

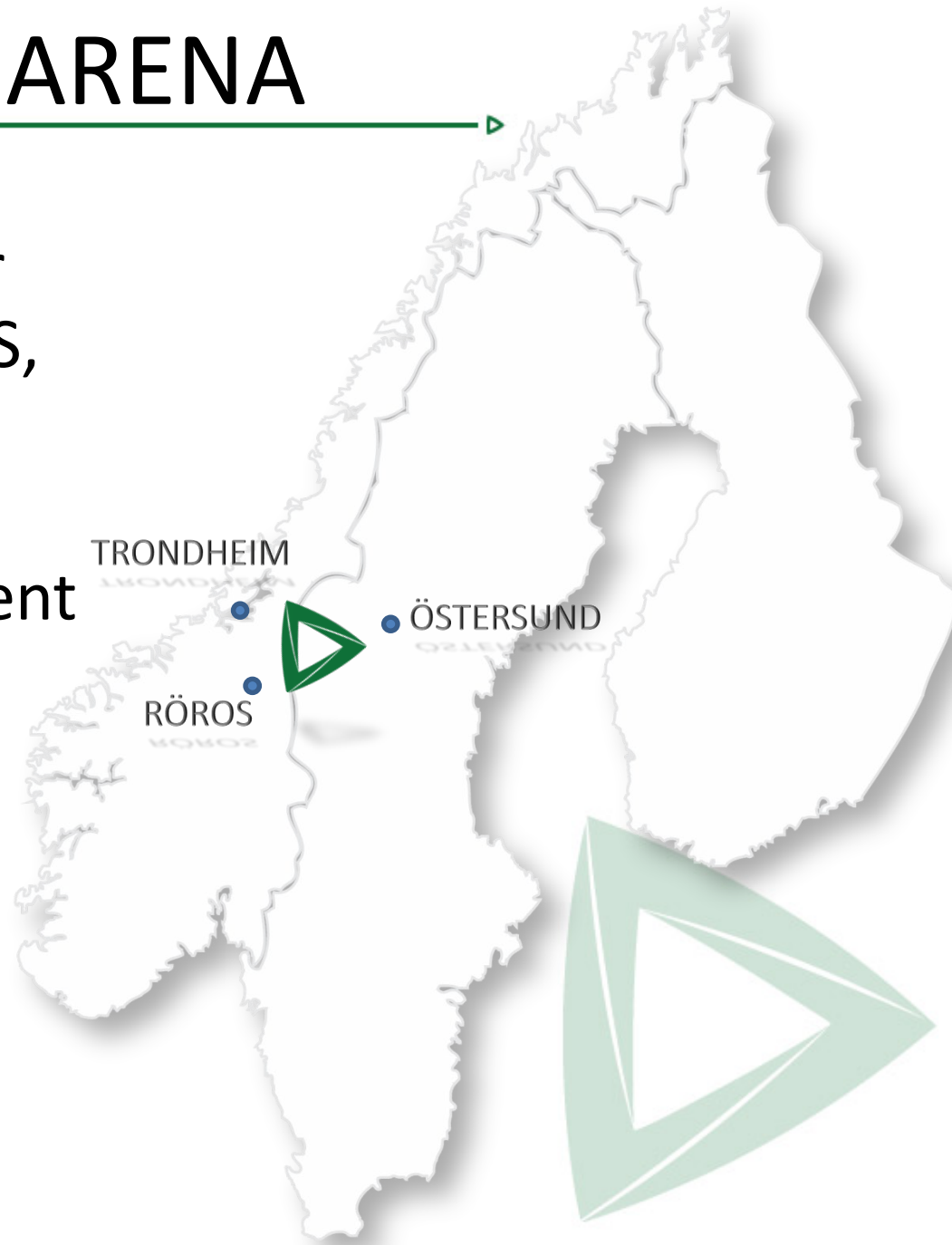
GREEN FLYWAY

ÖSTERSUND - RÖROS - TRONDHEIM

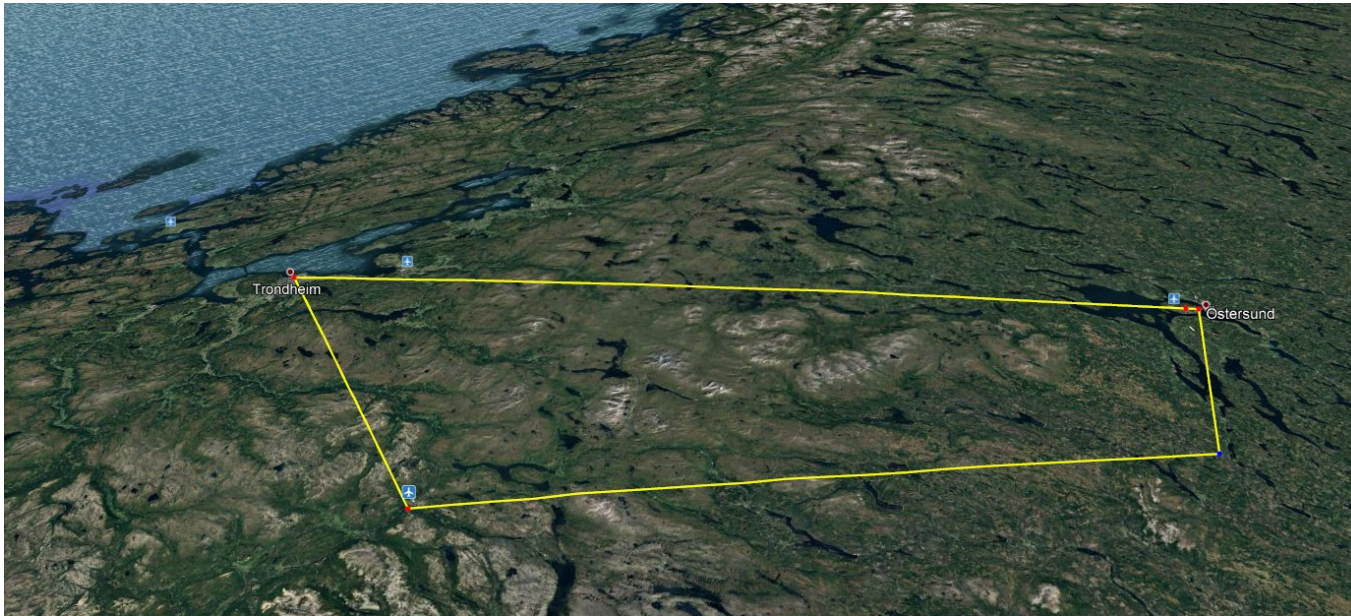
HANS DUNDER - DUNDERSON AB, SWEDEN
TOR IVERSEN - COMMUTATOR AS, NORWAY

INTERNATIONAL ARENA

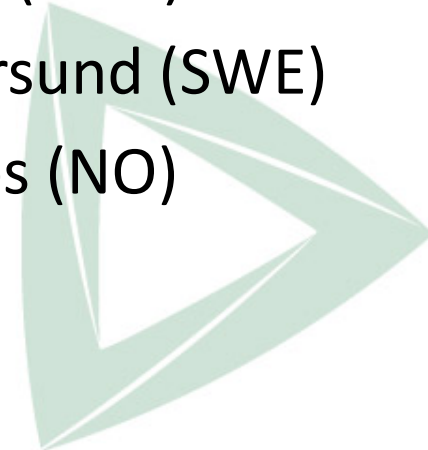
- Unique test arena for Electric aircrafts, UAS, ATS and ground support
- Unique test environment
 - Three airports
 - Large free air space
 - Tough weather
 - Point to Point
 - Cross border



AIR SPACE OVER TWO COUNTRIES



- 175 km flight distance Röros (NO) –Östersund (SWE)
- 180 km flight distance Trondheim (NO) –Östersund (SWE)
- 100 km flight distance Trondheim (NO) – Röros (NO)



INTERNATIONAL ARENA

- Located in the middle of Sweden and Norway
- International flights to all three airports
- Possible to expand the test area to include more airports



What is happening today in the area?

