



ELECTRIFIED DOMESTIC AIR TRAFFIC BY 2040?

The Sola Conference 2018

17 SEP 2018

Dag Falk-Petersen, CEO

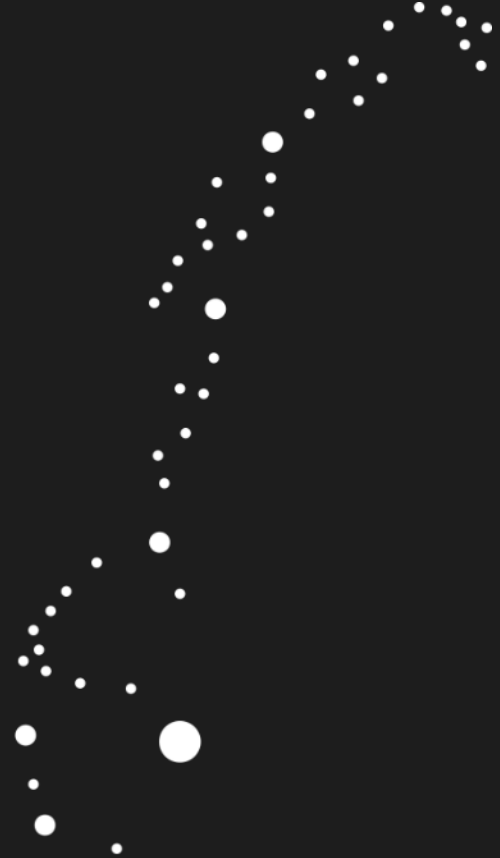


44 airports



Norway's Air Navigation Service
Provider

Norway is totally dependent on aviation



Traffic
growth %



Emission
reductions %

A close-up, low-angle shot of an airplane engine nacelle, showing the dark, metallic interior of the engine 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 sunrise or sunset. The overall tone is dramatic and professional.

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

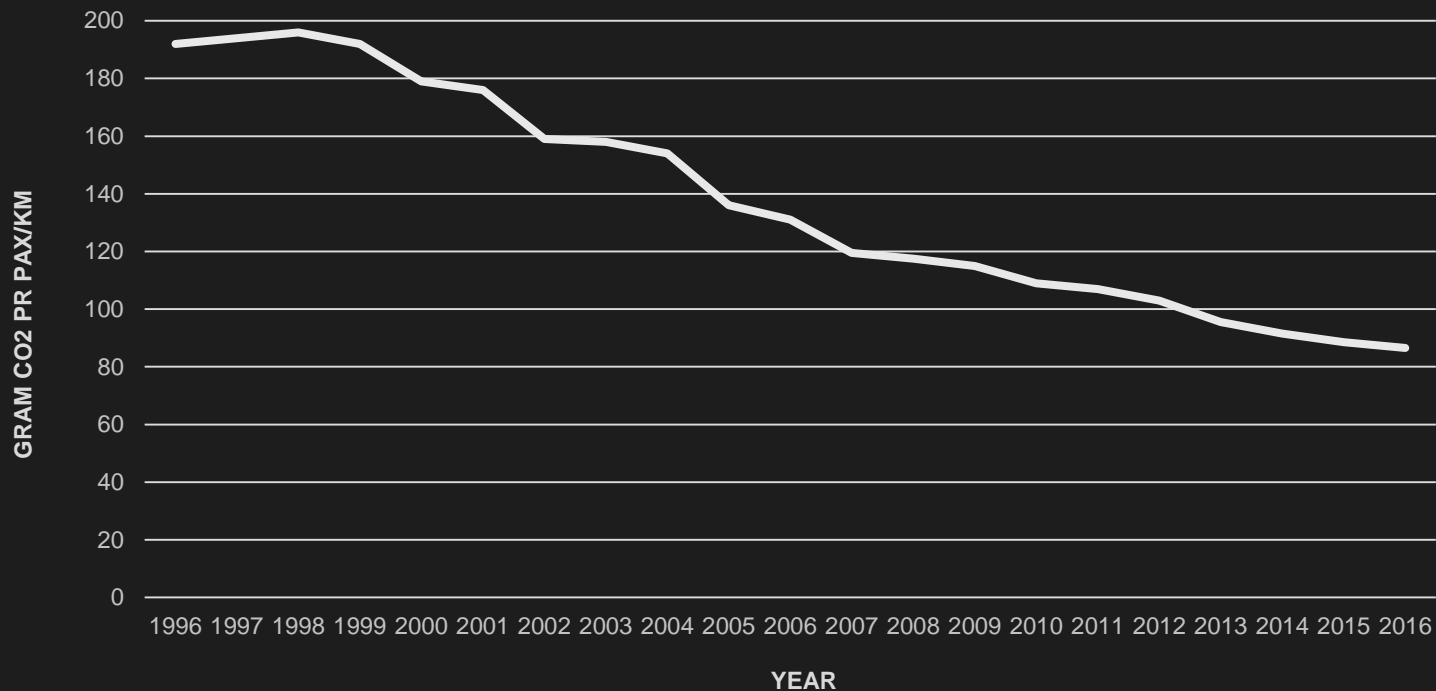
An aerial view from an airplane window showing a sunset over a vast sea of clouds. The sun is low on the horizon, casting a warm orange glow over the clouds. The airplane's wing and engine are visible in the foreground, partially obscuring the view. The sky transitions from a deep blue at the top to a bright orange near the horizon.

