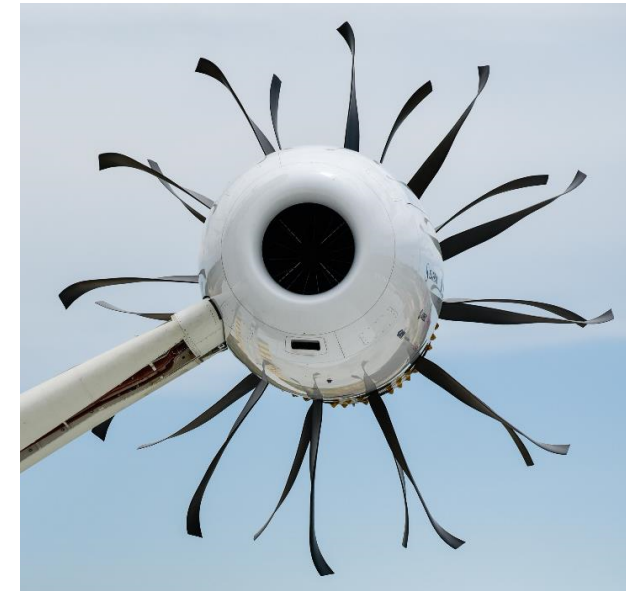


Clean Sky: Svenskt industriellt deltagande

Clean Sky är ett EU/Industri-partnerskap. Demonstratorer upp till TRL6.
Clean Sky 1 (2008-2016) levererade teknologier som ger 32% minskade CO2-utsläpp.
Clean Sky 2 (2014-2021) kommer ta ytterligare steg



Laminärströmning med Saab-vingen, flygprov



Open Rotor motorprov med GKN roterande struktur

11155 Rev. 2



SAAB



Clean Sky 2: Tackling Key Environmental Challenges

Environmental Objectives*



TO -20%
TO -30%



TO -20%
TO -30%



TO -20%
TO -30%

* vs today's best aircraft



1477 participations (over 800 unique entities)



334

INDUSTRY MEMBERS



420

SMES



373

RESEARCH CENTRES



350

UNIVERSITIES



28

COUNTRIES



110

REGIONS



>466

GRANTS



...while building industrial leadership and ensuring mobility



GKN Aerospace Engine Systems i Clean Sky 2

GKN Aerospace i Trollhättan är Core Partner i Clean Sky 2

GKN Aerospace ansvarar för utveckling och tillverkning av:

- Kompressorstrukturen i Rolls-Royce Ultrafan™
- Kompressorstruktur, axel och i Safran's UHPE-motor
- Kompressor och motorutlopp med MTU
- Roterande strukturer i Safran's Open Rotor-motor (från Clean Sky 1, utvärdering av motorprov)

Validering till TRL 5-6 i motorprov eller riggprov

60 M€ budget (30 M€ EU-finansiering)



RR Ultrafan



Safran UHPE



MTU GTF

Saab AB i Clean Sky 2

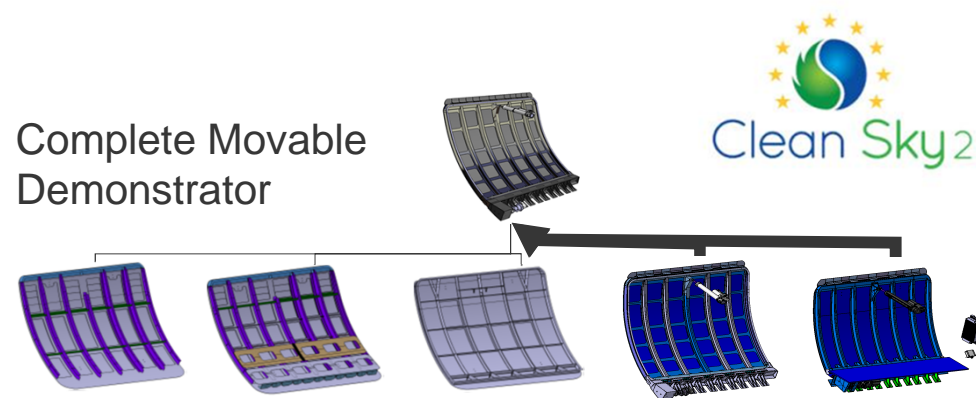
Saab AB är Leader i Clean Sky 2 på högsta nivån.

