ICAO State Action Plan on CO_2 emissions from aviation

Denmark

27th of June 2012

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Introduction

a) Denmark is a member of the European Union and of the European Civil Aviation Conference (ECAC). ECAC is an intergovernmental organisation covering the widest grouping of Member States[1] of any European organisation dealing with civil aviation. It is currently composed of 44 Member States, and was created in 1955.

b) ECAC States share the view that environmental concerns represent a potential constraint on the future development of the international aviation sector, and together they fully support ICAO's on-going efforts to address the full range of these concerns, including the key strategic challenge posed by climate change, for the sustainable development of international air transport.

c) Denmark, like all of ECAC's forty-four States, is fully committed to and involved in the fight against climate change, and works towards a resource-efficient, competitive and sustainable multimodal transport system.

d) Denmark recognises the value of each State preparing and submitting to ICAO a State Action Plan on emissions reductions, as an important step towards the achievement of the global collective goals agreed at the 37th Session of the ICAO Assembly in 2010.

e) In that context, it is the intention that all ECAC States submit to ICAO an Action Plan, regardless of whether or not the 1% de mimimis threshold is met, thus going beyond the agreement of ICAO Assembly Resolution A/37-19. This is the Action Plan of Denmark.

f) Denmark shares the view of all ECAC States that a comprehensive approach to reducing aviation emissions is necessary, and that this should include:

i. emission reductions at source, including European support to CAEP work

ii. research and development on emission reductions technologies, including public-private partnerships

iii. the development and deployment of low-carbon sustainable alternative fuels, including research and operational initiatives undertaken jointly with stakeholders

iv. the optimisation and improvement of Air Traffic Management, and infrastructure use within Europe, in particular through the Single European Sky ATM Research (SESAR), and also beyond European borders, through the Atlantic Initiative for the Reduction of Emissions (AIRE) in cooperation with the US FAA.

v. Market-based measures, such as open emission trading schemes (ETS), which allow the sector to continue to grow in a sustainable and efficient manner, recognising

[1] Albania, Armenia, Austria, Azerbaijan, Belgium, Bosnia and Herzegovina, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Georgia, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Moldova, Monaco, Montenegro, Netherlands, Norway, Poland, Portugal, Romania, San Marino, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, The former Yugoslav Republic of Macedonia, Turkey, Ukraine, and the United Kingdom

that the measures at (i) to (iv) above cannot, even in aggregate, deliver in time the emissions reductions necessary to meet the global goals. This growth becomes possible through the purchase under an ETS of CO_2 allowances from other sectors of the economy, where abatement costs are lower than within the aviation sector.

g) In Europe, many of the actions which are undertaken within the framework of this comprehensive approach are in practice taken at a supra-national level, most of them led by the EU. They are reported in Section 2 of this Action Plan.

h) In Denmark a number of actions are undertaken at the national level, including by stakeholders, in addition to those of a supra-national nature. These national actions are reported in Section 3.

i) In relation to actions which are taken at a supranational level, it is important to note that:

  i. The extent of participation will vary from one State and another, reflecting the priorities and circumstances of each State (economic situation, size of its aviation market, historical and institutional context, such as EU/ non EU). The ECAC States are thus involved to different degrees and on different timelines in the delivery of these common actions. When an additional State joins a collective action, including at a later stage, this broadens the effect of the measure, thus increasing the European contribution to meeting the global goals.

  ii. Nonetheless, acting together, the ECAC States have undertaken to reduce the region's emissions through a comprehensive approach which uses each of the pillars of that approach. Some of the component measures, although implemented by some but not all of ECAC's 44 States, nonetheless yield emission reduction benefits across the whole of the region (thus for example research, ETS).

SECTION 1: Current state of aviation in Denmark

Basic facts

Denmark is a part of the Nordic Region in Europe, and has borders with Germany to the south. Denmark has an area of 43,094 km2, and with a population of 05,356,000 it is the most densely populated country in the Nordic Region. The country consists of the Jutland peninsula and over 400 islands, of which Zealand and Funen are the largest. The Capital of Denmark, Copenhagen, is situated on the east of Zealand. 85% of the population lives in cities.

Greenland and the Faroe Islands are part of the Kingdom of Denmark but are self-governing. Denmark is bound together by many roads, railways and ferry routes, but domestic flights also play an important role in linking the various parts of the country together.

As shown in the table below, aviation is responsible only for a limited part of the total CO2 emission from the Danish transport sector.

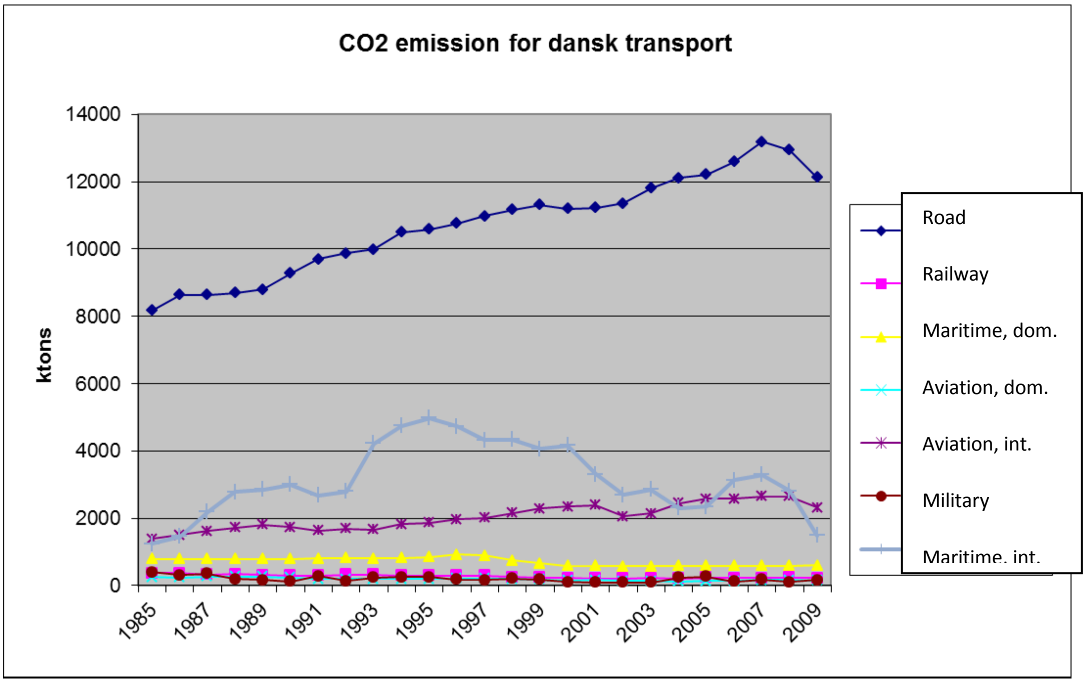

Table 1: Overview of the Danish sector of Transport's CO_2 emission.

