Final Annual Activity Report 2012

1 INTRODUCTION

Clean Sky Joint Undertaking (CS JU) is a unique public private partnership aiming to develop environmentally friendly technologies impacting all flying segments of commercial aviation with the aim of contributing to the ACARE targets for reduction of emissions and noise in Air Transport in Europe[1] thus contributing to improving the Air Transport system worldwide. It shall spearhead the contribution of aviation in minimising the impact of anthropogenic activities on climate change, thus provide socio-economic benefits to European citizens and society and increase the competitiveness of the European aeronautical industry.

To implement CS JU, the European Union, represented by the European Commission (EC), and the major aeronautical stakeholders in Europe have agreed to set up a Joint Undertaking as a legal entity for the period up to 2017. The Council Regulation[2] setting up the CS JU was adopted by the Council of Ministers on 20 December 2007, and was published in the Official Journal of the European Union on 4 February 2008. The Statutes of the CS JU are an integral part (Annexed) to the Council Regulation.

The objective of the CS JU is achieved through the coordination of research activities that pool resources from the public and private sectors, and that are carried out by the main aeronautical stakeholders (private Clean Sky members) directly and by partners selected following the response to open and competitive Calls for Proposals. The total budget of CS JU, equally divided between the EC and private members and divided between the EC and partners according to funding rules similar to FP7, is up to € 1.6 billion.

Clean Sky is organised in six Integrated Technology Demonstrators, each led by two founding members and active through a matrix structure:

- Smart Fixed Wing Aircraft (SFWA) led by Airbus and Saab;
- Green Regional Aircraft (GRA) led by Alenia Aermacchi and EADS Casa;
- Green Rotorcraft (GRC) led by Agusta-Westland and Eurocopter;
- Sustainable and Green Engines (SAGE) led by Rolls-Royce and Safran;
- Systems for Green Operations (SGO) led by Thales Avionics and Liebherr Aerospace;
- Eco-design (ECO) led by Dassault Aviation and Fraunhofer Gesellschaft;

A Technology Evaluator (TE) led by Thales Avionics and DLR is at the core of CS with the purpose of assessing the environmental performance of the technologies developed in CS at sub-system, system and system of systems level.

The present Annual Activity Report (AAR) describes the status of the execution of the activities of the CS performed during the year. Now more than 500 entities are participating to Clean Sky, either as Members or as Partners selected through calls. The JU staff was kept at a level of 24, like in the previous year, despite this increased number of beneficiaries.

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[1] Europe in this context means Member States and countries associated to the 7th Framework Programme (FP7) i.e. Switzerland, Israel, Norway, Iceland, Liechtenstein, Turkey, Croatia, the Former Yugoslav Republic of Macedonia, Serbia, Albania and Montenegro (April 2008).

[2] Council Regulation (EC) No 71/2008 O.J. L 30 4.2.2008 p.38

2 KEY OBJECTIVES 2012 AND ASSOCIATED RISKS

2.1 Achievement of objectives

The JU's key objectives, as described in the Annual Implementation Plan (AIP), are twofold:

- operational objectives, which are the milestones and deliverable defined for each ITD; they will be addressed below, in Chapter 4
- management objectives, at the level of the JU, which include research activities, administration and finances.

Generally speaking, the Clean Sky annual management objectives are linked to the completion of the forecast operational tasks, the progress towards the technologies readiness, the environmental benefits assessment and the satisfactory sequence and outcome of calls for proposals and the further improvement of the JU's quality management and internal control system. They are addressed below, extracted from the AIP 2012 and complemented by the assessment made by the Executive Director at the end of the year.

Objective set in the AIP 2012	Outcome
A reliable financial management and reporting to the JU's individual stakeholders is ensured, in order to maintain the confidence of the financing parties, i.e. the European Community and the industrial members and partners of CS JU.	Achieved. The JU's financial management has ensured the proper funding of operational activities and running costs of the JU throughout the year while complying with the requirements of sound financial management (principles of economy, efficiency and effectiveness). The opinion issued by the European Court of Auditors on the reliability of the Annual Accounts 2011 and the regularity of the underlying transactions included a qualification as regards the error rate of the ex-post audits, but not for any other matter. Decisions and financial reports of the JU management have been respectively adopted / welcomed by the Governing Board (GB). The GB has issued a positive opinion on the Annual Activity Report 2011 of the JU to the Budgetary Authority. Significant improvements have been brought to the ex-ante validation process of cost claims (see section 9). The formal validation of the accounting system was performed in 2011; the recommendations issued in this validation are progressively dealt with.
The Calls for Proposals result in less than 5 redress procedures per 100 proposals	Achieved. In 2012, 7 redress procedures performed out of 344 proposals received, i.e. a rate of 2%.