**AIRCRAFT CARBON
EMISSIONS**

AIRLINES INVESTING IN MORE ENERGY EFFICIENT AIRCRAFT



EMISSIONS PR PAX KM HALVED 1996-2016



(Average SAS og Norwegian)

SUSTAINABLE JET BIOFUEL IS AN IMPORTANT PART OF THE FUTURE OF AVIATION



- JAN 2016: OSL #1 hub to offer jet biofuel to all airlines on a commercial basis
- Avinor 2030 goal: 30 % of aviation fuel sold in Norway should be sustainable jet biofuel
- Norwegian government looking into a drop in mandate of 1% from 1 JAN 2019





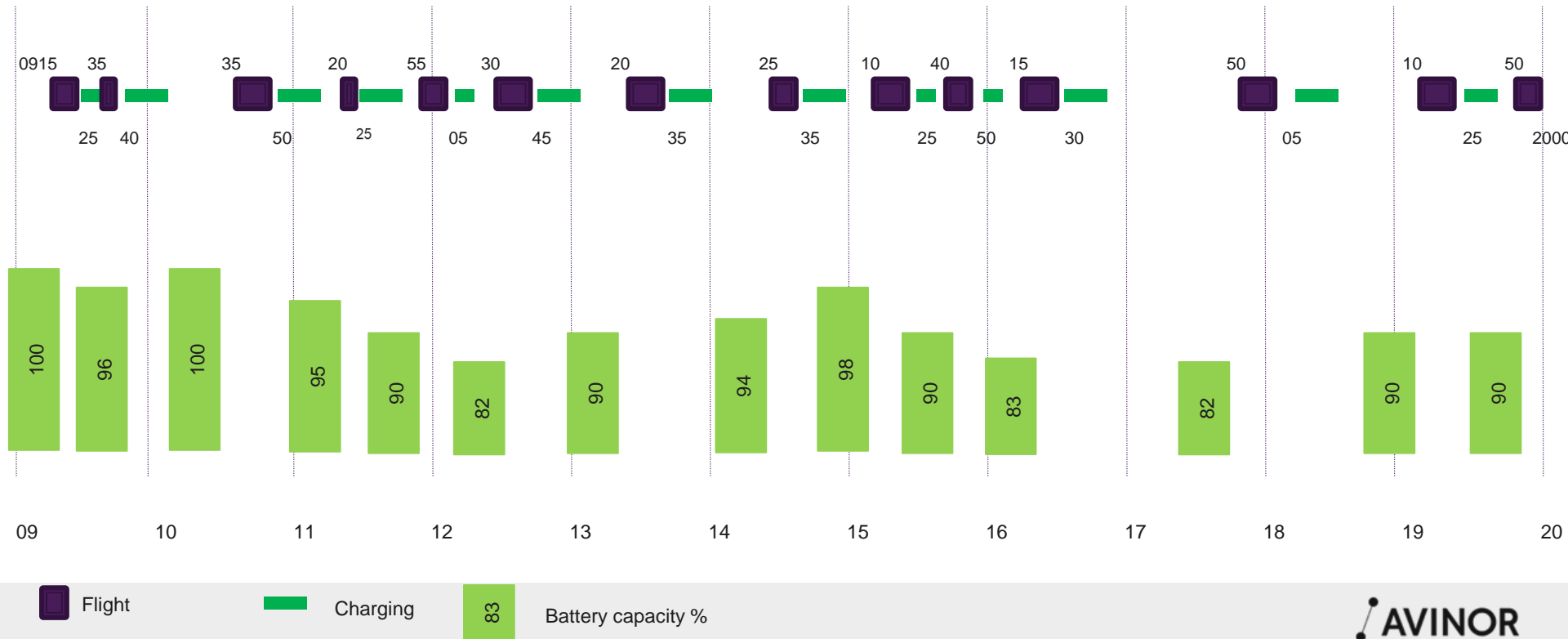
- Pipistrel Alpha Electro
- Demonstration and testing
- Range: 1 hour / ca 120 km
- Proof of concept?



