

VINGA - a great step towards sustainable aviation





The VINGA project

We all want to fly, to have that freedom of mobility and efficiency we now take for granted. And we all, hopefully, want to avoid being part of the problem with environmental pollution. So, across the planet, intense initiatives are taking place within the aviation community, with one singular goal: to act responsibly and to reduce emissions and noise from air traffic.

The Vinga project is one of the most remarkable of these efforts. Centred on Göteborg Landvetter Airport, east of Gothenburg, its aim is to optimize all phases of flight, on departing and arriving flights to the airport, and to explore new ways to conduct normal operation. The idea is that such new initiatives can significantly reduce emissions, noise pollution and fuel consumption and also shorten the time of the flight.

Vinga is a validation project, ending in the autumn of 2011.

Participating partners in Vinga are: Swedavia, Novair, Airbus, Quovadis and LfV. Vinga is powered by SESAR.



VINGA – A World's First Green Tech Breakthrough

In the frame of Vinga, aircraft spend less time in the surface phase of the flight with the engines running. The Vinga flights take off, accelerate and climb with an optimum speed profile to its cruising altitude. After take off and before landing, the Vinga flights choose, in comparison with other flights, different trajectories to obtain flight path shortening and mitigate noise in congested areas. In the approach phase, the airplanes glide with minimum thrust the whole descent before landing. In order to do that, they need to follow specially designed, curved flight paths, where the planes are guided by a very precise satellite navigation system, RNP, compared to the other traffic that uses a ground based navigation system, ILS.

The ILS system is very suitable in low visibility conditions. In addition, within the Vinga project, these two systems have been merged into one unique landing system – for the first time in the world. This is a major breakthrough, indicating that green flights can now be carried out independent of weather conditions.







SESAR – The Body Behind the Project

SESAR is a research and development project launched by the European Commission and Eurocontrol, a trans-European organization aiming at making air traffic flow easier and more efficiently across the European sky. One of SESAR's goals is to reduce environmental impact from air traffic.

SESAR is a strong force behind developing the Single European Sky, the objective is that all countries share a common airspace, thus allowing airplanes to fly along straighter routes to their destinations, which has an important environmental impact.

SESAR also drives several important projects around Europe, aiming at making each flight more environmentally friendly. Vinga is one of these projects. A main goal is to double the capacity of European airspace by 2020, reduce environmental impact by 10 per cent and cut the costs for air navigation services by half. In measurable terms: by 2020 air traffic in Europe aims to save, compared with today, 8-14 minutes flight time, 300-500 kg of fuel and 948-1,575 kg of CO₂, on average per flight.







AIR NAVIGATION SERVICES OF SWEDEN

LFV is a public enterprise with 1,350 employees that operates air navigation services for civil and military customers at 35 locations in Sweden. We have sales surpassing SEK 2 billion. LFV is one of Europe's leading actors in air navigation services. Our solutions for even safer and more cost-effective air navigation are being noticed, and in the area of environment we are at the forefront to minimize environmental impact.

LFV Group – Dedicated Promoter of Green Flights

LFV is working actively and comprehensively on decreasing the effects flights have on the environment. LFV embraces the concept of Green Flight comprising of three dimensions: green departures, direct routes and green approaches.

Green departure means aircraft have a shorter time on the taxiway with the engines on, awaiting the start phase. This is achieved through the advanced time-management of flight operations. When the aircraft takes off, the ascent is conducted with the most efficient speed, limiting noise pollution around the airport and quicker reaching cruising altitude where air resistance and fuel consumption are lower.



Direct flight routes were introduced in May 2010 in Swedish airspace for aircraft flying at an altitude above 8 500 metres. This affects approximately 500 flights in every 24-hour period and, according to LFV's calculations, will decrease carbon dioxide emissions by around 30 tonnes in that period within Swedish airspace.

Green approach involves an aircraft evenly gliding towards the airport from cruising altitude using minimum thrust. This decreases fuel consumption, emissions and noise.

Even if Green Flight is an established method for air navigation services in Sweden, LFV is continuing to decrease the effects on the environment. Project Vinga is one of these efforts.





Swedavia owns, operates and improves 11 airports in Sweden. Swedavia is a state-owned company with roughly 2,500 employees and revenue of SEK 4.5 billion. Since 2005, Swedavia has reduced its own net emissions of carbon dioxide with 37 percent and since 2003 with 60 percent. Being the first major Swedish company to have chosen to become climate-neutral, the goal is that emissions from Swedavia's own operations will be zero by 2020, at the latest.