Objective set in the AIP 2012	Outcome
The proportion of SMEs in the winners is above 35% in the Calls for Proposals	Achieved. 36% of SMEs in CfP, cumulated, to end of year.
The time to grant is lower than 8 months from the date of the call launch for 80% of the new Grant Agreements for Partners (GAPs)	Not achieved. Time to grant is continuously improving, the average time to grant, from the date of the call publication, is 10.5 months, to be compared to 14 in 2011.
The ITD deliverables, milestones and budget curves are followed along the year and are within 90% of the prevision end of year	Not achieved. 90% of the commitment appropriations budgeted[3] were committed and 75% of payment appropriations budgeted were used. The estimated implementation of the Grant agreements for members is 91%.
The Preliminary Design Review of the Open Rotor in-flight demonstrator is held in the SFWA ITD, and the work plan is followed according to its conclusions without delay	Postponed. The full Open Rotor roadmap was revised and optimized in December 2012. The emphasis has been put on the Ground Test (within SAGE ITD), confirmed before end 2015, with a Preliminary Design Review (PDR) in 2013. The flight test demonstrator PDR is postponed to 2014, in order to have a better phasing between ground and flight test objectives and hardware.
The draft budget 2013 is accepted with the full commitment appropriations to the completion of the programme	Achieved.
A set of multi-year Grant Agreements for Members is drafted in order to be signed by the Executive Director in the first quarter of 2013	Achieved. Some grant agreements will be multi-annual (ECO, SGO, GRC, TE), and the others will remain annual for 2013. The GB approved the new model grant agreements to cater for both annual and multi-annual grant agreements.
The internal control standards are fully implemented	14/16 standards implemented; Partially implemented: Business continuity and Document management
Ex-ante controls performed by the CS team on costs claimed by beneficiaries are based on a reliable procedure and identify all exceptions visible from a desk review of transmitted reports	Achieved. A dedicated procedure was written and applied for 2012.
The ex-post audits are performed according to the plan and show a materiality of errors lower than 2 % of operational expenditure.	Partially achieved. The first ex-post audit plans of the JU were fully implemented. However the error rate was above the target of 2% (see chapter 11), i.e. for cost claims received up to 2010 and audited in 2011.

[3] *'Budgetted' excludes the appropriations which were foreseen to be unused at year end*

Besides, a revised *Development Plan* was adopted by the Governing Board in March 2012. This document updates, once a year, the strategic targets of the JU: environmental forecasts, key technologies, demonstrators contents and schedule. The main evolution concerned the SAGE ITD, where a new project was created, SAGE 6, dedicated to NOx emissions decrease. To fund this project, one of the two Open Rotor projects (SAGE 1) was reduced in funding and in scope, while the other (SAGE 2) was fully confirmed and committed up to the engine ground test.

Concerning the Internal Control Standards, some points were still open at the beginning of 2012: the implementation of an ethical code, the business continuity plan and the IT security plan. For ethics, the process was started in November 2012 with an internal workshop involving all staff members, and will be finalized before March 2013. The business continuity plan is available as regards IT systems, common to all JTIs, which is the most important matter; the rest is in progress, also in liaison with the other JTIs.

The strategic audit plan from the IAS, which was agreed as the internal audit function of the JU, was adopted, and the first audit performed at the end of 2012, about grant management and annual planning process. More information is given on audits in chapter 10. One "very important" recommendation was issued, requesting a strengthened control of the JU over the multi-annual budget planning and the annual budget forecast.

Concerning the technical and financial management of the operational activities (research activities), the implementation or the improvement of various tools and processes was continued:

- Dedicated, strengthened procedures to validate the cost claims and, in particular, to better link the technical and the financial approvals
- Development of an IT tool, "GMT", for processing the cost claims from the Grant Agreements for Members
- More focus of the Scientific and Technological Advisory Board (STAB) on the Annual Reviews (one by ITD and for the Technology Evaluator);

The results of the monitoring activities are summarized via a dashboard on the CS JU level, the content of which has been revised for an efficient, quarterly reporting to the Governing Board. The final data, at the end of the year 2012 are as follow:

	Resources (%) Consumed (MM) vs planned	Deliverables (%) Delivered vs planned	Milestones (%) x Achieved vs planned
SFWA	86	84	80
GRA	98	75	100
GRC	80	78	84
SAGE	70	77	63
SGO	88	73	67
ECO[4]	94	70	74
TE[5]	95	68	80
Weighted average[6]	82%	76%	70%

The overview of the budget execution of the Grant Agreement for Members indicates an improved level of consumption overall by the ITDs, as seen in the table below:

2012	GAM Execution (%)
SFWA	98%
GRA	99%
GRC	77%
SAGE	91%
SGO	88%
ECO	82%
TE	91%
Weighted average	91%

[4] In some cases the planned investments were not completed within the year and consequently the related milestones are postponed. In ECO, outputs and formal deliverables are combined in one number: several deliverables/outputs were postponed to the following year. The deliverables are stored at JU, and the Project Officer checks them for the use of resources assessment together with the technical reporting. The Project Officer is checking the status of the outputs (which are not delivered to the JU but circulated internally and only declared to the Project Officer at Steering Committees/ Quarterly Report). In some cases, the resources are almost used as planned, although not fully correlated with the deliverables / milestones of the program.

[5] Only 1 milestone missing out of 5, which results in 80% execution. Most of the missing deliverables are caused by the delays in finalizing the reports about Conceptual models, due to late delivery from vehicle ITDs. In some cases, the resources are almost used as planned, although not fully correlated with the deliverables / milestones of the program.

[6] The weighted average has been calculate by considering the relative share of the individual ITD budgets at the total operational budget on program level.

The global situation is satisfactory and well in line with the schedule of the activities. Most of the integration activities for finalizing the demonstrators are still to come, where the highest costs will occur. In 2012, as described into more details in Chapter 5 below, the first demonstrator was started.

However, the lower level of budget execution for SAGE, both for 2012 and as regards the budget to completion, raises an issue which needs to be carefully looked at. At the end of 2012, the Executive Director formally requested the SAGE leaders to re-consider each project, project management, roadmaps, in order to confirm, or not, the current budget distribution across SAGE projects and across ITDs. This analysis is in progress. A first answer from the ITD leaders asserts a high confidence in their ability to achieve the objectives and complete all demonstrators in due time, executing the full programme. Some fine-tuning is still under consideration by the JU. Nonetheless, it has to be noted that the first demonstrator, mentioned above, of the whole programme, is an engine from this ITD, bringing evidence of actual progress.