Airports in Danmark

Denmark holds 10 public airports with more than 15,000 passengers per year. Copenhagen Airport is a central part of a route network, generated by the surrounding provincial airports. Copenhagen Airport has the largest number of passengers, while Billund is the largest provincial airport. The majority of international flights are currently performed via Copenhagen and Billund.

Figure 1. Danish Airports with more than 15,000 passengers per year

Regarding ownership, Copenhagen Airport A/S is a shareholder company, of which the Danish state owns 39.2% of the shares. Today, the Canadian pension fund Ontario Teacher's Pension Plan Board (OTPP) is the second largest shareholder. The other larger provincial airports are owned by the municipalities, except Roskilde Airport, which is owned by Copenhagen Airport A/S, and the state-owned Bornholms Airport.

The total number of passengers in the larger Danish airports has been increasing over the past years (except 2008) from almost 24 million passengers in 2005 to almost 28 million in 2011. The total quantity of cargo transported by airplane via Copenhagen and Billund (which are the most significant cargo airports) in the same period, has varied and amounted to 396,000 tons in 2011.

Air operators in Denmark

There are 23 aviation operators with a Danish EU license to execute air service. Moreover, there are two North Atlantic aviation companies (Atlantic Airways and Air Greenland), who have Danish concession to fly passengers, cargo, mail etc. The three largest companies measured by turnover in the last few years, are SAS Group, Thomas Cook Airlines Scandinavia A/S, and Cimber Sterling A/S. However, Cimber Sterling A/S went bankrupt in May 2012 as a result of the fiscal crisis. The company operated around 26 aircrafts and had 650 employees.

SAS Group consists of the airlines SAS Danmark A/S, SAS Norge ASA and SAS Sverige, which respectively have Danish, Norwegian, and Swedish EU license. Since 2001, the ownership has been structured with the listed Swedish holding company SAS AB, 50% owned by the three Scandinavian states and the latter 50% is privately owned, primarily by Scandinavian investors. SAS Group has about 15,000 employees and operates approximately 230 aircrafts. In 2010, SAS Group had around 27 million passengers.

Thomas Cook Airlines Scandinavia is a subdivision under Thomas Cook Northern Europe, which is owned by the Thomas Cook Group. Jointly with the Thomas Cook Airlines UK, Condor in Germany, and Thomas Cook

Airlines Belgium, the company operates around 97 aircrafts. Thomas Cook Airlines Scandinavia has approximately 920 employees.

13 of the 23 companies with an EU license hold a so-called "big license", meaning that they operate aircrafts, which have an approved starting volume larger than 10 tons, have more than 20 seats, or an annual turnover that exceeds 3 million euro.

Air Alsie A/S (Sønderborg)	HelicoApS (Jordrup)
Atlantic Airways P/F(Faroe Islands)	Jet Time A/S (Kastrup)
Air Greenland A/S (Greenland)	NEWCOPTER (Copenhagen)
BEL AIR Aviation A/S (Holsted)	Nordic Air Ambulance (Copenhagen East)
BenAir A/S (Skjern)	North Flying A/S (Nørresundby)
CHC Denmark ApS (Esbjerg)	Primera Air Scandinavia A/S (Copenhagen)
Cimber Sterling A/S* (Sønderborg)	SAS Danmark A/S (Kastrup)
Copenhagen Air Taxi A/S (Roskilde)	Star Air A/S (Dragør)
DanCopter A/S (Esbjerg)	Starling Air A/S (Marstal)
Danish Air Transport A/S (Vamdrup)	SUN-AIR of Scandinavia A/S (Billund)
Execujet Europe A/S (Roskilde)	Thomas Cook Airlines Scandinavia A/S (Dragør)
Falck DRF Luftambulance A/S (Copenhagen)	UNI-FLY A/S (Svendborg)
FlexFlight Aps (Roskilde)	*The company went bankrupt in May 2012

Box 1: Airlines with Danish EU license or Danish concession

The employees in the Danish aviation industry include those, who are directly employed in the airlines based in Denmark or the Danish airports, as well as employees working indirectly with aviation, such as aircraft repair and maintenance. The international trade organization of aviation (IATA) assesses that the Danish aviation industry generates approximately 45,000 jobs.

Regarding education, the growth in the airline industry generates an increase in demand for pilots, controllers, mechanics etc. In 2011, 72 private pilot licenses and 84 commercial pilot licenses were issued.

Air Navigation Services

The control of the air traffic in the Danish airspace is mainly executed by Naviair, who is designated by the Danish Government. From 2005-2011, except 2009, there has been more than 600,000 flights in Danish airspace. In order to make the airspace independent of national borders, a Danish-Swedish FAB was established in 2009. Same year, the Danish-Swedish company Nordic Unified Air Traffic Control (NUAC) was founded, which will undertake the control of the air traffic in 2012.

Danish Domestic Aviation

Most of the Danish provincial airports are placed in peripheral areas with a short travel time to Copenhagen Airport. Currently, there are domestic routes between Copenhagen and respectively Aalborg, Aarhus (Tirstrup), Karup, Billund, Bornholm, and Sønderborg. In addition, there are flights between Copenhagen and Søndre Strømfjord in Greenland, as well as between Danish airports and Vagar Lufthavn on the Faroe Islands, which in Denmark are also considered as domestic routes.

Since 1993 domestic aviation has been liberalised and the market conditions, the number of departures and pricing are determined by private operators.

The total number of domestic passengers amounted to 4,665,000 in 2011, which is 16.6% of the total number of passengers in the Danish airports.

Danish International Aviation

The role of Copenhagen Airport in the European hierarchy of airports is changing. In 1998, it was the 10th largest airport in Europe and in 2008 it has dropped to number 16, even though the number of passengers had increased to more than 20 million per year. Nevertheless, Copenhagen Airport has moved from number 16 and up to number 14 from 2008-2011, with 22.7 million passengers in 2011.

There are several airports with international departures in Jutland, e.g. Billund, Aalborg and Aarhus. Billund Airport had 2.34 million international passengers in 2011.

International aviation also includes cargo transportation, which typically transport goods that are expensive, compact, and/or easily spoiled. Air cargo is an important component in the logistics included in import as well as export. Most Danish companies produce goods with a high level of knowledge and design, thus they are relatively expensive and thereby goods of high value, where aircraft is an affordable means of transportation. Charter flights are also included in international aviation. In 2010, 2.5 million of the travellers to and from Danish airports were charter flight passengers.

The Development in Danish Aviation

Table 2 below shows the development of the total number of passengers at the Danish airports with more than 15.000 passengers per year, in the years 2002-2011.

