Supporting People and Communities in the Northern Periphery and Arctic Territories - A 2050 Vision for Air Mobility

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Introduction

A central challenge for the aviation sector in the northern periphery is that the costs of operating airports and air routes are not fully recovered by the revenues from passengers and cargo. The throughput volumes are not large enough to sustain the business without state intervention. Regulations and scarcity of public funding potentially also limits the availability of state support for investments and operating costs for airports and subsidies to airlines servicing these airports.

This strategic outlook formulates a vision of a safe, reliable and sustainable air mobility connecting Europe's northern territories with Europe's core and the wider world together with the requisite elements for achieving this.

Moving forward with the vision, it is not possible to ignore the digital revolution. The general trend in air traffic management is about unlocking and harnessing the potential that comes with the rapid development of digital technologies and the ensuing possibilities for a more accurate and timely planning and execution of flight procedures in congested airspace at major hubs, automation of ground and in flight operations, efficient reaction to incidents and overall resource optimization. The full benefits will however not be achieved if smaller airports are excluded from these developments. Even though they themselves don't have problems with capacity or air traffic congestion they are nevertheless feeding flights to the big hubs and therefore need to be integrated in the system.

However, new technologies alone will not make smaller airports financially viable. Technologies will have to be complemented by appropriate regulation that recognise the importance of connectivity, thereby recognizing the need of continuing state aid and interventions to the airports in all European regions without any alternative mode of transport and a small scope of population. To develop further the PSO system combined with a legitimate support of smaller airports is likely to be important as means for underpinning the socio economic vitality of the remote regions and communities these airports serve. Looking further ahead, new possibilities to exploit non-aeronautical revenues through additional business activities is one avenue that could play a larger role for many, if not all, of the airports in the region Do you have anything particular in mind already suitable for those airports?

Air mobility an indispensable connector for the Northern Periphery and the Arctic territories

Air mobility is indispensable for securing accessibility to Europe's Northern peripheral and arctic territories. The combination of insufficient transport alternatives, long distances over vast desolated areas or the sea to regional and national centres ensures aviation as the preferred mode of choice for time sensitive travellers. Aviation is thus a vital facilitator for the integration of these territories within national, continental and even trans-continental contexts and for enabling key centres to connect with their hinterlands.

The importance of air mobility for the area is demonstrated by the fact that Europe is home to approximately 150 scheduled passenger airlines and 450 airports of which some 130 receiving passenger traffic are located in what is defined as the union's Northern periphery. Only approximately 5% of these airports operate profitably but they are in many cases considered vital in providing services of general economic interest (SGEI). Maintaining air services to such regions requires ongoing support from scarce public budgets that remote municipalities are struggling with. However, despite any reliance on public support, this exposes remote airport services to uncertainties when it comes to long term financing solutions.

The Vision for aviation in the Northern periphery and the Arctic territories 2050

The Northern and Arctic territories is of strategic importance for Europe. The supply of natural resources from northern parts makes Europe less dependent on raw material imports. The region holds large deposits of minerals and has extensive forest assets that supplies the pulp, paper and sawn timber industries. The North Sea and the Barents region is the prime source of European gas and oil production. Fishing is a major source of revenues and provides local jobs along much of its value chain. The region is also an important part of Europe's cultural heritage and identity. These vast largely pristine areas have an intrinsic value. They're also an attractive place for winter and summer tourists looking for active outdoor holidays and wilderness experience.

In short, the Northern and the Arctic territories constitute a major raw material base for the continent and is home to a significant part of Europe's cultural identity. Maintaining adequate accessibility and connectivity is thus of interest not only for the region but for the continent as a whole. Given the vast expanses of the territories and the lack of alternative transport means for time sensitive travellers; air mobility is a key enabler for the continuing development and prosperity of the region. Any vision for aviation in the Northern region therefore underlines the benefits derived from air mobility.

<u>**Vision Statement**</u>

In 2050 aviation is a key facilitator for securing European integration and cohesion of the Northern and Arctic territories with the European core by providing essential, reliable, safe, and fast transport links in a cost- and market efficient way.

Airports and air vehicles serving the far reaches of the North will be part of a global interoperable aviation network which interleaves with the other traffic modes in a seamless door to door journey. Aviation in the Northern and Arctic territories is an important enabler of prosperity and wealth for the regions themselves. By the intelligent use of innovation and new technical solutions made possible by digitalization and autonomous systems, air mobility is largely self-sustaining and less reliable on public subsidies. Aviation has brought new opportunities for jobs and revenues outside the traditional raw materials sector. Successful public-private partnerships between industries, the state and local universities has resulted in new high end, high technology businesses with global reach. Aviation is natural partner for those companies providing them with sustainable and efficient mobility solutions for both personnel and time-critical freight. The aerospace industry itself has increasingly committed parts of their development activities such as tests and proof of concepts to the Northern and Arctic territories where they can find both qualified people and suitable testing grounds.