- Trondheim
 - Smaller drone test
 - Several companies in the area are working with solutions for electric aircrafts
(E-Fan co-operation, Rolls-Royce, Siemens and Airbus)
 - *Maritime autonomous test arena in use.*
- Røros
 - Smaller drone test
- Östersund
 - Test of landbased electric vehicles



Rolls-royce-evtol-concept



Testing drones for search & rescue in Norway's extreme conditions. www.crisis-response.com

Arjeplog - a success story

- The car industry turnover is 1,5 billion sek
 - 20 facilities
 - 30 car companies
 - 3000 engineers
- Tourism
 - 300 employees
 - Turnover 250 million sek
- Direct flights to/from Paris, Munich, Stuttgart and Hannover.



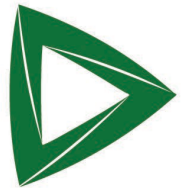
Icemakers testing facilities. Picture: www.icemaker.se



<http://www.mclarenautomotive.com>

GREEN FLYWAY – THE CONCEPT





GREEN FLYWAY

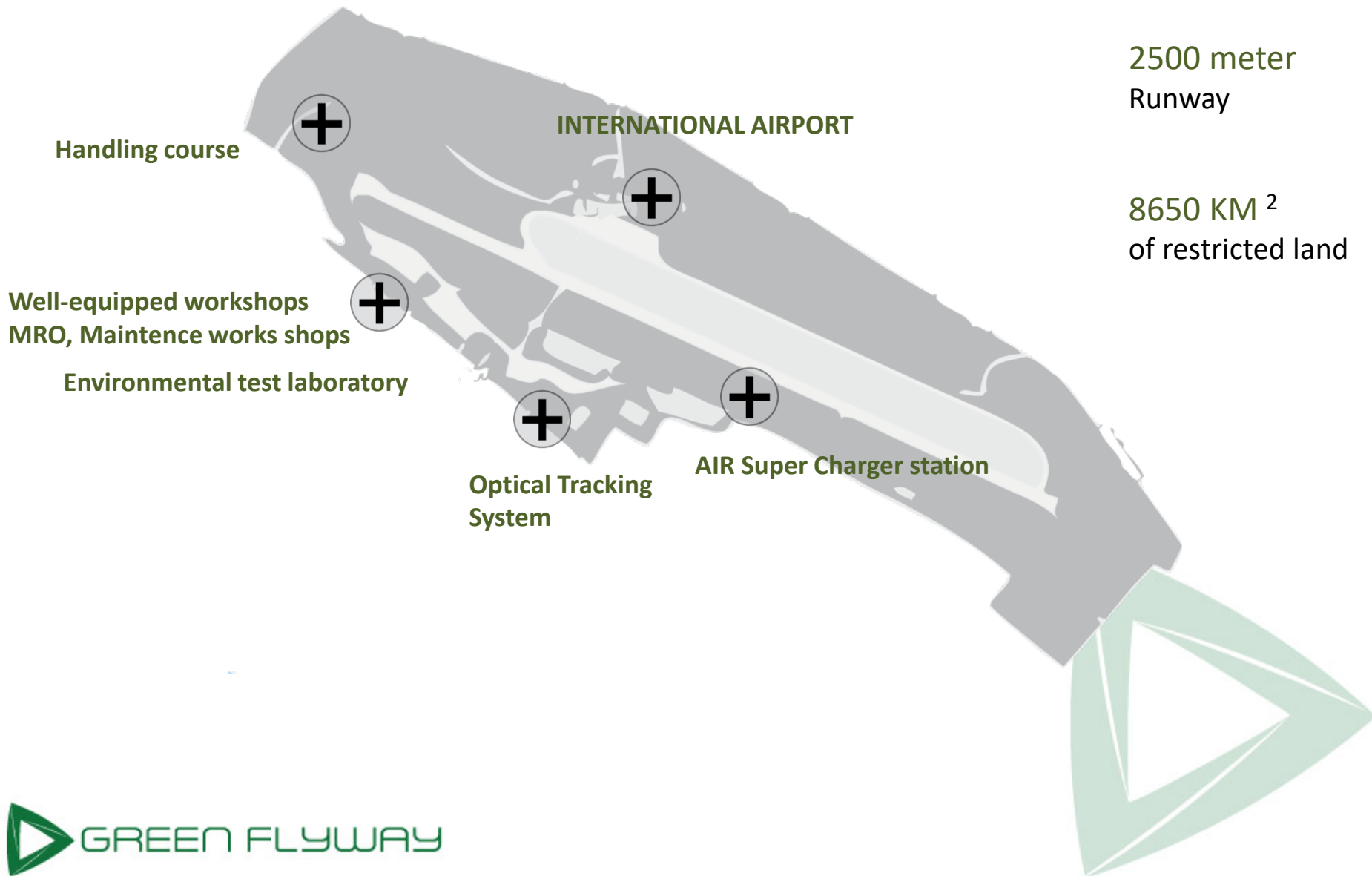
test arena



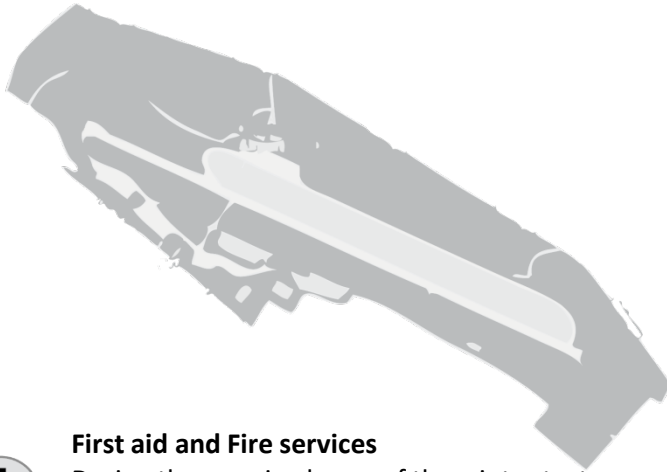
- Large available air-space for testing
- Challenging environment
 - Mountains and tough winters
- 3 airports in 2 countries
- Full service on ground
- Leading industrial partners



ÖSTERSUND- FRÖSÖ PARK



Highlights of Östersund test arena