Airports	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
København	18.253	17.708	19.035	19.980	20.878	21.410	21.530	19.715	21.501	22.725
Billund	1.606	1.468	1.844	2.037	1.886	2.265	2.549	2.297	2.570	2.711
Aalborg	661	615	656	684	782	992	1.049	1.127	1.327	1.380
Aarhus	579	579	524	538	553	571	573	526	562	591
Karup	226	211	201	197	211	219	200	166	311	293
Bornholm	138	127	121	162	224	232	194	190	249	237
Esbjerg	166	174	177	180	200	182	96	94	85	89
Sønderborg	70	65	64	62	65	74	67	60	71	72
Roskilde	49	43	33	32	33	33	30	27	25	33
Odense		5	6	7	11	14	18	21	14	21
Total	**21.748**	**20.995**	**22.661**	**23.879**	**24.843**	**25.992**	**26.306**	**24.223**	**26.715**	**28.152**

Table 2: Total number of passengers at the Danish airports 2002-2011 (x1000).

Table 3 shows the total amount of passengers at the Danish airports with more than 15.000 passengers, in 2011. Moreover, it is divided into domestic and international passengers, and their percentage of the total number of passengers distributed to domestic and international flights.

Airports	Total	Total Domestic	% Domestic	% International
København	22.725	2.401	10,6	89,4
Billund	2.711	218	8,0	92,0
Aalborg	1.380	1.038	75,2	24,8
Aarhus	591	323	54,7	45,3
Karup	293	286	97,6	2,4
Bornholm	237	228	96,2	3,8
Esbjerg	89	75	84,3	15,7
Sønderborg	72	71	98,6	1,4
Roskilde	33	22	66,7	33,3
Odense	21	3	14,3	85,7
Total	**28.152**	**4.665**	**16,6**	**83,4**

Table 3: Amount of passengers in the Danish airport, including domestic, in 2011 (x000)

It must be noticed that out of a total of 2,711,000 passengers, Billund Lufthavn had 218,000 domestic passengers in 2011, which equals a share of 8%. Comparatively, Aalborg Lufthavn had a total of 1,038,000 domestic passengers in 2011, which equals a share of approximately 75% of the total passenger amount of 1,380,000. In addition, it is worth noticing that Karup, Bornholm, and Sønderborg's rather large percentage of domestic passengers.

Air cargo only concerns the two largest airports, namely Copenhagen Airport and Billund. Table 4 shows the development in air cargo since 2005.

	2005	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
<u>CPH</u>							
Arriving	42	48	51	47	42	42	42
Departing	55	51	62	54	50	53	56
Transfer	258	281	283	245	220	214	235
Total	**355**	**380**	**396**	**346**	**312**	**309**	**333**
<u>Billund</u>							
Arriving	26	27	26	25	22	34	30
Departing	26	29	33	31	23	28	33
Transfer -	-	-	-	-	-	-	
Total	**52**	**56**	**59**	**56**	**45**	**62**	**63**

Table 4: Air cargo at Copenhagen Airport and Billund Airport (1000 tons)

SECTION 2: Supra-national measures, including those led by the EU

Aircraft related technology development

Aircraft emissions standards

European states fully support the on-going work in ICAO's Committee on Aviation Environmental Protection (CAEP) to develop an aircraft CO_2 standard. Assembly Resolution A37-19 requests the Council to develop a global CO_2 standard for aircraft aiming for 2013. It is recognised that this is an ambitious timeframe for the development of a completely new ICAO standard. Europe is contributing to this task notably through the European Aviation Safety Agency providing the co-rapporteurship of the CO_2 task group within CAEP's Working Group 3.

In the event that a standard, comprising certification requirement and regulatory level, is adopted in 2013, it is likely to have an applicability date set some years in the future. The contribution that such a standard will make towards the global aspirational goals will of course depend on the regulatory level that is set, but it seems unlikely that an aircraft CO_2 standard could have any significant effect on the fuel efficiency of the global in-service fleet until well after 2020.

Research and development

Clean Sky is an EU **Joint Technology Initiative** (JTI) that aims to develop and mature breakthrough "clean technologies" for air transport. By accelerating their deployment, the JTI will contribute to Europe's strategic environmental and social priorities, and simultaneously promote competitiveness and sustainable economic growth.

Joint Technology Initiatives are specific large scale EU research projects created by the European Commission within the 7th Framework Programme (FP7) in order to allow the achievement of ambitious and complex research goals. Set up as a Public Private Partnership between the European Commission and the European aeronautical industry, Clean Sky will pull together the research and technology resources of the European Union in a coherent, 7-year, €1.6bn programme, and contribute significantly to the 'greening' of aviation.

The Clean Sky goal is to identify, develop and validate the key technologies necessary to achieve major steps towards the Advisory Council for Aeronautics Research in Europe (ACARE) environmental goals for 2020 when compared to 2000 levels:

- Fuel consumption and carbon dioxide (CO_2) emissions reduced by 50%
- Nitrous oxides (NO_X) emissions reduced by 80%
- Perceived external noise reduction of 50%
- Improved environmental impact of the lifecycle of aircraft and related products.

Three complementary instruments are used by Clean Sky in meeting these goals:

Technologies.

These are selected, developed and monitored in terms of maturity, or "technology readiness level" (TRL). A detailed list of more than one hundred key technologies has been set. The technologies developed by Clean Sky will cover all major segments of commercial aircraft.

Concept Aircraft.

These are design studies dedicated to integrating technologies into a viable conceptual configuration, and assessing their potential and relevance. They cover a broad range of aircraft: business jets, regional and large commercial aircraft, as well as rotorcraft. They have been grouped and categorised in order to represent the major future aircraft families. Clean Sky's environmental results will be measured and reported upon principally by Concept Aircraft.

Demonstration Programmes.

Some technologies can be assessed during their development phase, but many key technologies need to be validated at an integrated vehicle or system level via dedicated demonstrators. These demonstrators pull together several technologies at a larger "system" or aircraft level. Airframe, Engine and Systems technologies are monitored through in-flight or large scale ground demonstrations. The aim is to validate the feasibility of these technologies in relevant (in-flight or operating) conditions. Their performance can then be predicted in areas such as mechanical or in-flight behaviour. This in turn will help determine the true potential of the technologies and enable a realistic environmental assessment. Demonstrations enable technologies to reach a higher level of maturity (or TRL: technology readiness level), which is the "raison d'être" of Clean Sky.

The environmental objectives of the programme are determined by evaluating the performance of concept aircraft in the global air transport system (when compared to 2000 level technology and to a "business as usual" evolution of technology). The ranges of environmental improvements result from the sum of technologies which are expected to reach TRL5-6 within the programme timeframe. While not all of these technologies will be developed directly through the Clean Sky programme, it is neither feasible nor relevant at this stage to isolate the benefits derived purely from Clean Sky technologies, as Clean Sky will achieve a significant synergy effect in European Aeronautics Research by maturing closely linked technologies to a materially higher TRL through demonstration and integration.