Achieving the vision
Innovative technologies to improve air mobility performance and control costs

Current situation

Ensuring a regular air service for peripheral regions is a challenge and is normally not possible without state aid interventions. Runways, control towers, other ground equipment such as vehicles for de-icing, snow removal, fire-fighting and the like represent significant investments. Maintenance of fixed and mobile assets together with other running costs – electricity, heating – are additional cost drivers. Suitable aircraft sizes for optimal meeting of demand is not currently available to a desired level[*]. In short the challenges in maintaining an acceptable access level to the peripheral regions together make a case for technology driven productivity improvements.

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[*] Widerøes has recently upgraded their DHC8/100-200 fleet (these aircraft are now approaching 25 years) for the STOL network. There is a future concern at least for the Norwegian network. The combination of 37-39 seaters and 800 m runways is challenging because the DHC-8 is out of production and to our knowledge no similar types are available

It is therefore imperative for most airports in the Northern Periphery Area (NPA) that upgraded and new technologies support productivity and cost reductions whilst maintaining or improving safety and reliability. New technologies are often designed with larger airports in mind and with one size fits all assumptions and specifications. The applicability is therefore frequently not within the limited budgets or needs of small airports. Some technologies are indispensable for the securing of reliability and connectivity to the peripheral regions. One example is that the reliability of landing at smaller airports is sometimes compromised by insufficient technologies for landings under poor visibility conditions. Another challenge for smaller airports is that the traffic is frequently concentrated to a peak hour in the morning and in the late afternoon with literally nothing in between. The resources for coping with this pattern can potentially be idle for much of the day representing underutilisation of skilled staff and costly equipment. Can the airport work with staff, sharing work hours between airport management in peak hours and other work in off-peak hours? We see the trend in airlines asking staff for multitasking in the airport. This could also link the airport to other businesses.

Moving towards the vision

Today we see a trend towards digitalization, robots, automation and autonomous operations. For aviation in peripheral areas digitalization envisions a future where today's airport functions will be handled by fewer people. Air traffic control for a number of airports will be handled collectively from a single point which ideally could very well be located at a peripheral airport (because of the employment implications). Runways are self-monitoring and self-repairing and all snow clearance and de-icing is automated[†]. Security screening will be increasingly automated and less intrusive. Non manned air vehicles will first be used for air freight and special missions but then, as the broader public gains confidence in the technology, handle passenger travel. Air vehicles will also be more energy efficient, low noise and use liquid fuels based on renewables. Flight planning, air vehicles and infrastructure in remote regions is optimized and fully integrated in a global interoperable aviation network through collaborative decision making tools. It enables real time management of direct route trajectories and ground handling for swift turnaround as well as effective handling of incidents and delays.

Seamless, high-reliability, punctual door to door travel is increasingly the norm including travel information and ticketing with one click. Air access to the peripheral regions is reliable, on-time, weather independent and ideally affordable.

[†] Suitable technology levels is dependent on the size of the airport (economies of scale) and weather conditions. Options where cooperation/coordination on firefighting, snow clearing and repair with the local community can be viable alternatives to highly driven levels of automation.

Single Engine Single Pilot operations may become more widespread in certain regions

If NPA airports are to be seamlessly integrated in the future digitalized European Air Transport System, the necessary investments at the NPA airports should be adequate to their size and financed in a business model where risks, costs and benefits are equitably shared amongst beneficiaries. Technologies should help in controlling costs, unlock productivity gains and reduce dependence on public subsidies. The performance of NPA aviation should be ameliorated with a minimum of disruptions due to adverse weather conditions or unplanned airport or air vehicle down times.

Remote control of Örnsköldsvik's airport from Sundsvall airport.

Sustainable energy use to reduce carbon footprint

Current situation

The carbon footprint of our civilisation needs to be drastically reduced if mankind is to minimise unwelcome environmental consequences that may deliver significant dis-benefits. It is prudent to assume that the already emerging and anticipated costs of climate change will be increasingly internalised through public policy and hence incorporated in business decisions by means of e.g. carbon taxes. Care for the environment can be reflected in the business models adopted for air mobility to peripheral regions. Airports in the region today use conventional technologies for heating and electricity. Equipment for snow removal and other mobile assets are powered by engines running on fossil fuels. The same holds true for aircraft. Green technologies for generation of electricity and production of bio fuels suitable for airplanes and ground equipment exist. Green alternatives are in comparison with conventional energy sources still too expensive. Transport to and from the airports also have to be considered and made greener. Noise and other emissions from aircrafts will continuously be improved and reduced.

