Skyline

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Clean Sky newsletter

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CLEANSKY

Editorial

Eric Dautriat, Executive Director of the Clean Sky Joint Undertaking

"Providing information is one of our priorities."

Dear reader,

This is the first issue of the Clean Sky Joint Undertaking "Skyline". This Newsletter will now be published on a quarterly basis. It is intended to provide a wide audience with the latest information about the progress of activities, the main decisions taken, the governance and technical achievements. It is also intended to trigger your comments.

Through the calls for proposals, Clean Sky is involving more and more new stakeholders, well beyond its 86 founding members. By the end of 2010, more than 300 new partners that will have joined us. But besides this widening circle, we know that there are many people interested in the Clean Sky endeavour, be they policy-makers, engineers, the general public or citizens paying attention to the environmental goals or to the technologies themselves. We will be happy to keep in contact with all of you and, I'm sure, to gaint or strengthen your confidence.

The Joint Undertaking has been autonomous now for eight months. The team build-up is almost completed: there will be 20 of us here, in Brussels, before the end of September. We have been working harddid work a lot… .This team mixes the public and the private cultures: project officers coming mostly from industry, financial and administrative staff mostly from the European Commission and its agencies, but also quite a number of staff members having already experienced both sectors in their previous career. This helps to create the melting pot of the Public-Private Partnership. We know that we have to build altogether, with the Integrated Technology Demonstrators (ITD) colleagues and the European Commission colleagues, a new way of managing research.

The relationship with the ITDs is strengthening, we have one Project Officer perby ITD, which will work in a close relationship with the ITD leaders. The 2010 budget and the draft budget for 2011 were set, at the level of the ITD needs. The activities in 2010 are progressing close to the expected planning, according to a mid-year assessment which was performed at the beginning of July.

The calls for proposals are now run at a livelysmart pace of one call every three months on average. The selection process, closely derived from the European Commission's one, is working in a fair manner, overviewed by independent observers. The nature of our topics, small enough and precisely defined, make it easy enough for SMEs and Universities to apply.

We have set up the Scientific and Technological Advisory Board, which met for the first time on 1st July. This committee is composed of 11 high-level scientists and engineers, independent from any Clean Sky stakeholder. In the coming weeks, a further meeting is foreseen, after which the Advisory Board will issue its first set of observations and recommendations. This is a guarantee of scientific excellence and of independent assessment, which will help the JU to make the right choices and keep improving.

The National States Representative Group advises and helps the JU in a lot of areas, and first of all, our calls for proposals. Now, we have also started to check the coherence of Clean Sky and the national programmes, as foreseen in our Statutes, in order to avoid unexpected overlaps, and, perhapsmaybe still more important, to find possible areas of cooperation to improve the global outcome. Clean Sky after all strives after all, to be a catalyst.

Last but not least, the Governing Board is running the JU through quarterly meetings. It is chaired by Marc Ventre (Safran) until the end of 2010. A verbal progress report about the technical activities is part of the agenda of every meeting; a formal update of the programme strategy, mainly about the refinement of the demonstrators schedule, was adopted at the last meeting by unanimity.

For your better information, we are creating a brand new website, which will be available soon. More up-to-date, more dynamic, with a renewed visual identity, it will help you to find your way to all the pieces of information that we disseminate. This newsletter and the website will then complement each other.

Providing information is one of our top priorities. Again, your comments on this first issue of this newsletter will be more than welcome.

Eric Dautriat
Executive Director of the Clean Sky Joint Undertaking

The JU team build-up is almost completed: there will be 20 of us here in Brussels before the end of September

Message from Marc Ventre,
Chairman of the Governing Board

Clean Sky is the tangible result of a long story, initiated 10 years ago or so, with the creation of ACARE. It was contained in embryo in the ACARE recommendations on Environment for the European Aeronautics in 2020: emissions of noise and CO2 divided by 2 and emissions of NOx divided by 5.

Based upon the Public Private Partnership (PPP) principle and carried by a new instrument, the Joint Technology Initiative (JTI), Clean Sky was officially kicked-off in February 2008, as a major part of the 7th Framework Programme. But undoubtedly, Clean Sky differs from other Framework projects on key features:

- its size, with a total activity of 1.6 B€, a true record for European Research in Aeronautics, of which 50% (800 M€) will be funded by the Commission,
- its structural organisation through a Governing Board and a Joint Undertaking (JU),
- its operational organisation gathering 86 members (12 leaders and 74 associates) and a growing number of partners selected through 4 yearly recurring Calls for Proposals.