Clean Sky activities are performed within six "**Integrated Technology Demonstrators**" (ITDs) and a "**Technology Evaluator**".

The three vehicle-based ITDs will develop, deliver and integrate technologies into concrete aircraft configurations. The two "transversal" ITDs are focused on propulsion and systems, and will deliver technologies, which will be integrated in various aircraft configurations by the vehicle ITDs. A further ITD will focus specifically on the life cycle assessment and 'eco-design' philosophy.

Smart Fixed Wing Aircraft (SFWA) – co-led by Airbus and SAAB - will deliver innovative wing technologies together with new aircraft configurations, covering large aircraft and business jets. Key enabling technologies from the transversal ITDs, for instance Contra Rotating Open Rotor, will be integrated into the demonstration programmes and concept aircraft.

Green Regional Aircraft (GRA) – co-led by Alenia and EADS CASA - will develop new technologies for the reduction of noise and emissions, in particular advanced low-weight & high performance structures, incorporation of all-electric systems, bleed-less engine architecture, low noise/high efficiency aerodynamics, and finally environmentally optimised mission and trajectory management.

Green Rotorcraft (GRC) – co-led by Agusta Westland and Eurocopter - will deliver innovative rotor blade technologies for reduction in rotor noise and power consumption, technologies for lower airframe drag, environmentally friendly flight paths, the integration of diesel engine technology, and advanced electrical systems for elimination of hydraulic fluids and for improved fuel consumption.

Sustainable and Green Engines (SAGE) - co-led by Rolls-Royce and Safran - will design and build five engine demonstrators to integrate technologies for low fuel consumption, whilst reducing noise levels and nitrous oxides. The 'Open Rotor' is the target of two demonstrators. The others address geared turbofan technology, low pressure stages of a three-shaft engine and a new turboshaft engine for helicopters.

Systems for Green Operations (SGO) - co-led by Liebherr and Thales - will focus on all electrical aircraft equipment and system architectures, thermal management, capabilities for environmentally-friendly trajectories and missions, and improved ground operations to give any aircraft the capability to fully exploit the benefits of the "Single European Sky".

Eco-Design - co-led by Dassault and Fraunhofer Gesellschaft - will support the ITDs with environmental impact analysis of the product life-cycle. Eco-Design will focus on environmentally-friendly design and production, withdrawal, and recycling of aircraft, by optimal use of raw materials and energies, thus improving the environmental impact of the entire aircraft life-cycle.

Complementing these six ITDs, the **Technology Evaluator (TE)** is a dedicated evaluation platform cross-positioned within the Clean Sky project structure. The TE is co-led by DLR and Thales, and includes the major European aeronautical research organisations. It will assess the environmental impact of the technologies developed by the ITDs and integrated into the Concept Aircraft. By doing this, the TE will enable Clean Sky to measure and report the level of success in achieving the environmental objectives, and in contributing towards the ACARE environmental goals. Besides a mission level analysis (aircraft level), the positive impact of the Clean Sky technologies will be shown at a relevant hub airport environment and across the global air transport system.

The first assessment by the Technology Evaluator on the way to meeting Clean Sky's environmental objectives is planned for the end of 2011. The ranges of potential performance improvement (reduction in CO_2, NO_X and Noise) will be narrowed or evolved during the life of the programme based on the results from the key technologies developed and validated through the demonstrations performed.

Clean Sky is a 'living' programme: each year, Annual Implementation Plans are produced and agreed, and research priorities are (re-)calibrated based on results achieved. The best approach to progressing the technologies is pursued. The Clean Sky JU uses regular Calls for Proposals to engage with the wider aeronautical industry, research organisations and universities in order to bring the best talent on board and enable broad collaborative participation. A very significant share of the Clean Sky research programme is already being taken on by Europe's aerospace related SMEs, and by September 2011 nine Calls for Proposals will have been completed, demonstrating the JU's commitment to involving all competent organisations in the European aeronautics research arena. In June 2011, a major and exciting milestone was reached with the 400th partner joining the Clean Sky programme.

Alternative fuels

European Advanced Biofuels Flightpath

In February 2009, the European Commission's Directorate General for Energy and Transport initiated the SWAFEA (Sustainable Ways for Alternative Fuels and Energy for Aviation) study to investigate the feasibility and the impact of the use of alternative fuels in aviation. The goal was to provide the European Commission with information and decision elements to support its future air transport policy, in the framework of the European commitment to promote renewable energy for the mitigation of climate change, security of supply and also to contribute to Europe's competitiveness and economic growth.

The study team involved 20 European and international organisations, representing all players in alternative aviation fuels: aircraft and engine manufacturing, air transport, oil industry, research and consulting organisations covering a large spectrum of expertise in the fields of fuel, combustion, environment as well as agriculture.

The SWAFEA final report was published in July 20112. It provides a comprehensive analysis on the prospects for alternative fuels in aviation, including an integrated analysis of technical feasibility, environmental sustainability (based on the sustainability criteria of the EU Directive on renewable energy3) and economic aspects. It includes a number of recommendations on the steps that should be taken to promote the take-up of sustainable biofuels for aviation in Europe.

In March 2011, the European Commission published a White Paper on transport4. In the context of an overall goal of achieving a reduction of at least 60% in greenhouse gas emissions from transport by 2050 with respect to 1990, the White Paper established a goal of low-carbon sustainable fuels in aviation reaching 40% by 2050.

As a first step towards delivering this goal, in June the European Commission, in close coordination with Airbus, leading European airlines (Lufthansa, Air France/KLM, & British Airways) and key European biofuel producers (Choren Industries, Neste Oil, Biomass Technology Group and UOP), launched the European Advanced Biofuels Flightpath. This industry-wide initiative aims to speed up the commercialisation of aviation biofuels in Europe, with the objective of achieving the commercialisation of sustainably produced paraffinic biofuels in the aviation sector by reaching a 2 million tons consumption by 2020.

This initiative is a shared and voluntary commitment by its members to support and promote the production, storage and distribution of sustainably produced drop-in biofuels for use in aviation. It also targets establishing appropriate financial mechanisms to support the construction of industrial "first of a

[2] http://www.swafea.eu/LinkClick.aspx?fileticket=llISmYPFNxY%3D&tabid=38

[3] Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC

[4] Roadmap to a Single European Transport Area – Towards a competitive and resource efficient transport system, COM(2011) 144 final

kind" advanced biofuel production plants. The Biofuels Flight path is explained in a technical paper, which sets out in more detail the challenges and required actions5.