First aid and Fire services

During the opening hours of the winter test center, a professional first aid service is in constant readiness on site



Workshop service

On request, we offer a variety of services. If you require services of our workshop, please contact us to discuss the scope of work



Accommodation

On request, we can organize accommodations in Östersund. You can choose between hotels with standard and VIP rooms or private homes



www.frosoparkhotel.se



Hangar/ Convention center
40 000 sqm including offices



National Helicopter Service center
Heavy maintenance for Helicopters



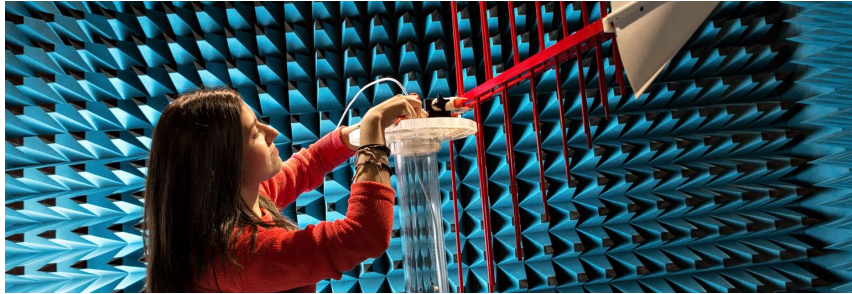
Maintenance for general aviation
Maintenance for General Aviation and Helicopters



Research and development



Highlights of Trondheim test arena



Department of Electronic Systems - NTNU



Rolls Royce, Siemens, Sevendof, Ubiq Aerospace
Several partners in front end of the industry



Technical university NTNU
NTNU has a main profile in science and technology, a variety of programmes of professional study
42000 students



SINTEF
SINTEF is one of Europe's largest independent research organisations.