More widely, the JU started questioning the appropriateness of all ITD budgets, including internal budget distributions, compared to the current consumption and tasks execution. Some re-balance between ITDs is under consideration, if needed for strengthening the achievement of the high-level objectives, minimizing the risks and optimizing the global output. This will be a target for 2013 and also for the following and last years, when the situation of each work package in each ITD becomes clearer.

More key performance indicators are available to the Executive Director, for a closer monitoring of all core processes of the JU. They are addressed in Chapter 10.

2.2 Risk management

2.2.1 General approach to risk management

As one major element of its Internal Control Framework, the JU assesses and manages with a dedicated process the potential risks, which may be detrimental for achieving its objectives. A Risk Register is maintained for the JU, providing information on the description of the risk, the risk type (financial, operational, reputational), the related business process and the required mitigating action.

The risk mitigating actions aim to contribute to the achievement of the following four categories of objectives:

- Strategic (high-level goals, aligned with and supporting its mission)
- Operations (effective and efficient use of its resources)
- Reporting (reliability of reporting)
- Compliance (compliance with applicable laws and regulations).

The risk assessments are performed on different management levels:

- top-down assessment of the CSJU management team
- bottom-up assessment of the entire CSJU team through regular process reviews
- harmonised risk assessment on ITD level performed by the individual ITDs and reported to the JU.

The following matrix shows the allocation of objectives to the levels of risk management in the JUs organisation:

	Top-down assessment of CS management team	Bottom-up assessment of entire CS team	ITDs' risk assessment
Strategic high-level goals	X		X
Effective and efficient operations	X	X	X
Reliable reporting	X	X	
Regularity compliance	X	X	

Program related objectives are closely monitored through the risk management within the ITDs, for which the JU has identified its requirements in its Management Manual. ITDs' risks, which can impact the objectives of the program, are consolidated in the CSJU Risk Register.
For each Level 1 Work Package of the program, a risk analysis is conducted by the Work Package Manager regarding the technical performance (achievement of the objectives) and the schedule. They are assessed in the ITD annual reviews. Recommendations for improving this risk management at operational level have been made in most reviews (in particular to improve the consistency across ITDs).

The Internal Audit function of the JU, which is shared between the JU's Internal Audit Officer (IAO) and the Internal Audit Service of the Commission, performed a separate, independent risk assessment in 2011, which is the basis for the current Internal Audit Strategy for the years 2011 to 2013. Based on an update of the risk assessment by the IAO in the year 2012 a revised audit plan for the year 2013 has been established .A summary of results from the IAO's risk assessment is reported in the Internal Auditor's annual report, as mentioned below in paragraph 3.2.

The main risks for the JU relate to the operational objectives of the programme and to some core management processes, which could have an impact on the implementation of the overall programme.

2.2.2 JU Level Risks:

Critical risks:

Risk Description	Action Plan Summary from AIP 2012	Comments on mitigation of risk
The initial delay and slow ramp-up of Counter Rotating Open Rotor (CROR) demo could result in missing the 2017 deadline	Detailed roadmap secured. Revise the schedule after the "go –no go" decision	A dedicated, high-level meeting to update the roadmap took place end of December 2012, in order to define a long-term roadmap for the Open Rotor technological development: engine and installation on the aircraft. Ground demonstrator confirmed in 2015. The flight test objectives will be widened, but will need more time for preparation. It will be scheduled within CS2 (if and when this continuation is confirmed). This new roadmap will be worked out in more details in 2013

The JU is actively following the necessary steps to have a detailed roadmap for the CROR defined as soon as possible with the respective industry members (see also section 5.1 dealing with this issue). Finally, in any event, the work done on these technologies will pave the way for its timely readiness for any other programme which may follow the current one.

Very important risks:

Risk Description	Action Plan Summary from AIP 2012	Comments on mitigation of risk
A late availability of ITD aircraft models for the Technology Evaluator (lack of prioritization or lack of technical inputs) could prevent the environmental benefits assessment to be efficiently performed.	Tightly monitor the work progress on this item through the Project Officers. Have preliminary models implemented where needed.	Deliveries from ITDs to TE are managed through the Grant Agreements. Preliminary models have been forwarded in some cases – some data are still late. Risk is partially mitigated in 2012. Most probably the 2012 TE assessment result will be shifted by 2 months into 2013.
Conflicts of priorities may happen within industrial companies, or change of strategy, resulting in a lack of resources available for Clean Sky and delays in the completion of the activities.	Have an early warning capability through quarterly reports and alert at Governing Board level.	Action taken as regards the GB, attention brought to this risk at highest level. In particular, reinforced monitoring of SAGE ITD and high-level follow-up by the ED and the ITD Leaders.