Moving towards the vision

The goal is to reduce emissions by 50% compared to year 2020. Trials with bio jet fuel are being successfully carried out in many countries and the supply infrastructure is developing. If production and delivery systems can be scaled up and reduce costs renewable liquid fuels should in the future increasingly replace conventional fuels. Harvesting of forestry bio fuel raw materials to be used as


conventional fuel replacements not only for aircrafts but for cars and trucks also represents a new opportunity and potential source of income for some NPA regions. Environmental targets should be challenging. Increased air traffic can be accompanied by decreased environmental impacts. All ground operations should be fossil free and bio jet fuel should be commercially available at all airports in the region. The scope for innovative solutions is limited only by imagination. As an example Gardemoen in Oslo is storing snow for summer cooling of buildings.

Maximise non-aeronautical activity to diversify income

Current situation

Even if new technologies reduce costs, it is likely that maintaining air-mobility to most NPA airports will continue to be loss making. Additional revenues are therefore important. Non aeronautical revenues play an important part for major hubs which are as much shopping malls as they are transport interchanges. For smaller airports such adaptions are not likely to be significant.
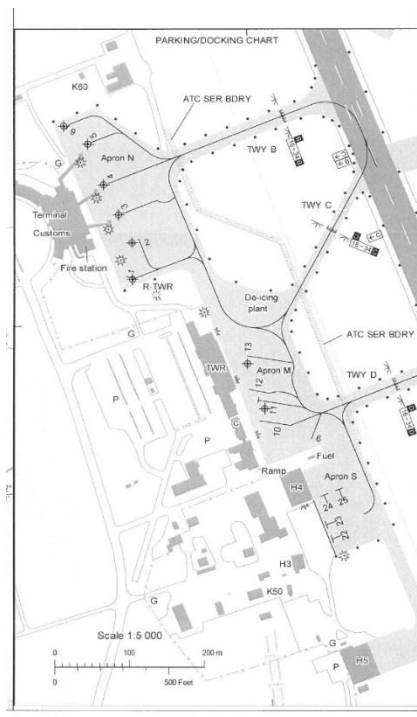
Moving towards the vision

Revenues from the core airport business can be supplemented by additional activities not directly related to air transport. NPA airports should strive to fully exploit their situational specific comparative advantages. An efficient airport management with staff performing several tasks check in, security and luggage handling complemented with other activities holds some promise.

Areas adjacent to the airports can be used for businesses that value the proximity to air connectivity. The airport as an incubator, innovation factory for start-ups could in some places be an interesting avenue. There is no golden formula for any non-aviation business. Each airport plays its specific role within the regional context.

We are entering a new era here where the airport can be seen as a public 'gathering' space for business and urban activities and the TOD concept has to be pushed much further. I would argue that the airport is becoming the town hall of small cities and therefore should be considered very differently in terms of its structure and accessibility. HEL btw calls its new T2 also City Hall in an attempt to emphasis its role at the airport as a multi-purpose facility. When you see its landside curb and amphitheatre like forecourt it becomes clear that terminals shift from mono to multi-programmed buildings items. The revenues should not be created at the expense on existing businesses located elsewhere in the local community but be truly community enhancing and bring with them additional employments. The yellow highlights are activities that potentially may duplicate already existing businesses:

- Postal flight services
- Car park
- Rental of hangars and parking of aircrafts accompanied by light maintenance offers
- Conference and catering
- High speed internet to attract SMEs
- Innovation incubators and business generators – triple helix concept
- Education sector synergies in areas pertaining to the airport business e.g. aero-engineering, marketing, security customer face to face relations, training for fire fighters

- Use of airport facilities as test beds for aeronautical or other technical systems
- Storage and logistic parks
- Events such as drag racing or concerts
- General aviation, parachuting and leisure activities connected with air vehicles

Socio cultural role of airports in the Northern periphery

Current situation

The regional airport is and can be part of the sustenance of a community's identity, with a "we're a part of the world feeling". Luleå Technical University has a research centre for distance spanning technologies which has been instrumental in the development of the EU's Living Lab concept. LTUs participation in international collaborations would not be possible without frequent connections to Arlanda and the rest of the world. Another example is the university in Molde that can recruit distinguished scholars from across Europe who, through the availability of the local airport, can maintain contact with their home university, family and relatives. Tromsö is a regional centre and regional airport hub for Northern Norway with higher education, specialist care and other societal services. The airports can sometimes also play an increased role as community centres were locals can meet and undertake suitable social activities.

Closing of regional airports are often perceived by locals extremely negatively with fears (incidentally supported by research) that it accelerates the depopulation of the area. The negative effects of an airport closure can be mitigated if there are other airports in the region at reasonable distances that can step in and offer compensatory or even enhanced connectivity. Increased use of video conferencing tools is an alternative but cannot fully replace the need for face to face meetings.
Rules and regulations governing small airports are frequently designed with larger airports in mind. A lighter regulatory burden for smaller airports would mean less costs and a better chance of long-term sustainability of services. An economic analysis of airport viability should be an important part of a decision to keep or close a local airport. There may be cases for airport closure but an airport may well be economically viable even with financial deficits.