Clean Sky covers a very broad range of Research & Technology topics in the field of Aeronautics, dedicated through 6 Integrated Technological Demonstrators (ITD) to all types of commercial aircraft and to transversal topics (engines, systems and eco-design) ; in addition, a special tool will assess the total environmental impact of the resulting technologies.

The conjunction of this level of complexity and novelty has by far accounted for the delay between the kick-off and the official autonomy of the JU in November 2009. Now this difficulty has been overcome, everything is in place to work on the concrete topics of Clean Sky.

The working teams are plural, encompassing the leading teams of ITDs, their Associates, and the Partners selected through the Calls for Proposals, either large Groups, SMEs, laboratories or research centres; at their level, all are an essential link of Clean Sky, giving evidence of the European richness in innovation in Aeronautics, strongly supported and motivated by the funding coming from the European Commission.

Let us have a special mention for the JU who has been achieving a huge amount of work since its setting up, nearly one year ago, under the Executive Director's leadership. The JU has to run a heavy and consistent pack of tasks, covering administrative, financial, legal and technical areas, and as so the JU represents a key asset of Clean Sky organisation.

Each stakeholder, whatever links or stakes with Clean Sky, active actor or simple observer, must be convinced of two things: the absolute necessity of the success and the promising first steps of Clean Sky.

Clean Sky must be successful because by itself it bears most of the environmental achievements needed for our next generation programmes in Aeronautics, their architecture, engines and systems. The challenge is no less than including right in time the appropriate proven green and competitive technologies into the successor of one of the most successful commercial aircraft in the world.

But Clean Sky is not an isolated programme for it relies on the results of a long series of Research projects, launched in the last decade, some of them still running in parallel in Level 1 & 2 frames of the 7th Framework Programme. The added value of Clean Sky consists in its demonstrative status, giving flesh and life on ground or in flight to many Research projects addressing a broad scope of aeronautical applications.

This is why Clean Sky must be a model for Research projects in Aeronautics in Europe, particularly in view of the 8th Framework Programme, where we all hope that Aeronautics will have the place it has deserved for more than two decades.

More than ever indeed, the European Aeronautics needs a strong European support. The challenges and the threats are numerous: Environment, Sustainable Growth and fierce competition. In addition to our "traditional" competitors, we have now to take very seriously into account the new entrants from emerging countries. We Europeans can overcome them mainly thanks to our ability to developing and implementing novel technologies in our products and systems.

With no doubt, the Clean Sky programme will dramatically contribute to these forthcoming challenges.

Marc Ventre, Chairman of the Governing Board

"Each stakeholder, whatever links or stakes with Clean Sky, active actor or simple observer, must be convinced of two things: the absolute necessity of the success and the promising first steps of Clean Sky."

Successful conference on 18 June

Speakers from both the European institutions and the aeronautical industry briefed the audience.

Over 300 aviation professionals attended last 18 June the first Clean Sky conference entitled "The aviation industry goes green".

This event aimed at giving stakeholders an update on the latest developments of the Clean Sky programme, highlighting the major technical steps to take in the near future by each Integrated Technology Demonstrator:

- 3 of them are covering all types of commercial aircraft: large aeroplanes, regional / midsize aeroplanes and helicopters,
- 3 of them are covering transversal and multiple purposes: engines, systems and eco-design,
- in addition, a special tool called the Technology Evaluator, is dedicated to assessing the environmental impact of the studied technologies when implemented in flight operations.

"Clean Sky is itself a demonstrator!" stated Eric Dautriat, Executive Director of the Clean Sky Joint Undertaking, during his introductory speech. "As a Joint Technology Initiative, it brings together the private and the public, the big and the small, the industry and the academics, in one programme".

An exhibition featuring the latest developments of the 6 Technology Demonstrators, the Technology Evaluator, and links between the Clean Sky and the Sesar programmes, the European Commission FP7 activities and ACARE, was open all day.