More specifically, the initiative focuses on the following:

1. Facilitate the development of standards for drop-in biofuels and their certification for use in commercial aircraft;

2. Work together with the full supply chain to further develop worldwide accepted sustainability certification frameworks

3. Agree on biofuel take-off arrangements over a defined period of time and at a reasonable cost;

4. Promote appropriate public and private actions to ensure the market uptake of paraffinic biofuels by the aviation sector;

5. Establish financing structures to facilitate the realisation of 2G biofuel projects;

6. Accelerate targeted research and innovation for advanced biofuel technologies, and especially algae.

Take concrete actions to inform the European citizen of the benefits of replacing kerosene by certified sustainable biofuels.

The following "Flight Path" provides an overview about the objectives, tasks, and milestones of the initiative.

Time horizons	**Action**	**Aim/Result**
Short-term (next 0-3 years)	Announcement of action at International Paris Air Show	To mobilise all stakeholders including Member States.
	High level workshop with financial institutions to address funding mechanisms.	To agree on a "Biofuel in Aviation Fund".
	> 1,000 tons of Fisher-Tropsch biofuel become available.	Verification of Fisher-Tropsch product quality. Significant volumes of synthetic biofuel become available for flight testing.
	Production of aviation class biofuels in the hydrotreated vegetable oil (HVO) plants from sustainable feedstock	Regular testing and eventually few regular flights with HVO biofuels from sustainable feedstock.
	Secure public and private financial and	To provide the financial means for

[5] http://ec.europa.eu/energy/technology/initiatives/doc/20110622_biofuels_flight_path_technical_paper.pdf

	legislative mechanisms for industrial second generation biofuel plants.	investing in first of a kind plants and to permit use of aviation biofuel at economically acceptable conditions.
	Biofuel purchase agreement signed between aviation sector and biofuel producers.	To ensure a market for aviation biofuel production and facilitate investment in industrial 2G plants.
	Start construction of the first series of 2G plants.	Plants are operational by 2015-16.
	Identification of refineries & blenders which will take part in the first phase of the action.	Mobilise fuel suppliers and logistics along the supply chain.
Mid-term (4-7 years)	2000 tons of algal oils are becoming available.	First quantities of algal oils are used to produce aviation fuels.
	Supply of 1.0 M tons of hydrotreated sustainable oils and 0.2 tons of synthetic aviation biofuels in the aviation market.	1.2 M tons of biofuels are blended with kerosene.
	Start construction of the second series of 2G plants including algal biofuels and pyrolytic oils from residues.	Operational by 2020.
Long-term (up to 2020)	Supply of an additional 0.8 M tons of aviation biofuels based on synthetic biofuels, pyrolytic oils and algal biofuels.	2.0 M tons of biofuels are blended with kerosene.
	Further supply of biofuels for aviation, biofuels are used in most EU airports.	Commercialisation of aviation biofuels is achieved.

Improved air traffic management and infrastructure use

The EU's Single European Sky initiative and SESAR

The EU's Single European Sky initiative was originally launched by the European Commission in 1999. Its fundamental aim is to reform the architecture of European air traffic control to meet future capacity and safety needs. Its main principles are to reduce fragmentation in European air traffic management, between states, between civil and military, and between systems; to introduce new technology; and to establish a new regulatory framework built on closer synergy between the EU and Eurocontrol.

The first package of EU Single European Sky legislation was adopted by the Council and European Parliament in 2004. This was followed in 2009 by the Single European Sky II package of measures, which comprises five main pillars: performance, safety, technology, airport capacity and the human factor. The aim is to improve the performance of air navigation services by reducing the cost of flights, while improving the capacity and better preserving the environment, all having regard to the overriding safety objectives.

Reducing fragmentation in European air traffic management is expected to result in significant efficiency and environmental improvements. A core starting point is the reduction of the current surplus length of flights in Europe, estimated on average to be almost 50 km. The defragmentation of European airspace with new possibilities for more direct routing, and efforts to define a true pan European network of routes and to implement flexible use of airspace are expected to result in emission reductions of 2% per year.

SESAR

SESAR (Single European Sky ATM Research) is the technological component of the Single European Sky (SES). It is a €2.1bn Joint Undertaking, funded equally by the EU, Eurocontrol and industry (€700m EU, €700m Eurocontrol, €700m industry). Fifteen companies are members of the SESAR JU: AENA, Airbus, Alenia Aeronautica, the DFS, the DSNA, ENAV, Frequentis, Honeywell, INDRA, NATMIG, NATS (En Route) Limited, NORACON, SEAC, SELEX Sistemi Integrati and Thales. The SESAR SJU includes an additional thirteen associate partners including non-European companies with different profiles and expertise.

SESAR aims to help create a "paradigm shift" by putting performance-based operations at the core of air traffic management's objectives, and will be supported by state-of-the-art and innovative technology capable of ensuring the safety, sustainability and fluidity of air transport worldwide over the next 30 years. It is composed of three phases:

- The Definition phase (2004-2008) delivered the ATM master plan defining the content, the development and deployment plans of the next generation of ATM systems. This definition phase was led by Eurocontrol, and co-funded by the European Commission under the Trans European Network-Transport programme and executed by a large consortium of all air transport stakeholders.

- The Development phase (2008-2013) will produce the required new generation of technological systems, components and operational procedures as defined in the SESAR ATM Master Plan and Work Programme.

- The Deployment phase (2014-2020) will see the large scale production and implementation of the new air traffic management infrastructure, composed of fully harmonised and interoperable components guaranteeing high performance air transport activities in Europe.

Implementation of SESAR in general will facilitate the following:

- Moving from airspace to trajectory based operations, so that each aircraft achieves its agreed route and time of arrival and air and ground systems share a common system view.
- Collaborative planning so that all parties involved in flight management from departure gate to arrival gate can strategically and tactically plan their business activities based on the performance the system will deliver.
- An information rich ATM environment where partners share information through system wide information management.
- A globally agreed 4D trajectory definition and exchange format at the core of the ATM system where time is the 4th dimension providing a synchronised "time" reference for all partners.
- Airspace users and aircraft fully integrated as essential constituents and nodes of the ATM system.
- Dynamic airspace management and integrated co-ordination between civil and military authorities optimising the available airspace.
- Network planning focused on the arrival time as opposed to today's departure based system with Airport airside and turn-around fully integrated into ATM.
- New Communication, Navigation & Surveillance (CNS) technologies providing for more accurate airborne navigation and spacing between aircraft to maximise airspace and airport efficiency, improve communication and surveillance.
- Central role for the human widely supported by automation and advanced tools ensuring safe working without undue pressure.

Within the SESAR programme most of the almost 300 projects include environmental aspects of aviation. They concern aircraft noise management and mitigation, aircraft fuel use and emissions management etc. throughout all of SESAR's 16 work packages. The Joint Undertaking's role is to establish environmental sustainability as an integral aspect of broader ATM development and operating processes.