Convention center
Trondheim city

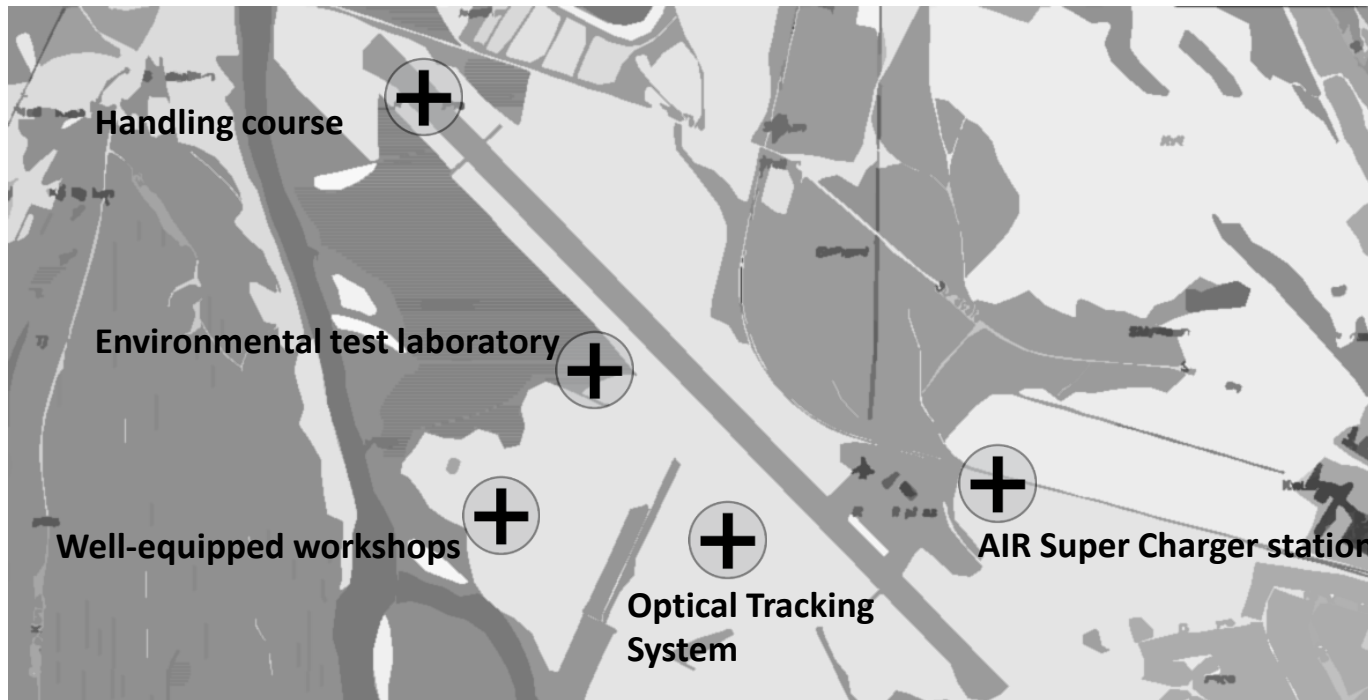


Rolls-Royce | Future shore control centre



RÖROS -

INTERNATIONAL AIRPORT



1720 meter
Runway

626 m
altitude



Highlights of Röros test arena



First aid and Fire services

During the opening hours of the winter test center, a professional first aid service is in constant readiness on site



Workshop service

On request, we offer a variety of services. If you require services of our workshop, please contact us to discuss the scope of work



Accommodation

On request, we can organize accommodations. You can choose between hotels with standard and VIP rooms or private homes