The programme has definitely switched from the status of a "1.6 B€ worth programme" to an operational R&T programme of great value dedicated to preparing the new generation of successful, performing and environmentally friendly aircraft.

Advising the JU ...

The First meeting of the General Forum took place last 18 June in Brussels.

The General Forum is a statutory assembly composed of all members and partners of the Clean Sky programme. It meets once a year and is chaired currently by Marc VENTRE, Chairman of the Governing Board of the Clean Sky JU.

The first meeting of the Forum took place on 18 June in Brussels, the same day as the aforementioned public conference. During this forum, most aspects of the Clean Sky programme were reviewed. According to the Statutes, the Forum is expected to make recommendations to the Executive Director and the Governing Board; 12 matters were addressed to improve the effectiveness and the efficiency of the programme, the call for proposals process, the dissemination of information, the communication within the JU and such other matters.

This General Forum is a key event for the Clean Sky partners, selected via the Clean Sky calls for proposals, to meet annually with the members and the JU.

The Scientific and Technological Advisory Board (STAB), composed of high-level scientists and engineers aims at advising the JU on matters related to scientific and technological analysis, environmental effects forecast, and societal aspects and economics. The STAB meets twice a year and is currently chaired by David EWINS, Professor at the Faculty of Engineering, Bristol university. The first meeting of the STAB took place in Brussels on 1 July last.

The National States Representative Group (NSRG) is the focal point on Clean Sky at the national level; it operates as a network of national representatives of each EU Member State and of each other country associated to the Framework Programme. The NSRG ensures the organisation and the outcome of the calls are transparent and fair, assists with the organisation of Info days and dedicated technical workshops, reviews information and provides opinions on the programme progress to the Clean Sky JU, contributes to the update of the strategic orientation of the programme and the involvement of SMEs in Clean Sky.

The NSRG is chaired currently by Jim LAWER, it meets several times a year.

Strategy Update

The Clean Sky programme strategy is mainly defined by the following features: the environmental targets for each product, the main technical characteristics of the demonstrators and their expected maturity level, the schedule, the interfaces between Integrated Technology Demonstrators (ITDs), and the cost profile. This strategy was recently updated by the JU and approved by the Governing Board.

With respect to the programme proposal issued in 2007, before the Regulation which created the Joint Technology Initiative, a lot of work was performed in the two first years of activity, in order to refine the demonstrations contents and to set priorities.

The main demonstrators will be run between 2013 and 2015. For most of them, their general shape has not been significantly changed with respect to the initial proposal. A flagship of Clean Sky is the open rotor demonstration. The industrial commitment to this has recently been strengthened with the definition of a technical roadmap with relevant milestones.

This open rotor demonstration, because of the large CO2 improvements expected, is a game changing technology. This demonstration is scheduled first on ground, in two different versions; the complexity of such a new architecture, the number of new technologies involved, the inherent risks of such an endeavour justify to devote to the open rotor two subprojects of the SAGE ITD (SAGE 1 by Rolls-Royce and SAGE 2 by Safran). Then, the in-flight demonstration is foreseen, on an Airbus A340-600. The target date for this demonstration is confirmed as 2015. This is consistent with the anticipated market needs. The progress of the two ITDs involved (SAGE and SFWA) will be carefully monitored through common milestones.

In parallel, a low Nox combustion in flight demonstrator could be added to the Clean Sky programme in the near future.

Another important in-flight demonstration is the full scale laminar wing test, on an Airbus 340-300 in the high speed range, whereas in the low speed range laminarity will be tested on a business jet type airplane (Dassault Falcon F2000 or F7X) or on an Airbus A320. The flight tests are planned at the end of 2014 and 2015.

Whatever the aircraft category (large commercial, regional, helicopter, bizjet), on-ground and/or in-flight testing were selected according to the targets of the demonstration needed to reach the highest Technology Readiness Level achievable in a Research phase and in the given timescale. It may be recalled that the legal deadline of the JTI is 2017, according to the Regulation. This, along with the available budget, clearly sets the general framework of the Programme, in which the JU and the ITD leaders must optimize the content, manage the risks and select the best technologies for the environment and competitiveness.