Utvecklar teknologi i Airframe ITD, Systems ITD, LPA

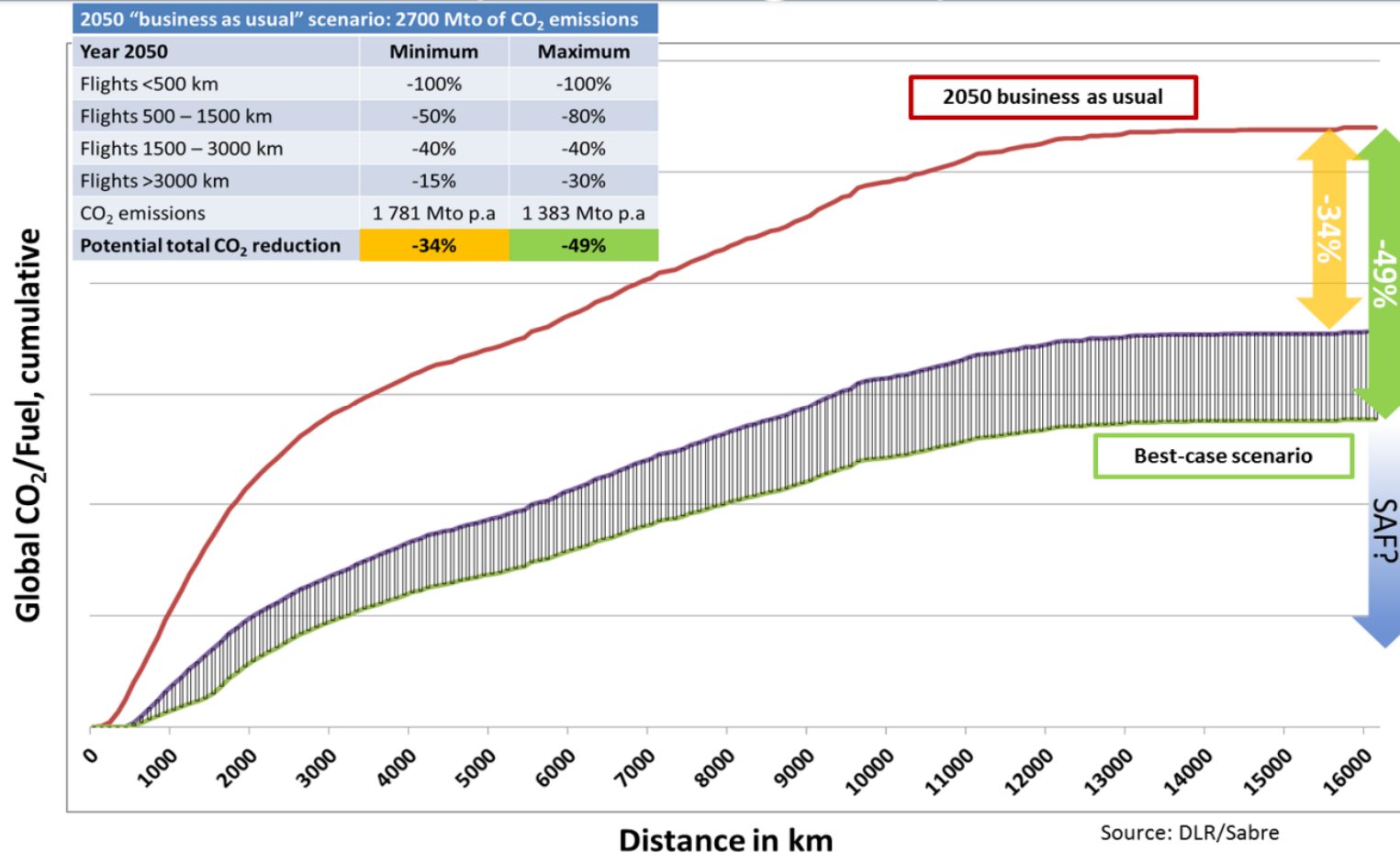
- Laminar wing – utvärdering av Saab-vingen från BLADE flygprov
- Doors – Saab utvecklar lastrumsluckor inkl. system för integration i Airbus skrovdemo
- High Lift Device – Saab utvecklar Flapron till Airbus Wing of Tomorrow
- Enhanced Flight Vision Systems – Saab utvecklar ett integrerat Vision and Awareness system för demonstration i Airbus Defence & Space Active Regional Cockpit demonstrator
- Enhanced Vision functions integration – Saab utvecklar och integrerar nya sensorer för Airbus Defence and Space Regional Aircraft demonstrator