SWEDAVIA – Working Towards Climate Neutral Airports

In Swedavia's overall environmental efforts in the continuing reduction of emissions of gases that affect the climate is a clear priority along with minimized use of energy and lean operations, cutting back emissions to soil and water. Swedavia handles chemicals responsibly and strives to replace chemicals harmful to the environment with less damaging.

In 2006, Swedavia was one of several Swedish enterprises that early on vowed to become climate neutral. A climate neutral business undertake to map its climate impacting emissions and implements measures re-



ducing them before compensating for the remaining emissions. Thus these companies carry out their operations without contributing to global climate changes. The UN is positive to the concept climate neutrality, providing it handles responsibly, meaning the companies reduces their own emissions before compensating.

Four of Swedavia's airports are accredited and are climate-labeled according to the highest European standards. The Göteborg Landvetter airport reached the highest level in 2010 since the airport is completely climate neutral regarding emissions from its own operations. Remaining emissions are compensated for through economic contributions to projects in other countries, among others a wind power plant in China, tree planting in Costa Rica and bio-fuel based heating production in South Africa. This accreditation is backed by ACI Europe and the global analyst- and technology company WSP International.





Novair is a charter airline and a wholly owned subsidiary of the Swiss travel group Kuoni. The Scandinavian part of the group is called Kuoni Scandinavia and consists of Apollo in Sweden, Norway, Denmark and Finland and the airline Novair. The Swedish golf specialist Golf Plaisir, the luxury specialist Lime Travel and the Danish tour operator Falk Lauritsen are also part of Kuoni Scandinavia.

NOVAIR – Pioneering Green Flights

For several years now, environmental issues have been a major focus for Novair, in accordance with Apollo and the other travel providers in Kuoni Scandinavia. Novair has a very modern aircraft fleet with state of the art engines from Airbus, a company dedicated to develop as environmentally friendly technology as possible. Novair makes green flights wherever possible. One single green landing can save up to 100 kg of fuel and reduce CO₂-emissions with over 300 kg. Novair



is a pioneer in making green landings as part of their normal operation. Green landings can be performed in a co-operation between the plane descending with engines on minimal thrust, the Air Navigation Service Provider and the airport, thus avoiding airplanes queuing before landing.

In the Vinga project, Novair was the first airline in the world to land an aircraft using a unique combination of satellite and land based navigation technologies. This proves that there are no technical barriers to conduct green landings in a new way. Novair hopes that the learning's from Vinga will contribute to a development of air traffic regulations so the EU as well as countries locally will support all advancements possible and make air traffic less detrimental to the environment. One example is co-ordinating regulations concerning the satellite and the land based navigation systems that now are separate and can only be aligned in validation activities, such as in the Vinga project.





Airbus is the leading aircraft manufacturer with the most modern and comprehensive family of airliners on the market, ranging in capacity from 100 to more than 500 seats. Airbus has sold over 10,000 aircraft and delivered over 6,600 since its first airliner entered service in 1974. Airbus aircraft share a unique cockpit and operational commonality, making operations more efficient.

AIRBUS – At the Technological Forefront of ATM

ATM (Air Traffic Management) is of strategic importance to Airbus, both in our responsibility to best support our customers, and also to ensure the sustainable growth of the air transport business. Airbus is therefore at the forefront of the development in ATM. The collective challenges ahead in ATM are huge for the airlines, airports and the Air Navigation Service Providers (ANSPs). The deployment of new ATM technologies requires coordinated investments both on board the aircraft and also on the ground. As an aircraft ATM "architect", Airbus plays a key role in this coordinated process. In particular, Airbus can leverage its ATM expertise to support ATM improvement and help its customers benefit from increased airspace capacity, greater operational efficiencies, and reduced aircraft emissions.