- Wingspan: 10.6 metres
- Empty weight: 382.5 kg
- Maximum take-off weight: 560 kg
- Engine power: 50 kW (cont) 60 kW (max 1 minute)
- Cruising speed (optimal range): 85 Kts (157 km/h)
- Range: 70 NM (130 km) + 20 % reserve
- Battery: 21 kWh (20 kWh usable)
- Climbing ability: 1220 ft/min (6.1 m/s)
- Take-off ground roll: 169 metres
- Landing ground roll: 125 metres

Arendalsuka 13 AUG 2018

- 14 flights
- Total flight time 2:45
- Turnaround times down to 10 minutes

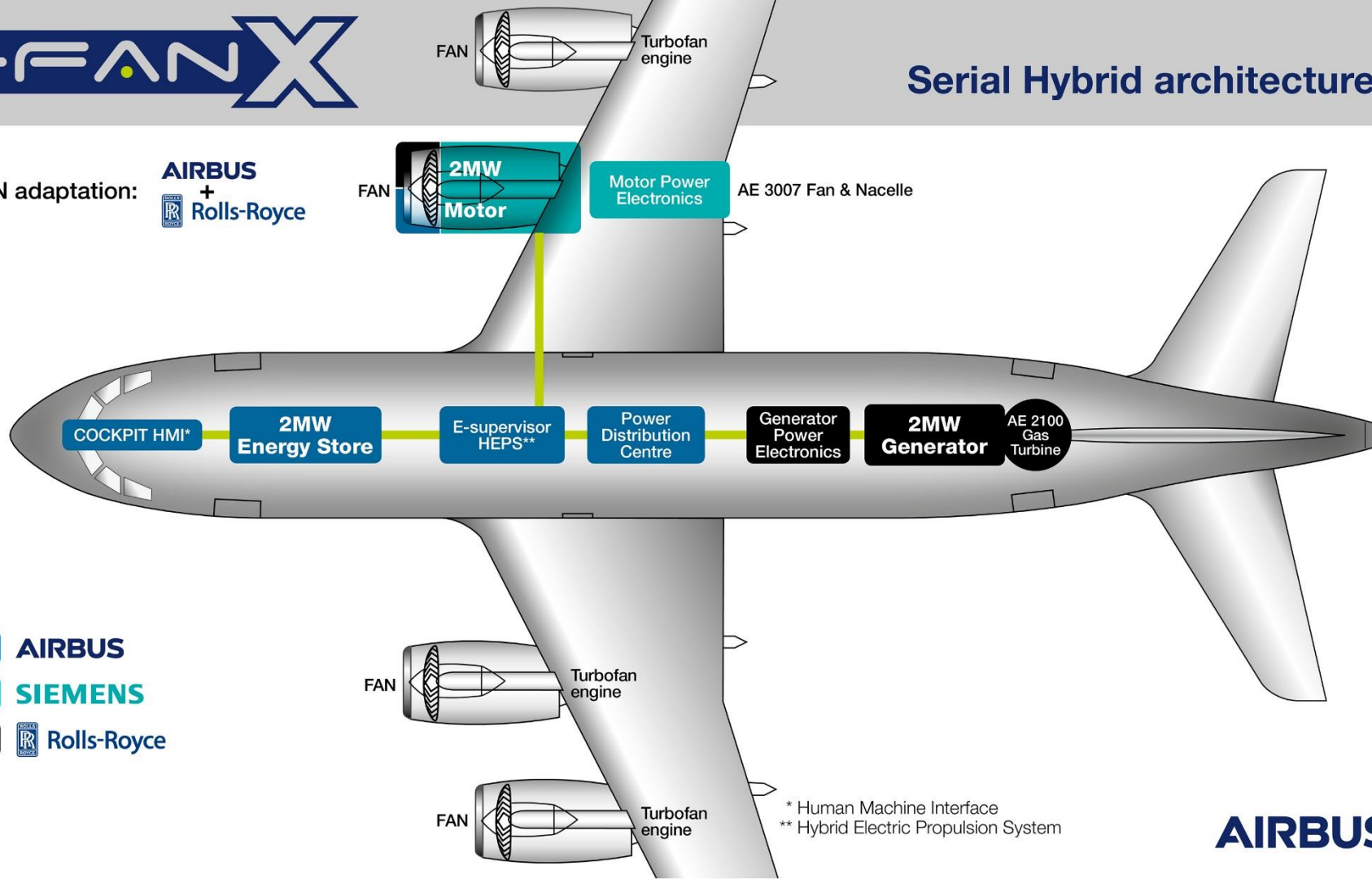






FAN adaptation:

AIRBUS
+
Rolls-Royce



AIRBUS
SIEMENS
Rolls-Royce

* Human Machine Interface
** Hybrid Electric Propulsion System

Hybrid electric aircraft

Range in 2030: 100 pax 1000 km





NASA X-57 Maxwell
Distributed Propulsion



NASA X-57 Maxwell
Distributed Propulsion

SAFETY

distributed electric propulsion system



SAFETY



RANGE ANXIETY

A blue-tinted photograph showing a close-up view of an airplane's wing and fuselage. The wing is in the foreground, curving upwards, and the fuselage is visible behind it. The background is a bright blue sky with some light clouds. The overall mood is serene but also evokes a sense of flight and distance.