System och struktur demonstration på TRL5-6 i skrov och systemdemonstrator

40M€ budget (20M€ EU-finansiering)



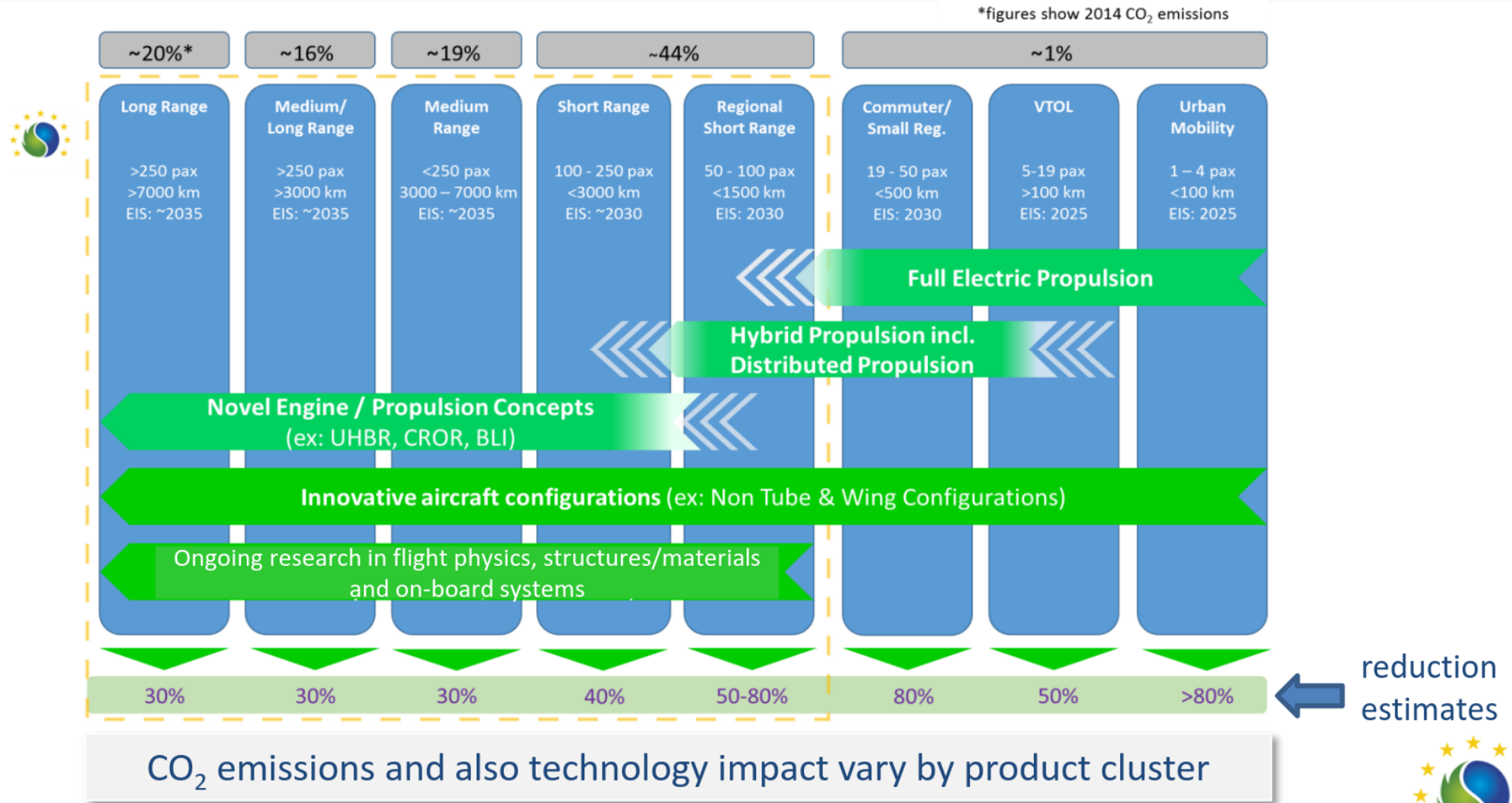
Potential CO₂ savings through technologies in 2050 (excluding SAF)