SESAR aims at reducing the environmental impact per flight by 10% without compromising on safety but with clear capacity and cost efficiency targets in mind. More specifically, in addressing environmental issues, SESAR will:

1. Achieve emission improvements through the optimisation of air traffic management services. The SESAR target for 2020 is to enable 10% fuel savings per flight as a result of ATM improvements alone, leading to a 10% reduction of CO2 emissions per flight;
2. Improve the management of noise emissions and their impacts through better flight paths, or optimised climb and descent solutions;
3. Improve the role of ATM in enforcing local environmental rules by ensuring that flight operations fully comply with aircraft type restrictions, night movement bans, noise routes, noise quotas, etc.;

4. Improve the role of ATM in developing environmental rules by assessing the ecological impact of ATM constraints, and, following this assessment, adopting the best alternative solutions from a European sustainability perspective.

5. Accompany the development of new procedures and targets with an effective regulatory framework in close cooperation with the European Commission;

6. Implement more effective two-way community relations and communications capabilities at local and regional levels including a commonly agreed environmental strategy and vision.

By 2012 SESAR is expected to deliver fuel burn reductions of approximately 2% (compared with a baseline 2010), to demonstrate environmental benefits on city pairs connecting 8 European airports, and to have airspace users signing up to the SESAR business case (including the environment case) for time-based operations.

Operational improvements: AIRE

The Atlantic Interoperability Initiative to Reduce Emissions (AIRE) is a programme designed to improve energy efficiency and lower engine emissions and aircraft noise in cooperation with the US FAA. The SESAR JU is responsible for its management from a European perspective.

Under this initiative ATM stakeholders work collaboratively to perform integrated flight trials and demonstrations validating solutions for the reduction of CO_2 emissions for surface, terminal and oceanic operations to substantially accelerate the pace of change.

AIRE has demonstrated in 2009, with 1,152 trials performed, that significant savings can be achieved using existing technology. CO_2 savings per flight ranged from 90kg to 1250kg and the accumulated savings during trials were equivalent to 400 tons of CO_2. Another positive aspect is the human dimension - the AIRE projects boost crew and controller motivation to pioneer new ways of working together focusing on environmental aspects, and enabled cooperative decision-making towards a common goal.

The strategy is to produce constant step-based improvements, to be implemented by each partner in order to contribute to reaching the common objective. In 2010 demand for projects has more than doubled and a high transition rate from R&D to day-to-day operations, estimated at 80%, from AIRE 2009 projects was observed (expected to further increase with time). Everyone sees the “AIRE way of working together” as an absolute win-win to implement change before the implementation of more technology intensive ATM advancements expected for the period 2013 onward. A concrete example of the progress achieved is that, due to AIRE, both FAA and NAV Portugal offer lateral optimisation over the transatlantic routes to any user upon request. In July 2010, the SESAR JU launched a new call for tender and had an excellent response - 18 projects were selected involving 40 airlines, airport, air navigation service providers and industry partners. More than 5,000 trials are expected to take place.

Economic / market-based measures

The EU Emissions Trading System

The EU Emissions Trading System (EU ETS) is a cornerstone of the European Union's policy to combat climate change and its key tool for reducing industrial greenhouse gas emissions cost-effectively. Being the first and biggest international scheme for the trading of greenhouse gas emission allowances, the EU ETS currently covers some 11,000 power stations and industrial plants in 30 countries.

Launched in 2005, the EU ETS works on the "cap and trade" principle. This means there is a "cap", or limit, on the total amount of certain greenhouse gases that can be emitted by the factories, power plants and other installations in the system. Within this cap, companies receive emission allowances which they can sell to or buy from one another as needed. The limit on the total number of allowances available provides certainty that the environmental objective is achieved and ensures that the allowances have a market value.

At the end of each year each company must surrender enough allowances to cover all its emissions, otherwise heavy fines are imposed. If a company reduces its emissions, it can keep the spare allowances to cover its future needs or else sell them to another company that is short of allowances. The flexibility that trading brings ensures that emissions are cut where it costs least to do so. The number of allowances is reduced over time so that total emissions fall.

The EU ETS now operates in 30 countries (the 27 EU Member States plus Iceland, Liechtenstein and Norway). It currently covers CO_2 emissions from installations such as power stations, combustion plants, oil refineries and iron and steel works, as well as factories making cement, glass, lime, bricks, ceramics, pulp, paper and board. Between them, the installations currently in the scheme account for almost half of the EU's CO_2 emissions and 40% of its total greenhouse gas emissions.

The EU ETS will be further expanded to the petrochemicals, ammonia and aluminium industries and to additional gases (PFCs and N_2O) in 2013, when the third trading period starts. At the same time a series of important changes to the way the EU ETS works will take effect in order to strengthen the system.

The legislation to include aviation in the EU ETS was adopted in November 2008, and entered into force as Directive 2008/101/EC of the European Parliament and of the Council on 2 February 2009. The proposal to include aviation in the EU ETS, made by the European Commission in December 2006, was accompanied by a detailed impact assessment.

Under the EU ETS, the emissions cap is increased to accommodate the inclusion of aviation. This addition to the cap establishes the total quantity of allowances to be allocated to aircraft operators. This quantity is defined as a percentage of historical aviation emissions, which is defined as the mean average of the annual emissions in the calendar years 2004, 2005 and 2006 from aircraft performing an aviation activity falling within the scope of the legislation. In July 2011, it was decided that the historical aviation emissions are set at 221,420,279 tonnes of CO_2.

The additional cap to be added to the EU ETS in 2012, the first year of operation for aviation, will be set at 97% of the historical aviation emissions. For the period from 2013 to 2020 inclusive the additional cap will be set at 95% of the historical aviation emissions.

Aircraft operators flying to and from airports in 30 European states from 2012 will be required to surrender allowances in respect of their CO_2 emissions on an annual basis. The large majority of allowances will be allocated to individual aircraft operators free of charge, based on their respective aviation output (rather than emissions) in 2010, thus rewarding operators that have already invested in cleaner aircraft. In 2012, 85% of the total quantity of the additional allowances (or "cap") will be allocated free of charge according to this benchmarking methodology, while in the 2013-2020 trading period 82% of the additional allowances will be allocated free of charge in this way. In the 2013-2020 trading period, an additional 3% of the total additional allowances for aviation will be set aside for allocation free of charge via the special reserve, to new entrants and fast-growing airlines. The remaining 15% of allowances will be allocated each year by auction.

Aircraft operators that choose to emit more than their free allocation of allowances will be able to source allowances from other participants in the ETS (including those outside the aviation sector), from intermediaries who trade allowances, from Member States via auctions, or they can use specific quantities of international credits from emissions reduction projects in third countries (e.g. CDM credits and ERUs).