Risk Description	Action Plan Summary from AIP 2012	Comments on mitigation of risk
Some subprojects could be scattered in too many, low TRL technologies, resulting in a failure to demonstrate them at system-level.	Monitor TRLs – define/check the priorities – take decisions at ITD SC level.	Work in progress, ITD by ITD. Implemented in several ITDs.
The lack of formalisation of interfaces between ITDs could result in delays in demonstrators.	Monitor the I/F at JU level. Have all inputs /outputs included in the Grant Agreements.	The actions have been fully implemented, GAMs properly reflect the interfaces.
Topics failures in CfPs could hamper the realisation of the demonstrators.	Implement the dedicated action plan.	Dedicated information meeting took place for critical topics involving targeted potential applicants.
The accounting systems used by the JU may not ensure reliability of data processed, as systems have not been validated yet. Thus the accounting officer of the Commission may question the annual accounts of the JU, which have to be included in the consolidated annual accounts of the Commission.	Following receipt of guidelines from the Commission on how to perform this validation, the JU will set out a roadmap for implementing this validation and ensure its implementation	The validation of the JU's accounting systems and the underlying business processes has been performed by the Accounting Officer. The exercise is an on-going process and is permanently continued. Some recommendations have been issued in the validation report, in particular in respect of the validation of financial statements for grant agreements. Enhancement of controls in this area has been achieved by the JU's management through developing a dedicated application for grant management (GMT).
A lack of guidance to POs/Admin and external grant recipients could lead to inefficient processing of agreements and respective activities and payments.	Organise further training and sharing of information opportunities, internally and externally to the JU using the CS website and internal/external meetings to disseminate knowledge and opportunities for efficiencies.	Negotiations kick-off meetings continue to be implemented after call evaluations. A new meeting type has been initiated for reporting of GAPs, but low participation of beneficiaries so far. Several internal, quality-related meetings held in order to improve the process. Internal procedures have been clarified. However, an efficient process is often hampered by a lack of resources in this area.

Risk Description	Action Plan Summary from AIP 2012	Comments on mitigation of risk
A delay or a lack of topics for CfP in some ITDs could prevent from achieving the 200 M€ target.	Check the capability of each ITD and rebalance funding accordingly.	Work in progress. All topics abstracts for the remaining budget should be available to the JU before end of year 2013. The achievement of the target is closely monitored and regularly discussed in ITD meetings.
Technical setbacks in one or several ITDs may result in a significant under-spending of annual budget.	Re-balance the budget across ITDs and with Partners if necessary at mid-year.	The status of program implementation has been checked at mid-year 2012. Despite an average under-execution, no major technical setback was found.
There is a risk that IPR / confidentiality issues may result in vague information to the end-user/interested party and therefore compromise the JU reputation for disseminating the research information gathered through the CS programme.	Harmonize the dissemination plans of ITDs. Follow and encourage dissemination actions.	Implementation is in progress through ITD coordination. All dissemination plans for 2013, and dissemination reports for 2012, are expected at the beginning of 2013.
There is a risk of insufficient communication from the JU and ITDs resulting in loss of interest / support from industry and EU institutions in short-term and long-term which could lead to reduction/abandonment of participation.	Improve lobbying actions towards EU key players. Target industrial annual reports 2010 national industrial associations. Go through Member States rep. and national industrial associations.	Business event "around Clean Sky" organized in the European Parliament in March 2012. Further actions have been taken to improve the EP awareness of CS. Participation to Farnborough Air show and ILA Berlin.
Insufficient staff resources allocated to the JU could result in a continuous backlog of grant agreements and resulting payments affecting both activities progressing and budget execution of the JU both within the JU and in the ITDs. Outcome: Insufficient resources to cover operational needs.	Request an increase of permanent staff posts and employ temporary staff until these are approved to manage the growing workload of the JU and the ITDs. Request 3 new positions 1. Project support officer 2. Project support officer 3. GAP coordinating officer	Subsequent to the rejection of the JU's request for 3 Temporary Agents posts and any Contract Agents posts, the JU was and still is facing serious HR constraints, which are tackled through making use of interim staff. The understaffing caused significant backlogs in the grant management and related payments to beneficiaries and evaluators. A public consultation for a framework contract is in preparation, for an external provider to bring support to project management.

Unclear career development possibilities for JU staff within CS limitations could result in a turnover of staff and loss of experience and knowledge of the JU and efficiency.	Draft IR for staff appraisal and promotion possibilities for staff; promote the need for this to be in place via the Commission services. Implement common actions with the other JUs to the European Commission in order to find possibilities for promotion and career development.	The JU's proposal for a staff promotion policy has been refused by the EC (DG Budget). During the year several staff left the JU and caused significant fringe losses.

2.2.3 ITD Level Risks:

The ITDs manage the risks inside their projects via risk registers or risk table, using the same methodology although applying different formats; they typically discuss the evolution of the risks in the Steering Committees of the ITD. In several cases the Risk management is a centralized function, with a single person collection and monitoring the risks, as assessed by the project/task leader inside the ITD.

The following list presents the significant risks at ITD level, whose evolution in 2012 has had an important effect on the ITD activities and objectives; in some cases the mitigation actions have not resulted in a significant reduction of risk, either due to nor effective risk mitigation strategy or to absence of expected changes with anticipated positive impact on the risk.

ITD	Risk	Comment
ECO	Actual assessment of effort needed to develop an LCA for aeronautical products	At beginning, the estimation was based on similar cases in other sectors; however, with growing experience, it appears evident that the effort required is much more significant, due to the peculiarity of the aeronautical products. The revised estimated must be accounted for in the budget to completion of the ITD.
GRA	Content and timing of demonstrators	The assumptions for flight demonstrators and for large-scale rig testing have evolved during 2012, to a point where the associated estimated effort and feasible timing are no longer valid. A budget revision and an update planning of activities are mandatory to confirm the actual content of GRA demonstrators.
GRC	Consistency of GRC5 project	It was recognised at beginning of 2012 that the planning and content of GRC5 (Environmentally friendly flight path) was no longer consistent. The ITD had to revise the project scope and redefine the contribution from the involved members, and specify the realistic targets for the related demonstration phase.
SAGE	CROR	See JU Level Risks
SFWA	CROR	See JU Level Risks

ITD	Risk	Comment
SGO	Availability of AVANT Test rig	This test rig is not yet available, although assumed in the planning since the beginning of the programme. Again in 212 another delay is anticipated; no specific mitigation action has been properly defined, postponing further the related testing, close to end of project. A real alternative is needed.
TE	Availability of inputs from ITDs to perform assessment	Although specified in the interfaces between ITDs and TE, both in technical content (models' characteristics) and in timing, the inputs to TE are delayed, with Impact on the planned issue of TE Assessment Studies. This has consequences on the deadline also at JU level and on the JU visibility.