Convention center



WORLD HERITAGE SITE



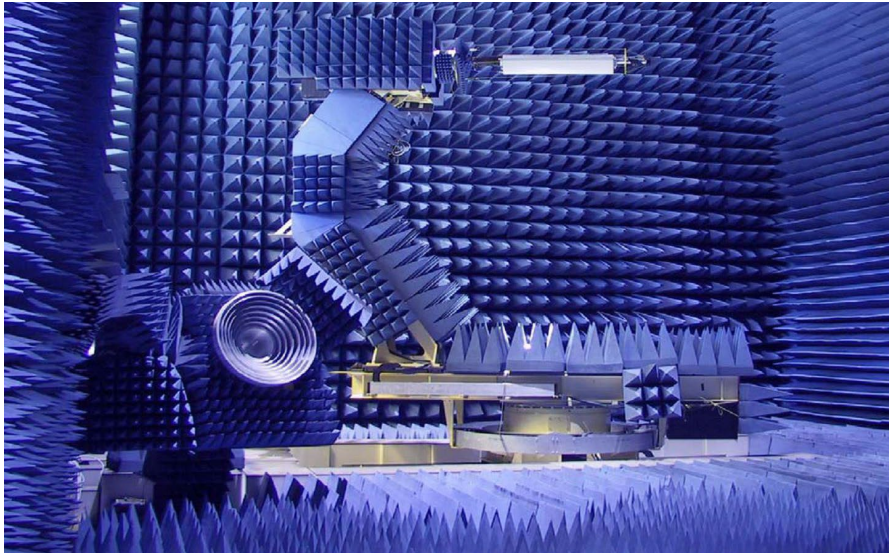
HANGAR





GREEN FLYWAY

research and development



www.emcinfo.se



www.saabgroup.com

- SAAB EMC
- Remote towers



SAAB

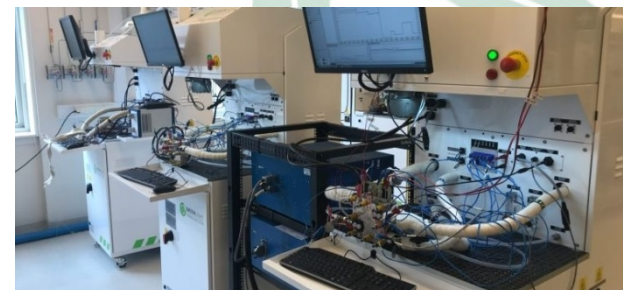


GREEN FLYWAY

research and development



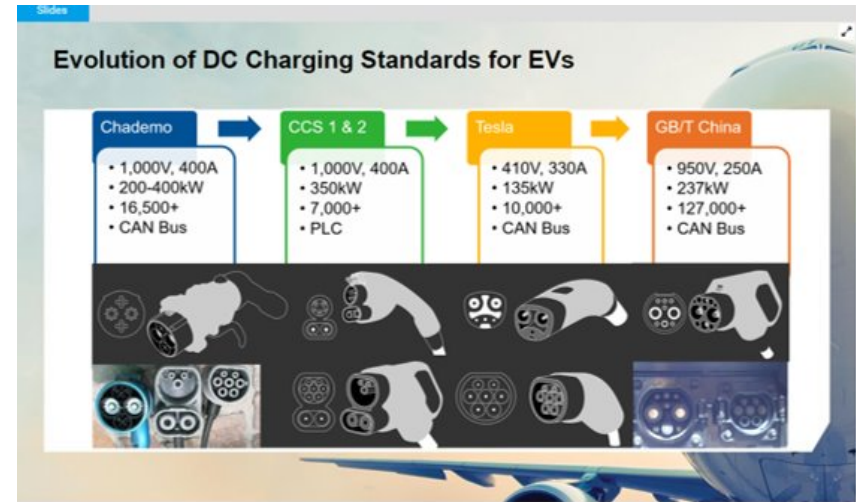
- Rolls Royce
- Siemens
- Hybrid systems
- Marine connections
- SINTEF
- NTNU AMOS



Energy storage and charging

Discussions of international standards

- Standard for aero batteries
- Charging standards





- NTNU Energy is one of NTNU's strategic research areas in the period 2014 – 2023
 - massively invest in research related to renewable energy sources
 - storage solutions
 - energy consumption and transportation.



