece in the logistics puzzle for cost effective bio jet fuel distribution
- EU ETS and domestic CO2-tax waived
- Premium cost split between the project partners



FIRST BATCH (APPROX 600.000 LITRES)

- Based on Camelina from the ITAKA project in Spain
- Refined by Neste in Finland
- Shipped to Gävle in Sweden blended with fossil JetA1 (50/50) and stored there
- Transported to OSL by lorries
- Dropped into the fuel farm at OSL
- Distributed in the dispenser system

- Works very well
- No issues technically
- No issues with other airlines
- No issues with passengers

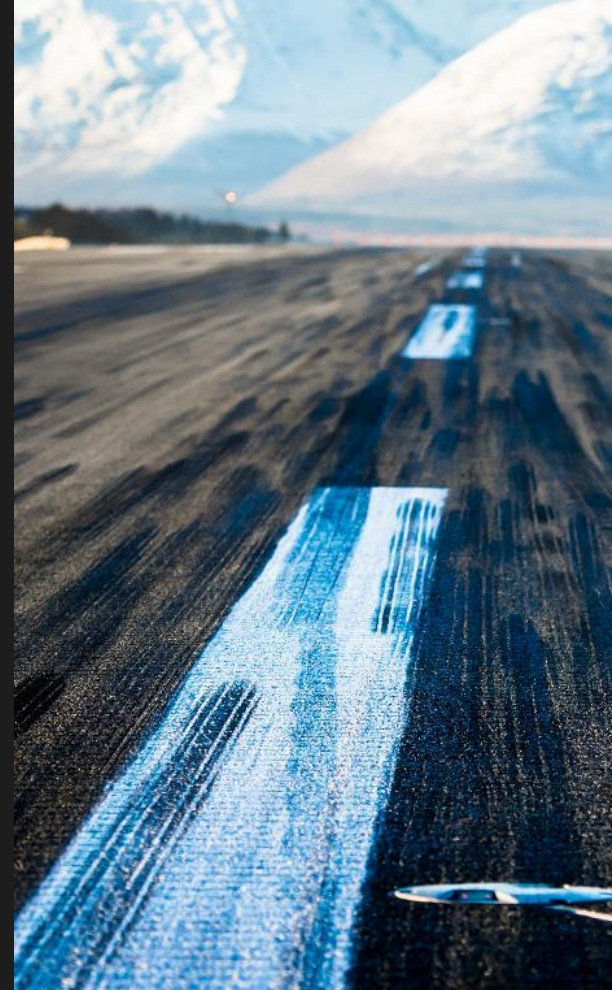


Lufthansa



WAY FORWARD

- Avinor 2030 goal: 30 % of aviation fuel in Norway should be sustainable biofuel = Approx 400 mill litres
- Continued supply at OSL and possibly other airports
- Support national/Nordic production of sustainable jet biofuel
- Push for jet biofuel in Norway on several arenas
- Long term commitment



THE AVIATION INDUSTRY HAS DONE AMAZING THINGS BEFORE – AND WILL DO IT AGAIN

