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Delegations will find attached Commission document SEC(2007) 774.

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COMMISSION OF THE EUROPEAN COMMUNITIES

Brussels, 13.6.2007
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COMMISSION STAFF WORKING DOCUMENT

Accompanying document to the

Proposal for a

COUNCIL REGULATION

- Setting Up The Clean Sky Joint Undertaking -

Analysis of the effects of a Joint Technology Initiative (JTI) in the area of AERONAUTICS and AIR TRANSPORT

SUMMARY OF THE IMPACT ASSESSMENT

{COM(2007) 315 final}
{SEC(2007) 773}

1. Background

This document presents the impact analysis of the "Clean Sky" Joint Technology Initiative (Clean Sky).

The Seventh Framework Research Programme (FP7; 2007-2013)[1] introduces the concept of **Joint Technology Initiatives** (JTI) as a response to needs of industry and other stakeholders. JTIs are conceived as public-private partnerships (PPP). Via JTIs, the Community will offer a legal and organisational framework that allows the pooling of resources across all R&D stakeholders in a specific area from the public and the private sector. JTIs should pursue activities that are of common European interest[2] thus contributing to the achievement of the Lisbon competitiveness objective and the Barcelona targets for research spending[3].

Aeronautics and Air Transport has been identified by the Commission as one of the areas for establishing a JTI[4]. Its main target is to make significant progress towards the High Level Target Concepts set forward by **ACARE**, concluding that step technological changes are needed to reach the goals by 2020 of reducing CO_2 emissions by 50%, NOx by 80%, perceived external noise by half, and reducing the environmental impact of aircraft and related products life cycle[5] .

PROCEDURAL ISSUES AND CONSULTATION OF INTERESTED PARTIES

The impact assessment of Clean Sky is based on two documents, and further input has been provided through two hearings reviewing the preparedness of the Impact Assessment documentation.

The first document, "Report on the Assessment Exercise on the "Clean Sky" Final Proposal" was drawn up by an independent group of experts nominated by National States (NS). Their report has focussed on the market situation for European Aeronautics, Clean Sky goals, policy options and analysis of socio-economic impact.

The second document, entitled "Clean Sky, a Joint Technology Initiative for Aeronautics and Air Transport – Executive Summary", was drawn up by the industrial founding members in response to a Commission request to demonstrate the readiness of the "Keys to Success" (Market failure, Additionality, Governance and Role of Member States).

The proposal and the governance aspects in particular, have taken on board inputs from National States in a number of workshops organised by the Commission. The proposed governance structure has support both from industrial stakeholders and from NS.

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1 Decision No 1982/2006/EC of the European Parliament and of the Council on FP7 of 18 December 2006.

2 SEC(88) 1882.

3 COM(2005) 488 - "More Research and Innovation Investing for Growth and Employment: A Common Approach" Impact Assessment.

4 Council Decision 2006/971/EC of 19 December 2006 on the Specific Programme "Cooperation" implementing the Seventh Framework Programme (2007-2013) of the European Community for research, technological development and demonstration activities.

5 SRA-2, p. 17.

2. Market failure justifies Community financial intervention

The aeronautics sector is confronted with important challenges in the 21st century: industry is facing the **necessity to reduce its contribution to climate change and emissions and noise around airports**.

The EU aeronautics industry is **confronted with strong international competition**. On 20 December 2006, the US Government issued an Executive Order establishing the **US first Aeronautics Research and Development Policy**, with the goal to advance US technological leadership in aeronautics.

Public financial intervention is justified by the need to address the different sources of market failure discouraging aeronautics research in the reduction of fuel consumption, emission, and noise of future aircraft.

In the case of Aeronautics research, market failure[6] preventing the optimum development of the technological area **assumes a variety of forms**:

1) There is a **higher level of risk**, and a **longer period before project results show a positive return on investment**, than acceptable to industry or to the financial community.

2 The step changes required to implement the ACARE SRA-2 for greening of Air Transport can only be met effectively in a **co-ordinated way** using an innovative integrated **multidisciplinary approach**.

3) There are significant **externalities**, connected both to aeronautics R&D investment and to aviation impact on climate change.

A **positive externality** is generated by R&D investment in Aeronautics. The innovative firm does not fully appropriate the benefits of its R&D investment due to involuntary knowledge dissemination through various channels, as the social return on R&D investment is higher than the private rate of return. **The gap between the social and the private rate of return on R&D investment is particularly wide in the case of aeronautics**.

A **negative externality** is associated to civil aviation: the full environmental costs to society are not paid by operators or manufacturers. This results in sub-optimal investment in, and deployment of, new environmentally beneficial technologies.

3. Objectives of Clean Sky

The main objective is **accelerating the EU development of clean Air Transport technologies for earliest possible deployment**[7] which will contribute to achieving Europe's strategic environmental[8] and social priorities, in combination with sustainable economic growth.

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6 For market failure definition, see SEC(2005) 800, p. 11.

7 See COM(2007) 2, p. 2.

8 European Parliament and European Council in spring 2005 re-stated the EU objective of limiting global temperature increase to a maximum of 2° C (2° objective).