CO₂ reduction potential through technologies up to 50%



Technology pathways and estimated CO₂ reduction potential



Clean Sky 3: The Way Forward

- An aggressive decarbonisation is the Grand Challenge facing the aviation sector
- Clean Sky 3 needs to develop highly ambitious and impactful technological innovations
- Only by joining forces with all European stakeholders, aviation will be able to meet the challenge



Clean Sky 3: Potential Demonstrator Areas



A mix of revolutionary and evolutionary research from TRL 1 - 6



Clean Sky 2: Demonstrators

<h3>Breakthroughs in Propulsion Efficiency</h3> <ul style="list-style-type: none">  Very High Bypass Ratio (VHBR) Large Turbofan TRL 6 - 2023  Ultra-High Propulsive Efficiency (UHPE) TRL 5+ - mid-2022  Advanced Geared Engine Configuration (HPC and LPT technology demonstration) TRL 5 - 2023  Business aviation / short range Regional Turboprop TRL 5 - 2022  Light weight and efficient Jet-fuel reciprocating engine (Small Aero-Engine) TRL 6 - 2019  Reliable and more efficient operation of small turbine engines (Small Aero-Engine) TRL 6 - 2019  Hybrid Propulsion Ground Test Bench 2020  Novel Aircraft Configuration & Scaled Flight Test 2021 	<h3>Advances in Wings and Aerodynamics</h3> <ul style="list-style-type: none">  Adaptive Wing Integrated Demonstrator Flying Test Bed 2022  Integrated Wing Technologies Flying Test Bed 2020 & 2023  Advanced Laminar Flow on Wings and Empennage  Laminar Nacelle Virtual TRL 5 - 2019 	<h3>Innovative Structures and Production Systems</h3> <ul style="list-style-type: none">  Advanced Rear End Demonstrator 2023  Functional Cabin & Cargo Demonstrator of new integrated systems  Next Generation Multifunctional Fuselage Demonstrator automated cabin assembly & structure integration  Advanced Lower Center Fuselage Demonstrator  Regional Aircraft Fuselage / Pax Cabin Integrated Demonstrator  Affordable aerostructures for Small Air Transport  Advanced Small Aircraft Wing Box in Out-of-Autoclave CFRP 2020 	<h3>Future Cockpit and Flight Guidance Systems</h3> <ul style="list-style-type: none">  Disruptive Cockpit Demonstrator (Function preparation test) 2023  Active Regional Cockpit 2020  Bizjet Enhanced Cockpit Concept 2022  Avionics for Extended Cockpit Demonstrator - 2020  Affordable SESAR Compliant cockpit for Small Aircraft 	<h3>More Electric Aircraft & Systems</h3> <ul style="list-style-type: none">  Regional Aircraft 'Iron Bird' Systems Integration - 2021  Innovative Electrical Wing - 2021  Electric Drive Landing Gear System (E-LDG)  Advanced Electrical Environmental Control System (E-ECS) Demonstrator  Full Chain demonstration: Electrical power generation, distribution and usage
<h3>Novel Aircraft Configurations</h3> <ul style="list-style-type: none">  NextGenCTR demonstrator - Next Generation Civil  RACER - Rapid And Cost-Effective Rotorcraft 		<h3>Optimal Passenger Environment</h3> <ul style="list-style-type: none">  Full Scale Mock-up of Business Jet Office Centered Cabin 2021  Innovative Cabin & Cargo Systems Technologies 2021 		



How to address Climate Impact?

Measures	Clean Sky 3 scope
Aircraft technology & design	<ul style="list-style-type: none">• Clean Sky 3 focus
ATM & Operations	<ul style="list-style-type: none">• SESAR focus• Requirements also from CS3• Integrated demonstrators
Sustainable aviation fuels & energy carriers	<ul style="list-style-type: none">• DG Energy• FCH / Clean Hydrogen• European Partnership Batteries• Requirements also from CS3• Integrated demonstrators
Market based measures	<ul style="list-style-type: none">• not part of CS3

Clean Sky will significantly contribute to meeting the challenge