3 CLEAN SKY GOVERNANCE

No changes have been introduced in the CS JU governance in 2012. It is composed of three bodies: the Governing Board, the Executive Director and the ITD Steering Committees. It is also supported by three advisory groups: the Scientific and Technological Advisory Board, the General Forum and the National States Representatives Group.

3.1 Governing Board

The Governing Board is composed of 19 members: the EC, with veto rights on matters of public concern, the 12 founding members of Clean Sky and one Associate member for each of the 6 ITDs, representing itself and the other Associates in the same ITD. These Associates in 2012 were: ONERA, MTU, Hellenic Aerospace, Green Systems Aircraft Foundation and INCAS. The Chair and Vice-Chair of the Governing Board are elected and for one year term, renewable once. On its meeting of December 14th 2011, the Governing Board re-elected respectively Charles Champion (Airbus) and Cătălin Nae (INCAS) as Chair and Vice-Chair for 2012.

The CS JU Governing Board had 4 meetings during 2012, on:
30 March 2012
21 June 2012
11 October 2012
13 December 2012

The Governing Board has adopted during 2012 the following key documents in its meetings (non-exhaustive list):

30 March 2012

CS JU Development Plan
CS JU Staff Committee Decision

21 June 2012

Assessment of the Clean Sky Annual Activity Report 2011
Adoption of the Panel recommendation for the extension of the ED contract

11th October 2011

Budget amendment n° 2 for 2012
Appointment of the Accounting Officer

13th December 2011

Election of the Chairman (Mr. Alessandro Franzoni) and Vice Chairman (Mr. Ric Parker) for 2013
GAM model grant agreement Core and Annex II
AIP 2013, Budget 2013 and Establishment Plan 2013
GB Decision on a transitional mandate to the Executive Director on the preparatory phase of Clean Sky 2

It can be noted that most of the decisions have been adopted unanimously or very close to unanimity, showing a smooth and efficient decision-making process. Each Governing Board is prepared by a "Sherpa Group" meeting, chaired by the JU.

The following 6 written procedures were performed:

- 21/1/2012 - Written Procedure 2012 – 01 to adopt Documents N° CS-GB-2012-001 Updating Annexes VI and VII of the Grant Agreements for Members and for Partners (GAMs and GAPs), and a Special Clause for GAMs
- 16/2/2012 - Written procedure 2012 – 03 for the adoption of the Annual Provisional Accounts 2011
- 26/3/2012 - Written procedure 2012 – 04 for adoption of Budget amendment no. 1 to AIP and ABP 2012
- 19/6/2012 - Written procedure 2012 – 07 to adopt decision n° 58 validation of in kind contributions 2008 2009 2010 2011
- 18/6/2012 - Written procedure 2012 – 08 to adopt decision n° 59 final accounts and budgetary implementation report 2011
- 19/12/2012 - Written Procedure 2012 – 10 to adopt calls outcome 10 11 12

3.2 Executive Director

The Executive Director is the legal representative and the chief executive for the day-to-day management of the CS JU in accordance with the decisions of the Governing Board in line with Article 6 of the CS Statutes.

The staff was kept at the previous level of 24, according to the Staff Policy Plan adopted – despite a request of 3 supplementary posts, accepted by the industrial members of the Governing Board but eventually rejected by the European Commission, as stated in the above report on risk management. This situation was faced through making use of some interim support and trainees. However, this lack of resources is hampering, in particular, all processes linked to the management of Grant Agreements for Partners.

The team experienced some turn-over in 2012: the legal officer, the communication officer and the ex-post audits officer resigned and were replaced.

The Executive Director is supported by two managers: the Coordinating Project Officer and the Head of Administration and Finance. One Project Officer per ITD and the TE allows the JU to play its coordination role.

As stated above, an agreement was reached at the Governing Board to appoint the Internal Audit Service (IAS) as the internal audit function of the JU. The IAS strategic audit plan was adopted by the Governing Board in December 2011. The first audit was performed in 2012: the report is expected in February 2012.

The management (internal and external, i.e. for the ITD coordination and management activity) relies on a few key documents: the Quality Manual, the Manual of Financial Procedures, the Management Manual, and the Development Plan – the latter being approved at the level of the Governing Board.

3.3 ITD Steering Committees

Each Integrated Technology Demonstrator (ITD) is in charge of one specific technology line within the CS programme. The ITD and Technology Evaluator (TE) Steering Committees are responsible for technical decisions taken within each ITD and the TE and have met regularly in the course of 2012. The relevant Project Officer, supported when needed by the Coordinating Project Officer or the Executive Director, attends these meetings. The Executive Director in particular chairs the TE Steering Committee meetings.

3.4 Scientific and Technical Advisory Board

The Scientific and Technological Advisory Board (STAB) is a body of now 10 high-level scientists and engineers, all independent from CS JU stakeholders. Its purpose is to focus on the scientific and technical analysis of Clean Sky from different perspectives: besides environmental impact; technology and scientific forecast; societal aspects; economics. Chaired by David Ewins, Professor at the Bristol University and the Imperial College, it met five times in 2012.