Specifically: implementing a large scale **programme** promoting pre-competitive EU **aeronautics R&D** to enable the major technological advances required **to reduce by 2020 CO_2 and NOx emissions and noise significantly** and the environmental impact of product life cycle. Such policy should **maximise the efficiency** of EU aeronautics research efforts, by exploiting R&D economies of scale and scope and **increase industry ability of rapid exploitation** of the potential step changes in clean Air Transport technologies.

3.1. Consistency with other EU policies

Stimulating aeronautics R&D complements measures such as the proposal to include aviation in the EU **Emission Trading Scheme** (ETS). This is supported by the ETS Impact Assessment[9].

4. Alternative policy options

The following options were examined:

- No EU action
- EUREKA type of intervention
- FP-only EU action (use of traditional instruments of Collaborative Research)
- Clean Sky JTI

4.1. No EU action (i.e. no intervention at national or EU level)

This option was rejected as it is not possible to rely simply on market mechanisms to achieve the major innovations needed for the greening of aircraft.

4.2. EUREKA type approach

This option was considered not suitable: it will not allow the budget required to overcome the high risks which discourage private investment in developing green aircraft technology. Furthermore, EUREKA is an intergovernmental programme and thus not adequate to accelerate the development and introduction of green air transport technologies.

4.3. FP-only EU action

While being most effective to stimulate basic research and validation at (**sub-)system level**, traditional Instruments of Collaborative Research were ranked as **sub-optimal** to **accelerate the development of clean Air Transport technologies in the EU for earliest possible application**, as it requires full-system technologies demonstration. Even if a large scale budget were distributed between different projects of Collaborative Research on the same time horizon, the target to develop technologies to reduce by 2020 CO_2 emissions, noise and NOx significantly will not be fulfilled.

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[9] http://ec.europa.eu/environment/climat/pdf/aviation/sec_2006_1684_en.pdf, see also section 5 of COM(2005) 35.

4.4. Clean Sky Joint Technology Initiative (JTI)

Clean Sky is a JTI aiming to speed up development and introduction of major technological changes to substantially improve the impact on the environment of next generation aircraft, rotorcraft, and their associated equipment. It is articulated around 6 **Integrated Technology Demonstrators** (ITDs). There are three vehicle ITDs (fixed-wing Aircraft; Regional Aircraft; Rotorcraft) and two supporting ITDs (Engines and Systems) that will provide inputs to the vehicle ITDs. An Eco-Design ITD will support further other ITDs in terms of the greening of material life-cycle. All ITDs will develop full scale demonstrators as tangible deliverables.

The corporate structure of "Clean Sky" is a **Joint Undertaking** (JU), which will be a legal entity created as a Community body under Article 171 of the EC treaty.

Clean Sky is expected to reduce by 2020 CO_2 aircraft emission by 20%-40%, NOx by 60% and noise by 10db to 20db. It has an overall budget of € 1.6 billion over a seven years period. The programme will stimulate € 800 million additional R&D investment from industry, which represents 50% of the Clean Sky budget.

5. Clean Sky Impact Analysis

Clean Sky will have a significant impact in many areas. It will decrease the environmental impact of aviation on a global level. **Increase in efficiency enhances market development**. Job creation will benefit EU economy. Passenger satisfaction will increase and mobility rate will be higher. **Step changes** in technology and environmental performance offer the potential for addressing environmental concerns while maintaining and boosting the competitiveness of the European industry.

Most of the **environmental benefits** are achieved by lower fuel burn thus combining environmental benefits and efficiency. Industry commitment is very high in terms of resources invested and this will guarantee exploitation of research results. New generations of wide and narrow body aircraft, regional aircraft, and rotorcraft are planned to benefit from Clean Sky technological advances.

Although Clean Sky is a green programme, **the economic benefits alone can justify the significant investment of public money**. The life cycle of an aircraft fleet is around 20-25 years. By 2010 about one third of the aircraft will reach the targeted lifetime so there will be an urgent need for replacement. Narrow body aircraft have 60% share in the aircraft segment. It is crucial that a new narrow-body product taking advantage of new technology development enabling step changes in environment protection be ready for the fleet renewal process.

More efficient aircraft will help airlines to **decrease their operational costs thus enhancing** trade and tourism.

Innovation and research potential of Europe will be strengthened as a project like Clean Sky will bring all relevant industry players together and generate a spill-over effect on other initiatives, as well as in other industries.

Estimates on added value and economic additionality in Europe have been derived from both high-level market forecasts and from data provided by individual companies, cross-checked

by Oxford Economic Forecasting (OEF). Overall figures are integrated over **20 years** (2010-2030) for R&D, and another 20-year period offset by 5 years (2015-2035) for market impact.

The total value added to the EU in the period 2010-2035 associated to Clean Sky is the sum of direct and indirect industry value added (€ 350 billion) and spill-over (€ 450 billion), totalling at **€ 800 billion**.

5.1. Social Impacts of Clean Sky

Any positive impact on environment has a positive effect on **public health**. The increase in airline operational efficiency will have a huge social impact through the **increase in mobility**.

