



FACING THE CHALLENGE: DECISIONS, VISIONS AND PROJECTS IN NORWAY

SAF Workshop

Copenhagen, 20 NOV 2018



45 airports



Norway's Air Navigation Service
Provider

Norway is totally dependent on aviation



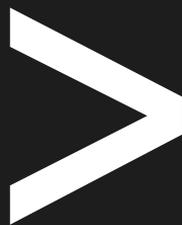


SUSTAINABLE DEVELOPMENT GOALS

17 GOALS TO TRANSFORM OUR WORLD

1 NO POVERTY 	2 ZERO HUNGER 	3 GOOD HEALTH AND WELL-BEING 	4 QUALITY EDUCATION 	5 GENDER EQUALITY 	6 CLEAN WATER AND SANITATION
7 AFFORDABLE AND CLEAN ENERGY 	8 DECENT WORK AND ECONOMIC GROWTH 	9 INDUSTRY, INNOVATION AND INFRASTRUCTURE 	10 REDUCED INEQUALITIES 	11 SUSTAINABLE CITIES AND COMMUNITIES 	12 RESPONSIBLE CONSUMPTION AND PRODUCTION
13 CLIMATE ACTION 	14 LIFE BELOW WATER 	15 LIFE ON LAND 	16 PEACE, JUSTICE AND STRONG INSTITUTIONS 	17 PARTNERSHIPS FOR THE GOALS 	 SUSTAINABLE DEVELOPMENT GOALS

Traffic
growth %

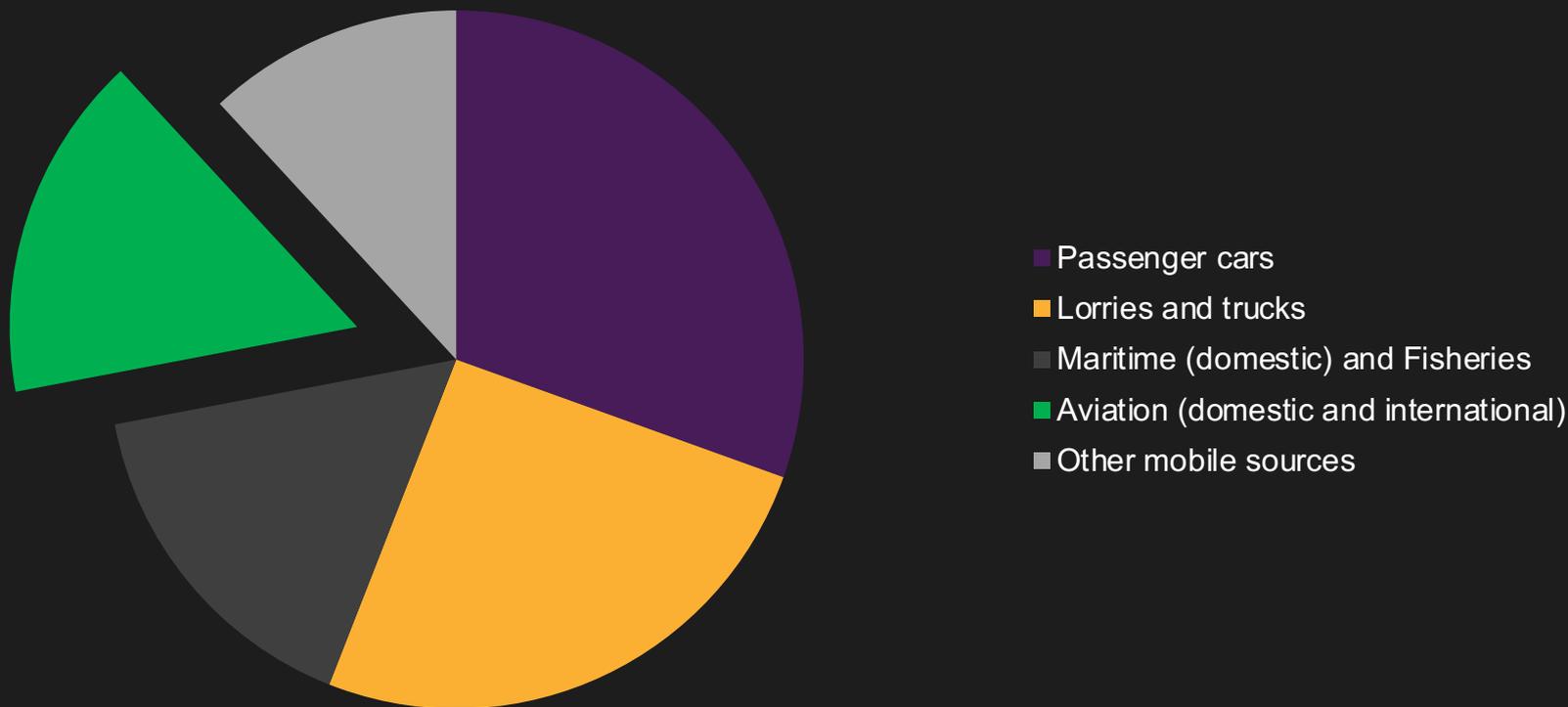


Emission
reductions %

IPCC | 1.5°C



CARBON EMISSIONS FROM TRANSPORT IN NORWAY 2016



NIGHTMARE SCENARIO



- Passenger cars
- Lorries and trucks
- Maritime (domestic) and Fisheries
- Aviation (domestic and international)
- Other mobile sources