The system also includes a de minimis provision under which commercial aircraft operators with a low level of aviation activity in Europe are excluded from its scope. This is likely to mean that many aircraft operators from developing countries will be unaffected by the scheme and, indeed, over 90 ICAO states have no commercial aircraft operators included in the scope of the EU ETS.

The EU legislation foresees that, where a third country takes measures of its own to reduce the climate change impact of flights departing from its airports, the EU will consider options available in order to provide for optimal interaction between the EU scheme and that country's measures. In such a case, flights arriving from the third country could be excluded from the scope of the EU scheme. The EU therefore encourages other countries to adopt measures of their own and is ready to engage in bilateral discussions with any country that has done so.

The legislation also makes it clear that if there is agreement on global measures, the EU shall consider whether amendments to this Directive as it applies to aircraft operators are necessary.

Anticipated change in fuel consumption and/or CO_2 emissions

The environmental outcome of an emissions trading system is pre-determined through the setting of an emissions cap. In the case of the EU ETS, an addition to the overall cap is established for aviation emissions. However, aircraft operators are also able to use allowances allocated to other sectors to cover their emissions. It is therefore possible (indeed highly likely given traffic growth forecasts) that the absolute level of CO_2 emissions from aviation will exceed the number of allowances allocated to aviation. However, any aviation emissions will necessarily be offset by CO_2 emissions reductions elsewhere, either in other sectors within the EU that are subject to the EU ETS, or through emissions reduction projects in third countries. The "net" aviation emissions will however be the same as the number of allowances allocated to aviation under the EU ETS.

In terms of contribution towards the ICAO global goals, the states implementing the EU ETS will together deliver, in "net" terms, a 3% reduction below the 2005 level of aviation CO_2 emissions in 2012, and a 5% reduction below the 2005 level of aviation CO_2 emissions in the period 2013-2020.

Other emissions reduction measures taken, either at supra-national level in Europe or, by any of the 30 individual states implementing the EU ETS, will of course make their own contribution towards the ICAO global goals. Such measures are likely to moderate the anticipated growth in aviation emissions in Europe and therefore reduce the extent to which the absolute level of CO_2 emissions from aviation will exceed the number of allowances allocated to aviation. However, assuming that absolute aviation emissions will nonetheless in future exceed the additional aviation cap, the aggregate contribution towards the global goals is likely to remain that which is determined by the EU ETS cap.

Expected co-benefits

The EU ETS covers both international and domestic aviation and does not distinguish between them. It is not therefore possible to identify how the "net" emissions reductions it delivers are apportioned between international and domestic aviation.

Support to voluntary actions: ACI Airport Carbon Accreditation

Airport Carbon Accreditation is a certification programme for carbon management at airports, based on carbon mapping and management standard specifically designed for the airport industry. It was launched in 2009 by ACI EUROPE, the trade association for European airports.

This industry-driven initiative was officially endorsed by Eurocontrol and the European Civil Aviation Conference (ECAC). It is also officially supported by the United Nations Environmental Programme (UNEP). The programme is overseen by an independent Advisory Board. ACI EUROPE is looking at expanding the geographical scope of the programme through the other ACI regions. Discussions are currently under way with ACI Asia Pacific for a possible extension of the programme to the Asia Pacific region.

Airport Carbon Accreditation is a four-step programme, from carbon mapping to carbon neutrality. The four steps of certification are: Level 1 "Mapping", Level 2 "Reduction", Level 3 "Optimisation", and Level 3+ "Carbon Neutrality". One of its essential requirements is the verification by external and independent auditors of the data provided by airports. Aggregated data are included in the *Airport Carbon Accreditation* Annual Report thus ensuring transparent and accurate carbon reporting. At level 2 of the programme and above (Reduction, Optimisation and Carbon Neutrality), airport operators are required to demonstrate CO2 reduction associated with the activities they control.

In June 2011, 2 years after the launch of the programme, 43 airports were accredited, representing 43% of European passenger traffic. ACI/Europe's objective for the end of the 3rd year of the programme's operation is to cover airports representing 50% of European passenger traffic. Programme's implementation is twofold: on top of recruiting new participants, individual airports should progress along the 4 levels of the programme.

Anticipated benefits:

The Administrator of the programme has been collecting CO2 data from participating airports over the past two years. This has allowed the absolute CO2 reduction from the participation in the programme to be quantified.

	2009-2010	2010-2011
Total aggregate scope 1 & 2 reduction (tCO2)	51,657	54,565
Total aggregate scope 3 reduction (tCO2)	359,733	675,124

Variable	**Year 1**		**Year 2**	
	Emissions	**Number of airports**	**Emissions**	**Number of airports**
Aggregate carbon footprint for 'year 0'[6] for emissions under airports' direct control (all airports)	803,050 tonnes CO2	17	2,275,469 tonnes CO2	43
Carbon footprint per passenger	2.6 kg CO2		3.73 kgCO2	
Aggregate reduction in emissions from sources under airports' direct control (Level 2 and above)[7]	51,657 tonnes CO2	9	51,819 tonnes CO2	19
Carbon footprint reduction per passenger	0.351 kg CO2		0.11 kg CO2	
Total carbon footprint for 'year 0' for emissions sources which an airport may guide or influence (level 3 and above)	2,397,622 tonnes CO2	6	6,643,266 tonnes CO2[8]	13
Aggregate reductions from emissions sources which an airport may guide or influence	359,733 tonnes CO2		675,124 tonnes CO2	

6 'Year 0' refers to the 12 month period for which an individual airport's carbon footprint refers to, which according to the Airport Carbon Accreditation requirements must have been within 12 months of the application date.

7 This figure includes increases in emissions at airports that have used a relative emissions benchmark in order to demonstrate a reduction.

Total emissions offset (Level 3+)	13,129 tonnes CO_2	4	85,602 tonnes CO_2	8

Its main immediate environmental co-benefit is the improvement of local air quality.

Costs for design, development and implementation of *Airport Carbon Accreditation* have been borne by ACI EUROPE. *Airport Carbon Accreditation* is a non-for-profit initiative, with participation fees set at a level aimed at allowing for the recovery of the aforementioned costs.

The scope of *Airport Carbon Accreditation,* i.e. emissions that an airport operator can control, guide and influence, implies that aircraft emissions in the LTO cycle are also covered. Thus, airlines can benefit from the gains made by more efficient airport operations to see a decrease in their emissions during the LTO cycle. This is coherent with the objectives pursued with the inclusion of aviation in the EU ETS as of 1 January 2012 (Directive 2008/101/EC) and can support the efforts of airlines to reduce these emissions.