Oslo – Bergen

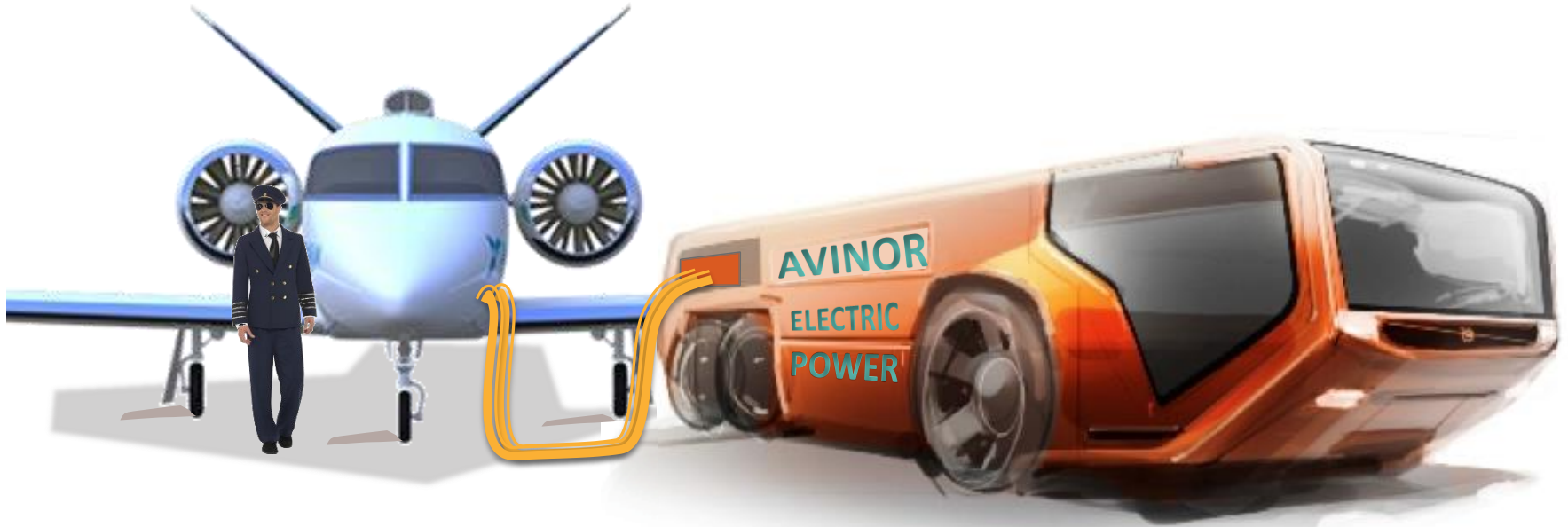
Alternate: Haugesund

+ 30 minutes

COST REDUCTION = BETTER CONNECTIVITY

- Reduced costs?
- Shorter runways?
- Smaller aircraft with new business cases?
- New routes?
- Increased frequency?

CONSEQUENCES FOR AVINOR'S INFRASTRUCTURE?



- Mapping surplus electricity capacity on Avinor's airports
- Looking into innovative and flexible charging solutions
- Or will fuel cells/H2 be the preferred solution?



JOBY
AVIATION



NEVA Aerospace © 2017. All rights reserved.

NEVA
AEROSPACE



INTRODUCING
DELOREAN AEROSPACE



Aurora
FLIGHT SCIENCES



LILIUM



AIRSPACE X



EMBRAER

UBER



JOBY
AVIATION



AIRBUS



XTI



Bell Helicopter
A Textron Company



AIRBUS



VOLOCOPTER



CARTER



EHANG



JOBY
AVIATION



RELEVANT IN NORWAY?

- AIRBUS' A³ Vahana
- 100% electric
- 8x 45 kW motors
- Full autonomy
- Cargo/1 pax (2 pax after 2020)
- Planned range: 80 km
- Charging and Battery swap
- Pic from first full scale flight FEB 2018

NORWAY FIRST?

- Unique network of airports
- An established market for short flights with small aircraft (incl PSO routes)
- Broad support from Government, Parliament and other stakeholders
- 100% renewable electricity

→ Aircraft producers are looking for a market and a customer – we have both





VISION:

**ALL DOMESTIC TRAFFIC
ELECTRIFIED BY 2040**

**AIR TRAVEL:
THE MOST ENVIRONMENTALLY FRIENDLY
MODE OF TRANSPORT > 300 KM**



CONCLUDING REMARKS

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