Moving towards the vision

Future life style trends and the emergence of the connected, virtual society may lead to an upswing in demand among some categories of people for moving out from crowded metropolises to the rural tranquillity of peripheral places.

Air connectivity offers the option for such people to combine big city clients with quality of life back offices.

Marketing the possibilities for alternative lifestyles in combination with the specific uniqueness of the area, nature, community, culture as well as the possibility to acquire good priced housing can be an eye opener for potential new residents.

Reindeer herding in Lapponia

Policy, regulations and regional economic impact

Current situation

A fundamental role for the government is to provide the soft and hard infrastructure that makes the society and economy work. Regional, National and EU governments are responsible for creating conditions under which businesses and people can prosper. This holds true for centres as well as the periphery and requires collective action. But leaving the burden of maintaining accessibility to the peripheral local governments and private investors will result in underinvestment in transport infrastructure and a less than desirable socio economic outcome. However an economic analysis of airport viability should be an important part of a decision to keep or close a local airport. There may be cases for airport closure but an airport may well be economically viable even with financial deficits. And other modes of transport may not be sufficient for remote European need of mobility.

Policies and regulations have direct consequences for the cost and revenue structures of these airports which are mostly showing red numbers. Even if new technologies, better management practices such as more of multitask staff or sharing of resources with other mandatory communitarian activities such as firefighting and development of alternative business can make the NPA airports more economically viable there will still be a need for continuous and additional public subsidies. It is critical that national and EU level policy and decision makers base their decisions on correct facts and evidence based findings. That is, policy and regulatory measures need to better take remote Europe's significant preconditions into consideration when it comes to public service obligation, state aid and other means of government support.

Moving towards the vision

Since both costs and revenues are interrelated with regulatory regimes and national public budgets, the rules and regulations should adequately take into account the low level of complexity of the airspace at the NPA airports. EU state aid rules should furthermore be flexible and recognise the economic importance of these airports for the regions they serve. Proper assessments may require refinements of tools and methods such as socio economic cost benefit analyses, integrated socio economic impact assessment studies, forecast or back cast methods.

Launch of near space science probe from ESRANGE

Roadmap achieving the vision

Vision item	2020	2025	2030	2050
Innovative Technologies to improve air mobility performance	* ATM regulations adopted for low density/low complexity traffic NPA airports.	* Remote controlled non-intrusive, non-disruptive security check * High-capacity ICT connections to enable automation of airport functions	* Air-vehicles optimised for NPA usage with capability to operate during most weather conditions. *Aircraft size and infrastructure is optimized for cost efficient operation on NPA airports. * Cargo flights by unmanned air vehicles * Real-time management of air mobility operations	* NPA airports seamlessly integrated in the European Air Transport System * NPA airport/air vehicles fully automated and able to operate in all weather conditions.
Sustainable energy usage to reduce carbon footprint	* Negative environmental impact will not increase with increased traffic	* Negative environmental impacts decrease in spite of increased traffic * Fossil free fuel commercially available for air traffic use *Most ground operations are fossil free	* All ground operations are fossil free	* Negative environmental impact reduced by 50% compared to year 2020. * Drop in liquid fuels from renewable sources has fully replaced conventional jet fuel. *Electrified air mobility vehicles in use

Increased income from non-aeronautical activities	* High-capacity Internet connection to attract SME business * The NPA airport is a multi-modal transport hub	* Innovation incubators and business generators in local win –win partnerships * Education sector synergies (aero-engineering, marketing, security customer relations) * Evolvement of airports into knowledge hubs	* People are attracted to live in NPA since air connectivity ensure them out of big cities work opportunities in combination with quality of life	
The socio-cultural role of airports in the Northern Periphery	* Economic possibilities of tourist or business events	* Airports as centre of community * Airports as spaces for experiment	* Educational and training facilities for young people in remote areas * Explore the potential for co-location with other R&D/R&I activities to maintain/reach a critical mass	* Automation and robots, job losses off set by job creating prospects in other businesses derived from maintaining of the airport *Potential for co-location with other R&D activities fully exploited
Policy, regulations and economic impact	* Comprehensive model for policy making available * Public procurement schemes that incentivise development on non-aero revenues.	* Communitarisation of resources * Common regional strategies adopted * 80% of the population in NPA-areas have good or acceptable accessibility to their centres	* Airports less dependent on subsidies – well founded subsidies maintained or increased * Common regional strategies implemented	

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SESAR showcase days in Amsterdam 14-16 June, 2016

Flight Path 2050

SESAR ATM Master Plan

CANSO Vision 2020

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