SECTION 3: National actions in Denmark

Aircraft related technology

Renewal of the fleets is the main contributor to reduction of the CO_2 emissions from Danish operators. The major Danish operators SAS and Thomas Cook Airlines Scandinavia both have set goals for reduction of CO_2 emissions.

Please note that this information about SAS is valid for the whole of SAS and is submitted in the Action Plans for Sweden and Norway as well.

The goal for SAS is to reduce total flight emissions by 20 % in 2015 compared with 2005, and to reduce the flight emissions per unit by 50 % in 2020 compared to 2005. This is primarily done by fleet renewal, where older MD80's and B737 Classic are replaced with new A320's and B737NG before 2015. Between 2016 and 2020 a number of A320neo will replace current generation A320's. SAS is currently investigating a potential long haul replacement with the target to start the replacements before 2020. Furthermore SAS is working actively with a fuel saving-program which includes almost all operations. Other elements in the emission reduction program include modification of existing aircraft, lighter products onboard, green flights, landing and starts, and future access to alternative sustainable jet fuels.

Thomas Cook Airlines Scandinavia has set a goal to reduce emissions by 12 % per passenger kilometre in 2020 compared to 2008. This is done by replacing older aircraft with new A321's with sharklets. 8 older A320 and A321 will be replaced in 2014 and 2015, and the expected reduction per aircraft is 700 tonnes/year, yielding in total 5600 tonnes CO_2/year.

Alternative fuels

The Danish State has for a number of years supported development of second-generation bio fuels, though not specifically aimed for aviation. A number of research projects on alternative fuels are being carried out or are in the planning at the moment. There is an established production of bio fuels for cars in Denmark.

A number of the major Danish stakeholders on biofuels are part of Sustainable Biofuels Network, through which they are working on improving the commercialization of sustainable biofuels for aviation.

Furthermore SAS, the Confederation of Danish Industry and the Danish Transport Authority are currently considering ways to increase the supply of bio fuels for aviation.

Improved ATM and infrastructure use

The company Naviair operates the air traffic control in the Danish airspace. Naviair's primary approaches to reduction of CO_2 emissions are through:

- Short routes, continuous flights towards the destination and fuel saving levels
- Fuel saving approach to Danish airports
- Minimum of on ground waiting time with engines running through efficient traffic management at the airports
- Green departures (CCD) wherever possible – with continuous climb to cruising level

Among others, Naviair analyses and works with development of climate-friendly traffic concepts within Free Route Airspace (FRA), Continuous Climb Departures (CCDs), Continuous Descent Approach (CDA) as well as Required Navigation Performance (RNP).

DK/SE FAB and NUAC

In 2009, Danish and Swedish airspace became one joint Danish-Swedish Functional Airspace Block (DK-SE FAB) with a joint company, NUAC (Nordic Unified Air traffic Control), which in 2012 takes over the responsibility for operating the three control centres in Copenhagen, Malmö and Stockholm – and by this the air traffic control of the en-route traffic in the DK/SE FAB. NUAC is the first – and so far the only – fully integrated ANSP in Europe, operating the traffic control across national airspaces.

Besides securing harmonisation and streamlining of traffic control, the objective of the new integrated ANSP is to reduce fuel consumption with flights in DK/SE FAB, reducing the emission of environmentally damaging gases. During the next years, NUAC is committed to ensure a reduction of CO_2 emission in DK/SE FAB by least 52,000 tonnes of CO_2 annually.

Other tangible climate initiatives

Use of CCD by departure from Copenhagen Airport saves the environment from emissions of approximately 32,000 tonnes of CO_2 annually and the airlines fuel consumption of approximately 10,000 tonnes annually. The concept means that more than 95 per cent of departing flights are given permission to deviate from the Standard Instrument Departure (SID) procedure. Instead, they use Naviair's special CCD procedure, where aircraft are given permission to climb directly to their preferred cruising level and head directly for their destination as quickly as possible during the departure procedure.

Naviair is also improving the possibility of using CDA at Copenhagen Airport. In periods with low traffic density, it is possible to use CDA. In 2009 more gentle level restrictions at approach into Copenhagen Airport were introduced, this means that the airlines can complete an approximate CDA.

FAB 4 and the Borealis Alliance

In the so-called FAB4 project, options of a closer cooperation among the ANSP's in DK/SE FAB and the Irish/English FAB, are being looked in to.

In the so-called Borealis project, Naviair cooperates in an even larger context with a number of North European companies concerning the air traffic control in the North European airspace. It is the provisional objective to establish an alliance in preparation for a stronger cooperation related to harmonising and streamlining the air traffic control. In the longer term, the Borealis project has a vision of establishing a joint airspace.

Market based measures - MBM

Denmark is part of the EU, and thus participates in the EU Emissions Trading Scheme (EU ETS). Denmark plays a central role in the current (spring 2012) Ad-Hoc Group under ICAO Council, where Denmark represents the European region.

Denmark has a clear preference for a global scheme for MBM. Denmark considers this the best way to achieve substantial reductions in CO_2 emissions and to avoid distortion of competition.

Ground related activities

Copenhagen Airport has in 2007 decided on a goal to reduce the airport's emission of CO_2 by 21 % in 2012 compared to 1990, in accordance with Denmark's obligations in the Kyoto-Protocol. This goal has been achieved, and Copenhagen Airport is currently working on setting new goals for CO_2 emission.

The CO_2 emission from Copenhagen Airport has thus been reduced from 46.000 tonnes in 1990 to 31.000 tonnes in 2011, equalling 33 %.

The second largest airport, Billund, participates in a joint European project for regional airports in the North Sea region: "Green Sustainable Airports" that aims to establish strategies and solutions for a more eco-efficient and green regional aviation industry.

SECTION 4: Emissions Data

The Danish emissions data are taken from the Danish Inventory Report, Emission Inventories 1990-2009, by the National Environmental Research Institute. The data for 2010 are also supplied by the Institute. The data are in [ktonnes/year].

Year	Domestic	International
1985	256	1391
1986	241	1503
1987	268	1613
1988	271	1725
1989	262	1809
1990	243	1736
1991	199	1632
1992	193	1693
1993	190	1659
1994	196	1818
1995	199	1867
1996	205	1971
1997	212	2010
1998	194	2159
1999	174	2290
2000	154	2350
2001	163	2384
2002	141	2058
2003	138	2141
2004	128	2447
2005	135	2574
2006	143	2581
2007	161	2647
2008	162	2647
2009	153	2316
2010	156	2421

Conclusion

This action plan provides an overview of the actions undertaken by the Kingdom of Denmark and Danish companies– either alone or in collaboration with others such as the European Union – in order to mitigate the effects of aviation's contribution to climate change.This Action Plan was finalized on the 27th June 2012, and shall be considered as subject to update after that date.