There is a recognised need for a regional and collaborative approach to ATM development. Major improvements need to be designed regionally, while local ATM know-how and infrastructure are harnessed

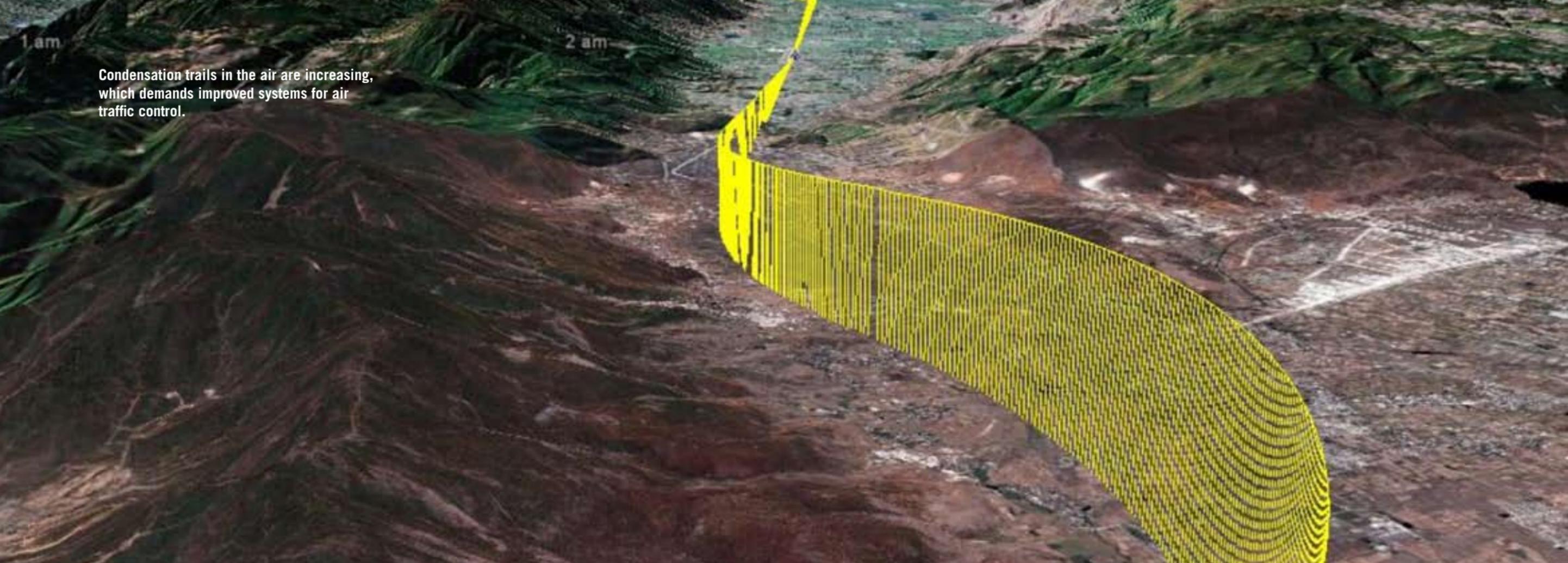
wherever possible for developing an optimised solution. In addition to planning 10 years ahead or more, Airbus already supports the uptake of known "best practices", as well as maximising the use of the available technologies -- in particular our on-board ATM capabilities, which bring immediate benefits for all our stakeholders.



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Condensation trails in the air are increasing, which demands improved systems for air traffic control.





Quovadis, is wholly owned by Airbus. It is a Flight Operations Services company, dedicated to Performance Based Navigation (PBN) consulting. Quovadis provides a full range of services to safely improve operations, efficiency, aircraft utilization optimization, environmental performance, access to challenging airports and airspace capacity. Airbus launched Quovadis as a natural step to support the PBN initiative customers whether they have Airbus aircraft or others.

QUOVADIS – Tests New Navigation Concepts in Vinga



Quovadis offers the highest level of expertise in commercial aircraft operations and PBN. The staff at Quovadis comprises highly experienced pilots, performance engineers, air traffic controllers, project managers and terrain analysts. Quovadis also has access to the best systems and simulators in the world to validate new procedures in any kind of aircraft.

Quovadis is a fully integrated Airbus subsidiary. This close and permanent relationship with the worldwide benchmark aircraft manufacturer ensures a full mastery of PBN solutions.

Prior to starting the validations flights, flyability analyses including simulator sessions have been organized by Quovadis with all relevant stakeholders at their headquarters in Toulouse.

Quovadis also supported Novair in their work with the Swedish regulator to obtain operational approval to fly the RNP-AR procedures in the frame of the Vinga project.

Taking advantages of the tight relationship between Quovadis and its parent company Airbus, acting as an ‘expert advisor’ to the VINGA project, it is ensured that all the relevant results from the trials will be injected into the SESAR development work especially where it concerns the “Work Package 9” (WP9) led by Airbus (specifically 9.01 Airbone initial 4D Trajectory Management, 9.09 RNP transition to xLS.)

VINGA - a collaboration between:



VINGA