NTNU

Norwegian University of
Science and Technology



Mittuniversitetet

MID SWEDEN UNIVERSITY





GREEN FLYWAY
education



- Flight academies
- Flight engineering
- Ground Services
- Standardizations

 GREEN FLYWAY



- Three large hospitals (University hospital of Trondheim)
- Long distances
- Tough terrain for transports
 - Medicin
 - People
- Remote villages
- Mountain tourists
- Challenging environment
 - Mountains and tough winters
- etc



Medical care in remote areas



www.zipline.com



www.tudelft.nl ambulance drone

The age of drones has arrived and now both autonomous driving AND autonomous flying are becoming more of a reality.

Companies from new startups to established businesses like Google and Amazon are fighting for a piece of the sky, looking at best modes of incorporating drones into our lifestyle.



Medical care – testing UAS



www.medicaldrones.org

- Commercial use today in Africa and Australia (very remote)
- No test area in colder climates today
- Green Flyway is unique as sparsely populated area with tough weather condition.
- Three airports to start from
 - Plus private airports





<https://www.youtube.com/watch?v=dfNpQzivkJA>



GREEN FLYWAY

Center of excellence



- **Unique arena in the world**
- **Meets all needs**
- **Infrastructure is already here**
- **Triple helix**
 - Working model of innovation between academia, industry and government
- **More than just a test arena**

RÖSÖ PARK ARENA



Next step

- Establish an overhead project
 - Aug/sept 2019
- Creation of subprojects
- Planning of strategic business ownership.



WP 1 – LUFTROM	Kontrollert luftrom	Myndighetsdialog og avklaringer
	Ukontrollert luftrom	Myndighetsdialog og avklaringer
	Samspillet mellom ulike luftfartøyer	Myndighetsdialog og avklaringer
	Samspillet mellom ulike luftromseiere	Myndighetsdialog og avklaringer
	Samspillet mellom ulike teknologier	Remote Tower N+S
		UTM
	lover og regelverk	Luftrom
		Teknologi
		Luftfartøyer
		Toll
WP 2 – TEST ARENA	Flyplassene	Samarbeid over grensen
	Luftfartøyer	Dialog med aktører
	Infrastruktur	Ground Handling
		Andre servicefunksjoner
		Overnatting og bomuligheter
		Verkstedfasiliteter
	Synergier med andre testområder	Dialog, kunnskapsdeling, PR
	Autonomt Center of Excellence	Myndighetsdialog, aktørdialog
	Tverrvitenskapelig forum/arena	Kunnskapsdeling, konferanse
WP 3 – GRØNN ENERGI, ENERGILAGRING OG LADE-/TANKINGSINFRASTRUKTUR	På flyplassene	Sol
		Vind
		Hydrogen
		Batterilagring
		Ladeinfrastruktur
		Tanking (hydrogen, biofuel)
WP 4 – UTDANNING/FORSKNING OG UTVIKLING	Pilotutdanning elfly	Elfly
		Droner
	Teknisk utdanning	Alle fagkretser (fly, elektronikk, avionikk, sterkstrøm osv.)
	Mittuniversitetet	Forskning og utvikling, samt enkelte utdanningsløp
	NTNU	Forskning og utvikling, utdanningsløp
	SINTEF	Forskning og utvikling
WP 5 – INNOVASJON	Reindriftsnæringen	Overvåking
		Effektivisering
	Skogbruksnæringen	Overvåking
		Effektivisering
		Sensorteknologi
	Jordbruksnæringen	Effektivisering
		Sensorteknologi
WP 6 – REGIONAL UTVIKLING	Ruteutvikling	Nye ruter og destinasjoner
	Destinasjonsutvikling	Nye destinasjoner og muligheter
	Infrastruktur	Tilknytning mot andre transportformer
WP 7 – Helse og beredskap	E-helse	
	Samarbeid over grensen	
	Transport	
	Leveranser	
	Overvåking	

a window of opportunity