The STAB provided recommendations on the necessity to focus on the mainstream of large demonstrators, on the schedule management, the strengthening of the system-level vision and the management of resources in the leading companies. Two STAB members, on average, participated in each ITD annual review, according to their expertise area, mostly with the same distribution as in 2011, for continuity purposes, while some rotation is also organized for the sake of cross experience and for bringing fresh views. The main recommendations and general views on the technical progress were forwarded by the Executive Director to the Governing Board and discussed.

In 2012, "interim progress reviews" involving for each ITD, the reviewers, the JU project officer, coordinating project officer and Executive Director, the coordinators and when necessary the work package leaders, were held six month after the annual review, in order to check the implementation of the recommendations and to update the reviewers on the technical progress. These interim reviews proved quite helpful and demonstrated a satisfactory situation in most work packages, or sub-projects.

Besides this, dedicated reviews were organized when deemed necessary by the Executive Director, in particular as concerns the GRC 5 project, dedicated to the management of trajectory and mission for rotorcrafts. The work programme, on the request of the JU Project Officer, had been deeply revisited, and the update was submitted to this review with STAB and external reviewers. The result was satisfactory and the revised work programme endorsed, with some recommendations.

The STAB was also involved in a review performed jointly with SESAR, focussed on Clean Sky and SESAR activities in the field of development of Flight Management Systems (FMS). The purpose of the review was to identify potential interfaces between respective programmes as well as potential overlaps. The main conclusion of the review was that no undue overlap was noticed. Recommendations for further improvement of the interface were provided.

3.5 National States Representatives Group

The National States Representative Group (NSRG) is an advisory body to the Clean Sky Joint Undertaking. Article 10 of the Council regulation setting up Clean Sky outlines that it will, review information and provide opinion on programme progress in the CS JU, compliance and the meeting of targets, updating of strategic orientation or links to Framework Programme Collaborative Research. It shall also provide input to Joint Undertaking on the interface with relevant national research programmes and identification of potential areas of cooperation, as well as specific measures taken at national level with regard to dissemination events, dedicated technical workshops and communication activities.

It consists of one representative of each EU Member State and of each other country associated with the Framework Programme. It is chaired by one of these representatives. To ensure that the activities are integrated, the Clean Sky Executive Director and the Chair of the Governing Board or his representative attend the NSRG meetings and the Chair of the NSRG attends as an observer at the Clean Sky Governing Board.

During 2012 the NSRG met four times and was represented at the Governing Board meetings. Two of the meetings were held outside Brussels, one at SAAB in Linkoping where members reviewed SFWA in detail and the other hosted by Airbus in Toulouse where the members visited the Flight Test aircraft and control centre.

In February, Jim Lawler was re-elected as Chair and Gerben Klein Lebbink as Vice Chair. This year the members were invited and many chose to actively participate in the General Forum in November.

The National States continue to be very supportive of Clean Sky and members take a proactive and supportive role particularly in its relations with the European Council.

The Group has taken an active interest in the rules and conditions being used for Calls for Proposals and the selection of Partners in order to ensure and demonstrate transparency and accountability. The NSRG has received and discussed the reports of the independent observers.

The NSRG has also been interested in monitoring the development of the different ITDs and the maturing of the Technology Evaluator. They welcomed the continuing risk assessment system which ensures that the interfaces between individual ITDs themselves as well as the Technology Evaluator work and the resulting refocusing in terms of work and budgets as they develop and the priorities of the leaders change. In particular, the NSRG formally recognised and supported the developments which necessitated a change in the SAGE ITD.

The NSRG also recognised the issue around the JU current understaffing.

National States have taken a very supportive view on the continuation of the JTI instrument under H2020. A national states view was developed as a joint initiative of the Clean Sky NSRG and the ACARE Member States Group. The document was the collective view of the representatives involved in the NSRG and ACARE Member States Group and was not a formal view of any of the States involved. These are being formulated in the European Council process. The document reflected that Clean Sky is proving to be an effective and efficient instrument to mature and demonstrate technologies and brings added value to

Europe. The National States support the preparation of a future JTI (Clean Sky 2) provided that the lessons learned and successes of Clean Sky are taken into account to improve the JTI instrument further. Specific recommendations were made relating to Governance, Content, Initiation and Processes.

Following the study carried out in 2011 on the role and activities of the NSRG, the specific actions identified were actively pursued. These related to:

- Representation from all relevant states and their attendance at meetings. 29 of a potential 39 States have nominated representatives but only 14 attend regularly. There are a few MS which have not nominated representatives. It was agreed with the European Commission that these will be specifically approached in the context of any further Clean Sky programme.
- Coordination with national programs. Ideas were discussed by the states with large programmes. MS with "smaller" or no dedicated aerospace programmes could use a selective approach to put collaborative projects together using National funds. Clean Sky JU is expected to nominate projects that could possibly be funded in this way.
- Information dissemination and Info days: suggestions on how much information, how soon, to whom it needs to be disseminated, etc. have been developed. The general consensus is: as much as possible, as soon as possible, using the National Contact Point system. A number of actions were taken in calls 12 and 13 and the effects are being monitored. Ideally, information should be made available in the Annual Implementation Plans for consultation in advance of calls to allow for feed-back on proposed budgets/content and to prepare resources.
- Major Clean Sky events should be held about every 9 months, with a fundamental presentation of the progress, the current issues and the upcoming calls, plus possibly dedicated sub-meetings per ITD. These are to be supplemented by local events in different parts of the EU. With "failed" topics special events are recommended.
- In cases where a topic is a follow up project then it has been suggested that the potential applicant should have access to the full information of the previous project, including results, so that the competition is fair and transparent. There is a proposal to maintain a list of topics that have not been answered on the website. This has not been implemented at present.
- The JU has identified a list of communication actions where the support of the NSRG members is needed. With the appointment of the new Communication Officer, this now needs to be developed to define the specifics.