The initial environmental targets were not revised in this strategy update, but they will be, before the end of the year. An analysis is currently performed under the coordination of the Technology Evaluator (TE), with respect to a set of agreed references of 2000, at the right mesh within each ITD. This revised forecast will allow the ITDs, the JU and any external reviewer to have a more detailed view of each subproject targets in CO2 and/or noise. The TE software tools will then become available (in 2011) for more accurate analyses.

The open rotor, a flagship of Clean Sky

Zoom on... the Nanoworld of Clean Sky

Green Regional Aircraft – Low Weight Configuration Domain (LWC)

The Clean Sky – Green Regional Aircraft LWC challenge aims at demonstrating and validating specific technologies and concepts for a new future generation "green" regional aircraft aimed at reaching ACARE environmental goals.

The products of the aeronautic industry, in all their diversity and specificity, require continuous improvement in order to guarantee competitiveness in an increasingly fierce global market taking into account the ecolonomic aspects of the final products.

Composite materials are one of the most promising technologies able to deliver substantial aircraft structure weight savings that directly produce a proportional fuel consumption reduction with subsequent strong reduction of CO2 and NOx emissions. Unfortunately, when composite materials technologies are applied to smaller vehicles in the size of regional aircraft, a simple scale-down of existing materials and processes is not possible due to some unfavourable properties (i.e. electrical conductivities, impact resistance) that may require undesirable technical adjustments, producing further weight increase instead of reduction! Therefore, regional aircraft new technologies are required to retain all the promising weight saving of composite structure and in this direction an undoubtedly attractive opportunity (already demonstrated by previous research activities at laboratory level) is to improve the performances of composite materials by the introduction of dispersed nanoparticles that can give peculiar mechanical and functional properties to the resulting charged material.

In 2000, the scientist Sir Richard Smalley said that the "Nanotechnology is the art of building devices at the ultimate level of finesse: atom-by-atom", and with this conviction the scientific community are focusing their efforts to improve the traditional composite materials for aeronautical applications.

Nanocomposites, called in this way the composite material where nano-charged polymeric materials may be used as the matrix, are globally known as the 21st century emerging technology in advanced materials engineering.

In Clean Sky – Low Weight Configuration, the nanotech activities are developed mainly in the work package named Enabling Technologies for Nanomaterial, where Alenia (WP leader), EADS-CASA, Fraunhofer Institute, CIRA+, AIR GREEN (fire characterisation) and ONERA (lightning strike tests) cooperate. In addition, the objectives will be reached also by Calls for Proposals launched.

The main objective is to design and produce an innovative nanocomposite utilizing nano-filled thermosetting resin and carbon fibre for the manufacturing of composite panels with increased structural behaviour and improved functional and/or improved thermo-mechanical properties (matrix shrinkage and Coefficient of Thermal Expansions, electrical conductivity, damping, fire resistance, …). The technology for the manufacturing of the panels will be the traditional ones, e.g. laying and curing in autoclave.

The activity requires the application of the more efficient systems for the nano-particles selection, purification, modification/activation and dispersion into selected resin.

One of the most outstanding objectives of this research activity is in particular to increase the electric conductivity of the composites. The growing use of the composite materials for aeronautical structures implies several problems due to their low electrical conductivity. Despite the fact that carbon fibres are good conductors, the epoxy resins can be considered as perfect dielectrics.

This low electrical conductivity makes the aeronautical structures very weak against lightning strikes. The primary objectives of designing against lightning direct effects are to prevent catastrophic structural damage, prevent hazardous electrical shocks to occupants, prevent loss of aircraft flight control capability, and to prevent ignition of fuel vapors.

Traditionally to protect the aeronautical structures against lightning, conductive coatings (generally aluminum based) or a metallic mesh (copper or bronze) are used in the composite lay-up with significant weight increments. It has been demonstrated that Carbon Nanotubes (CNT) dispersions in the resin are able to improve the electric conductivity of the composite material providing innovative solutions for the design of aeronautical structures.