A close-up, low-angle view of an airplane engine nacelle, showing the dark, metallic structure and the circular opening. The engine is positioned on the left side of the frame, pointing towards the right. The background is a bright, hazy sky with soft, wispy clouds, suggesting a high-altitude or sunrise/sunset setting. The overall tone is dramatic and professional.

**THE RIGHT THING TO DO
MAKES BUSINESS SENSE**



AVINOR 2022 GOAL:
Reduce own emissions
by 50%

(2012 baseline)



AIRCRAFT CARBON EMISSIONS

AIRLINES INVESTING IN MORE ENERGY EFFICIENT AIRCRAFT



ELECTRIC AIRCRAFT

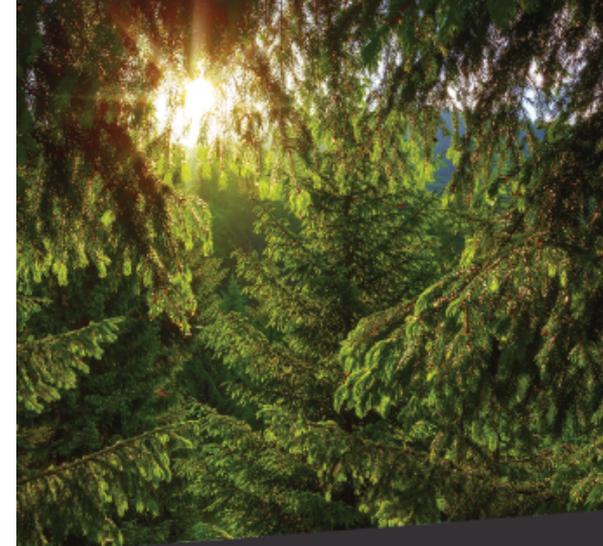




SUSTAINABLE AVIATION FUEL

- Avinor monitoring the development since 2007
- Several projects
- Cooperation with industry and stakeholders

2014: CONFERENCE AND DEMO FLIGHTS



FØRSTE FLYGNINGER
MED BIODRIVSTOFF
I NORGE

11.11.2014



JAN 2016: OSL #1 HUB TO OFFER JET BIOFUEL TO ALL AIRLINES ON A COMMERCIAL BASIS

- Cooperation with aviation industry
- Dropped into the main fuel farm
- Distributed in the hydrant and dispenser system
- Premium cost split between the project partners
- Works very well!
- Aug 2017: Program expanded to Bergen!





WHAT'S UP?

- A few industrial initiatives
 - A drop in mandate

SILVA GREEN FUEL

- 500 MNOK
- 25 people
- Hydrofaction technology (Steeper Energy)
- First: Diesel
- Later: SAF



Demo plant for
**2ND GENERATION
BIO FUEL**



Made from
**FOREST
FEEDSTOCK**



TOFTE
in Norway



Test period
2019 - 2020



OWNERSHIP
Statkraft 51%
Södra 49%



Can produce
4000 LITER
of bio fuel per day

- Currently producing fuel from plastics
- Looking into a project to test their technological ideas on forestry biomass
- Aim to produce SAF



BIOZIN

- Plan to produce bio condensate from forestry residues
- Owner: Bergene Holm AS
- Technology: IH2® developed by CRI
- (Cooperation with Preem AB)

FOLLUM INDUSTRIAL SITE

- St1 – Bio ethanol?
- Elkem – Pyrolysis?
- Others?

• www.treklyngen.no



QUOTA OBLIGATION (DROP IN REQUIREMENT)

- On the agenda since 2015
- The White Paper on the National Transport Plan 2018-2029: «*The Government will implement a drop in requirement of 1 % sustainable aviation biofuel from 2019 with a target of 30 % in 2030.*»
- *[In addition to CO2 tax, ETS, CORSIA and Passenger duty]*



DECISION

- 0.5 % Advanced Biofuel from 1 JAN 2020
- Fuel suppliers responsible
- All civil traffic
- Domestic and international
- Approx 6 mill litres annually
- Scaling up not yet decided
- Only formalities remaining for the decision to be implemented in our legal system



CONCLUDING REMARKS

- Norway is totally dependent on aviation
- Green House Gas emissions must be mitigated
- Airlines investing in more energy efficient aircraft
- Electric passenger aircraft will be a reality
- Sustainable aviation fuels are an important part of the solution

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