Note in memory: The NSRG regrets to report that in 2012, the Polish member Jakub Sypien, passed away on the occasion of one of its meetings in Toulouse. The NSRG and the JU expressed their condolences to the family, friends and colleagues of this well appreciated member.

3.6 General Forum

The General Forum is a statutory assembly open to all members and partners of the Clean Sky programme.

On November 21st, 2012, this meeting gathered more than 120 of Clean Sky members from SMEs, Academia, Research organisations and Industry.

The meeting was divided in 2 parts: a plenary session in the morning followed by workshops on specific topics in the afternoon.

In the morning, the presentations focused on programme implementation in 2011 (technical and financial), forecast for 2013 and implementation of recommendations from 2011 General Forum among others. The preparation of the continuation of Clean Sky was also presented.

In the afternoon, three workshops gathered inputs from participants on:

1. Communication and dissemination of results,
2. Networking within Clean Sky and
3. Innovation in Calls.

During these workshops, moderated by members of the JU staff, presentations by Clean Sky's stakeholders were followed by a session for debate and discussion.

In total, six recommendations were issued.

Clean Sky's Members and Partners are invited to further promote their activities in the framework of Clean Sky – by referring to the programme and using the Clean Sky logo, but also by providing the JU with feedback and materials to be disseminated.

The JU acknowledged the need to inform prospective partners early on the topics, and recommended them to use National Contact Points and clusters when forming consortia. Concerning calls, CS JU will try and engage non-aerospace companies and further explain the purpose of the topics.

4 RESEARCH ACTIVITIES

4.1 Reminder: Clean Sky Research Objectives

Clean Sky supports research activities carried out by the non-EC members of Clean Sky and by partners selected following open and competitive Calls for Proposals, independent evaluations and negotiations leading to the conclusion of grant agreements with partners.

CS JU aims to create a radically innovative Air Transport System based on the integration of advanced technologies and full scale demonstrators, with the target of reducing the environmental impact of air transport through reduction of noise and gaseous emissions, and improvement of the fuel economy of aircraft. The activity covers all main flying segments of the Air Transport System and the associated underlying technologies identified in the Strategic Research Agenda for Aeronautics developed by the Aeronautics Technology Platform ACARE.

Clean Sky is built upon 6 different technical areas called Integrated Technology Demonstrators (ITDs), where preliminary studies and down-selection of work will be performed, followed by large-scale demonstrations on ground or in-flight, in order to bring innovative technologies to a maturity level where they can be applicable to new generation "green aircraft". Multiple links for coherence and data exchange will be ensured between the various ITDs.
The ITDs are:

- The Small Fixed Wing Aircraft ITD (SFWA), focused on active wing technologies that sense the airflow and adapt their shape as required, as well as on new aircraft configurations to optimally incorporate these novel wing concepts.
- The Green Regional Aircraft ITD (GRA), focused on low-weight configurations and technologies using smart structures, low-noise configurations and the integration of technology developed in other ITDs, such as engines, energy management and mission and trajectory management.
- The Green Rotorcraft ITD (GRC), focused on innovative rotor blades and engine installation for noise reduction, lower airframe drag, diesel engine and electrical systems for fuel consumption reduction and environmentally friendly flight paths.
- The Sustainable and Green Engine ITD (SAGE) integrates technologies for low noise and lightweight low pressure systems, high efficiency, low NOx and low weight core, novel configurations such as open rotors or intercoolers.
- The Systems for Green Operations ITD (SGO) focuses on all-electric aircraft equipment and systems architectures, thermal management, capabilities for "green" trajectories and mission and improved ground operations.
- The Eco-Design ITD (ED) addresses the full life cycle of materials and components, focusing on issues such as optimal use of raw materials, decreasing the use of non-renewable materials, natural resources, energy, and the emission of noxious effluents and recycling.

A Technology Evaluator will be the first available European complete integrated tool delivering direct relationship between advanced technologies, still under development, and high-level local or global environment impact. It considers inputs from both inside and

outside the "Clean Sky" perimeter to deliver environmental metrics and the levels of aircraft, airport and aircraft fleet level.

As aircraft fuel economy is also influenced by a flight trajectory management strategy, CS JU has established links with the SESAR Joint Undertaking which investigates Air Traffic Management (ATM) technologies in line with the "Single Sky" initiative of the European Commission. These links are established via the Technology Evaluator, as well as via the SGO ITD that develops the avionics equipment interfacing with ATM, and via management meetings involving the relevant staff members of the two JUs (i.e. for Clean Sky, the SGO Project Officer, up to the two Executive Directors). As mentioned above, a joint review / audit was performed in a leading company of both JUs, in order to check the quality and the comprehensiveness of the interface between the two programmes in the relevant work packages.

In the following chapters, the detailed description of activities and achievements by ITD and TE is provided, with indications and explanations of significant deviations compared with initial planning, where applicable.

5 ACTIVITIES CARRIED OUT BY THE MEMBERS

5.1 SFWA - Smart Fixed Wing Aircraft ITD

In 2012 SFWA has been focussed on achieving progress on all key SFWA target technologies. Based on the progress made in year 2011, positive experience in the project and supported by the SFWA-ITD Reviewers all activities conducted were even stronger aligned along the eight "Technology Streams":

1. Natural Laminar Flow Smart Wing (NLF SW)
2. Hybrid Laminar Flow Smart Wing (HLF SW)
3. Innovative Control Surfaces (ICS)
4. Fluidic Control Surfaces (FCS)
5. Load Control Functions and Architectures (LCFA)
6. Buffet Control (BC)
7. CROR engine integration (CROR-EI)
8. Integration of Innovative Turbofan Engines to Bizjets (IITE)
9. Advanced Flight Test Instrumentation (FTI)

For all technology streams respective leaders have been well installed in order to manage the technical coordination and management through the overall SFWA-ITD work breakdown structure, which means the appropriate steering and interconnections between the work packages feeding inputs to the technology stream.
A review of the technology stream content elements towards reaching technical readiness levels of typically TRL 5 or 6 in each of the technology streams and careful "to completion" planning update have been conducted in the second half of the year in parallel to the technical activities.