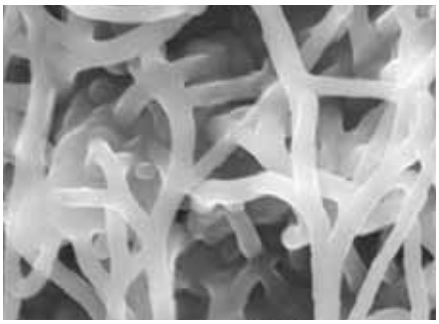

Figure 1 - SEM images of the resin system modified Multi Walls CNTs

The simplest way to visualize the structure of a carbon nanotube is to consider one (in case of single wall) or more (in case of multi wall) plans of graphite rolled up to form a series of closed coaxial cylinders. The nanotubes formed by only one sheet of rolled up graphite ("graphenic" tubes, or single wall nanotubes, SWCNTs) are fundamentally different from those formed by two or several graphite sheets ("graphitic" tubes, or multi wall nanotubes, MWCNTs).

The exceptionally high aspect ratio in combination with a low density and a high strength and stiffness make carbon nanotubes a potential candidate as reinforcement for polymeric materials.

Aimed to weight reduction a conductive epoxy resin with CNTs has been proposed as matrix for the composite. In fact a nanomodified composite structure could bring a reduction of 10% about with respect to the conventional structure weight with a copper mesh. The CNTs dispersion within the composite material allows the required current distribution on the aircraft surfaces reducing the effects of the lightning strikes (see figure 1).

So, the scope of the nano-tech activities in GRA is to mature and apply a CNT based matrix in the development of the Full Scale Ground Demonstrator to contribute together with the other materials to the expected weight saving and though this, to contribute to the reduction of the fuel consumption and the carbon emissions.

The objective is very ambitious!

Calls for Proposals

In Clean Sky, a fourth of the funding is allocated to calls for proposals, aimed at involving partners (especially Small and Medium Enterprises) in the activities of the different Integrated Technology Demonstrators (ITDs). The Calls are organized following the criteria of those in collaborative research launched by the European Commission, in terms of publication, submission and evaluation.

What is peculiar for Clean Sky is that the content of the activities is much more focused, i.e. they are topics and not research themes, with limited duration and specific targeted results expected (at higher Technology Readiness Levels). The topics are prepared by the Topic managers of the ITDs and checked by the Project Officers at the Clean Sky Joint Undertaking (JU).

Another difference from collaborative research calls is that the budget is defined by the topic value, and not by the maximum funding: this to allow a wider participation from all types of entities, independently from the actual eligibility for funding.

And lastly, even a single entity can present proposals, with no need for a consortium to be created.

The first call was launched in mid 2009, bythe European Commission, as interim JU. A second call was published in November 2009, just after the autonomy of the Clean Sky JU.

Up to today, four other calls have been published in 2010: in January, in February, in April and in July. Another one is planned for September.

The period for submission typically is about 3 months. Within one month from deadline the evaluation takes place, using facilities in Brussels: this process involves a significant number of experts. The evaluation panels are composed by four experts: two external and two being proposed by the ITDs and their Topic Manager. An External Observer is also present for the full duration of the evaluation to ensure the correct implementation of the rules.

The statistics related to the first 6 calls showthat 210 topics have been published for a total budget of 108 M€, with an average budget of 18 M€ and about 35 topics per call.

The success rate is about 30% (about 3 proposals are submitted for each topic).

The different criterion for consortia causes the average composition of applicants to be 1.7 partners per proposal

SMEs and research institutions total 37% each of the participation in winning proposals. This is a major element of satisfaction for Clean Sky, as it fulfils the target of the programme to involve and widen the participation of SMEs in aeronautical projects. It also confirms that the Clean Sky specific criteria of the calls are favourable to the application by SMEs, both as single entity or as part of ad-hoc consortia.

Further, their involvement in projects of research content but also linked to demonstration phase can represent a significant supporting element for the development of the technological capabilities of these companies.

For further information on the calls, please visit www.cleansky.eu

Some average figures

200 M€ dedicated to calls for proposals

4 calls per year in 2010, 2011, 2012…

35 topics per call

400 K€ as total cost by proposal

1,7 partner by proposal

30 % success rate

6 months targeted as time to contract

20 months as topic duration

Short news

Meet us …

- On the Clean Sky JU stand at the 27th International Congress of the Aeronautical Sciences (ICAS), 19-24 September, Nice, France
- At the ASD/CEAS Conference 2010, 1– 2 December 2010, Brussels, part of the ASD Aeroweek (29 November – 3 December 2010, Brussels).
- During the regular Info days on calls for proposals we organise for the interest of potential applicants. For further info and dates: www.cleansky.eu

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