The positive effect on **employment** will also contribute to the increase of standard of living. Investment into research has a high social return through spillover to other industries and generates an increase in the quality of life of the European citizens.

The decrease of the **social cost of emissions** leads to a social benefit. In terms of CO_2, Clean Sky can result in 30% overall improvement. Estimations show that Clean Sky can diminish the quantity of carbon between 2 and 3 billion tonnes. The social cost spared is several hundred billion euros[10].

5.2. Additionality of Clean Sky

Clean Sky is expected to have a major impact in terms of "additionality" at the Community level. European Aeronautics Industry will invest an additional € 800 million in R&D for reducing aviation environmental impact. A large scale long term EU programme delivering demonstrators (i.e. high technology readiness level) will influence the magnitude of private R&D investments in product development programmes. The value of industry funded R&D performed in the EU over 2010-2030 in developing new products incorporating Clean Sky technologies is expected to be around € 100 billion.

Clean Sky will also **stimulate and aligning national governments programmes** on aeronautics research addressing environmental problems. The cyclical nature of the sector implies that the baseline for assessing the impact of Clean Sky varies substantially from year to year, while an R&D programme focussing on innovation technology has an intrinsically more stable character.

Finally the additionality can also be measured in terms of the direct contribution to total **"Value Added"** to the EU from the development and exploitation of Clean Sky supported technologies. The direct contribution from Clean Sky is estimated to reach around € 160 billion, compared to the € 800 million of public money to be invested in the programme.

5.3. Risks associated with Clean Sky

Various scenarios have been considered:

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[10] The Social Costs of Carbon Review – Methodological Approaches for Using SCC Estimates in Policy Assessment", AEA Technology Report for DEFRA (UK Govt), December 2005.

- Individual ITDs not reaching in full their targets: although this cannot be ruled out, the targets set forward may equally result in an overachievement as the interlinking between the various ITDs increases the overall robustness of Clean Sky.

- Failure to reach its targets: ITDs interlinking is a guarantee for success.

- Failure of JTI consortium (e.g. by withdrawal of key partners): given the high level of commitment already set forward by each of the ITD Leaders, this scenario is quite unlikely. All companies involved will try to exploit their investments quickly and efficiently. Nevertheless, a backup is in place via the fact that each ITD is co-led by two members.

Overall, it is felt that the governance and internal and external control mechanisms will guarantee that recovery actions could be implemented quickly if and when necessary.

6. Monitoring and evaluation

Internal evaluation is executed through the management structure of Clean Sky. The ITD Steering Committee manages, monitors, evaluates the work of the participants in the Integrated Technology Demonstrators. This Committee reports to the Directorate where the work of the ITDs is evaluated. A strategic evaluation is carried out by the Executive Board composed of the European Commission and the main industrial members of Clean Sky.

The Transport Programme Committee and the National States Representatives Group will be the two main **external reviewing bodies**. The main task of the latter is to monitor project progress against original targets. ACARE will focus especially on the progress considering the Strategic Research Agenda which the objectives of Clean Sky are in line with.

In addition, it is foreseen that an **Advisory Board** will support the JU in all scientific, technical, managerial, and administrative issues. This board will be formed of independent experts including regulators.

7. Measurement of progress

Assessing **technical progress** implies evaluating to what extent the project is in line with its stated goals. Clean Sky will have full scale demonstrators as tangible deliverables.

The most important instrument for progress measurement is the Technology Evaluator, which ensures the technical cooperation coherence among the ITDs. It will measure the work of all the six ITDs against the technical project plan and the ACARE target, ensure the consistency between the ITD activities and allow a detailed assessment of the environmental benefits.

Detailed technical sub-objectives will be measured at the level of ITD Steering Committees and in the JTI Directorate where there is a Responsible Officer for each of the six ITDs. Results of higher level analysis of progress will be evaluated at the Executive Board level; these will be shared with the external evaluating bodies via the European Commission.

The **managerial monitoring** is executed by the governing bodies of Clean Sky: the Steering Committees of the ITDs, the Directorate and the Executive Board. These bodies are also responsible for the administrative, managerial monitoring of the project by analysing the

reports from lower management levels and measuring the progress against the detailed project plan.

The Director will be the legal representative of the project. With his staff, he/she will collect all the relevant information from the ITDs and will prepare most of the reports. He/she will report directly to the Executive Board.

The National States Representatives Group and the Advisory Board can monitor **financial** and administrative Clean Sky targets continuously. Funding received from the Commission is spent according to public interest; this is strengthened by the veto right of the Commission on issues of strategic importance.

Fair representation will be ensured. The Call for Proposals process is clear and indicates that the actual selection will be transparent and satisfactory for all stakeholders. It guarantees that companies not yet part of the supply chain will have equal possibilities if they have useful capabilities for the project.

In-kind contributions will be valued using the following principles:

- Overall approach based on FP7 modus operandi, assessed at review level.
- Implementing Rules of the Financial Regulations as guideline.
- Additional items covered by International Accounting Standards.
- Assessment of contributions in accordance with usual practices of the founding industrial partners.
- Verification via an independent auditor.