With reference to the contract, the currently estimated overall consumption of resources amounts to 97% of the grant agreement value.

The majority of activities in the SFWA-ITD have been related to the detailed design and manufacturing of the major flight test demonstrators.
In particular building the two A340-based laminar wing tip sections for the "High Speed Demonstrator Passive" (project title: "BLADE" = Breakthrough Laminar Aircraft Demonstrator in Europe) ramped up to full pace in 2012.
A major share of work was dedicated to the detailed design of components for the large flight test demonstrations including the modification of the test aircraft. For the smart laminar wing and low speed flight tests, the manufacturing and assembly of parts will be continued.
The critical design review for the wing is re-scheduled to take place in the first semester of 2013.
The focus of work in 2012 was laid to launch the detailed design work and the launch of manufacturing of parts as well as the preparation of flight test instrumentation and measurement equipment.

For preparation of the "Low Speed Demonstrator" the work program was updated to allow for the different levels of the required technologies. The result is an intermediate step, namely two ground test demonstrators, one for the "smart flap" and one for an active vibration attenuation test, both have been initiated in 2012. For the active vibration attenuation test the decision was taken in February this year to go for a full size vibration suppression test on a Dassault Falcon F7X on ground.

The low speed demonstrator of vibration control will fly in 2016.

The detailed design of the CROR-pylon and the modification of the Airbus A340-600 test aircraft started at the end of the end of 2012 with the "CROR-demo-engine FTB" launch decision. Even though integration details will depend on the outcome of a feasibility study on the integration of the CROR into a "single aisle" short range aircraft to be concluded in 2013, some preparatory actions for the flying test bed are "long lead time items" and must start very early in year 2013.
The review of the CROR engine integration has been extended until mid of 2013.
This was considered necessary to review in great detail configurations other that the previously preferred rear fuselage mounted pusher installation.
The main challenges for all configurations are the minimization of the external noise, the dynamic loads to the structure, the complexity and weight of the propulsion system as well as handling quality certification issues. Activities have been added to provide additional information for the definition of certification rules in close coordination with engine manufacturers, and rulemaking authorities.
The preparation phase to start with the detailed design of the pylon, the engine related systems including the interfaces to the test aircraft, as well as the structural modifications to the Airbus A340-600 test bed has been launched and will be in the scope of activities addressed in 2013.
The preparation work done so far was reviewed after the proposed replacement of the SAGE 1 engine by the SAGE 2 engine as already agreed in autumn 2011 by Snecma, Rolls-Royce, Airbus and the Clean Sky JU.
While the engine related research and development work is mainly covered in CleanSky SAGE 1 and SAGE 2, the related development schedules are and have to be jointly harmonized between SAGE-ITD and SFWA-ITD.
Most of the experimental tests on the CROR in Wind tunnels have been jointly undertaken with Airbus, Snecma and Rolls-Royce in SFWA coordination with the relevant SAGE technical planning.

An entirely new noise-shielding rear empennage for business-jets which have been carefully designed in SFWA in the previous years led to the kick-off of building a full scale structural demonstrator in 2012. The detailed design will start in 2013 based on further numerical studies and a number of large scale wind tunnel tests

The development, integration and large scale ground and flight testing of the SFWA-ITD technologies are based upon a maturation of the underlying principle technologies.
In 2012, the majority of technologies typically reached TRLs between 3 and 4, allowing testing them in an integrated (ground) environment. In parallel to those tests, the pre-selected, integrated concepts will be assessed in the (virtual) SFWA-ITD aircraft concepts. A part of these tests, for example, like those feeding into the Technology Stream "Innovative Control Surfaces" with the latest test article of a wing active flow control system done in cooperation with a dedicated CfP-topic, will come to conclusion in year 2013.
The matured SFWA-technologies are partially provided to the CleanSky Technology Evaluator for further evaluation.
SAGE and SGO-ITD contributions have been and will be incorporated as well.
The computer simulation model PANEM was prepared but difficulties with this new established model caused some delays in the on time delivery to TE. A high level of effort has been undertaken in order to harmonize engine model data with the aircraft models. Further effort beyond this year will be necessary within the program in order to get reliable results.

A large number of research and industry type wind tunnel tests have been prepared and performed in 2012; it was the highest number of tests in a single year of SFWA-ITD.
Four large tests covered the testing of preselected CROR engines using different blade designs. The test articles will be at 1/5 respectively 1/7 scale and will address a wide range of noise and aerodynamic measurements. The most demanding test session has been finished at the end of the year in the DNW wind tunnel. Two large wind tunnel tests are planned to evaluate a preselected innovative tail design for business jets in combination with advanced turbofan engines. Most of the experimental tests on the CROR in Wind tunnels have been jointly undertaken with Airbus, Snecma and Rolls-Royce in SFWA coordination with the relevant SAGE technical planning.
Almost 50 days of testing have been conducted with the very complex 1/7 scale full span test article, with the engines being tested installed, uninstalled, and with typically three different CROR blade designs. The tests will continue in 2013.

A number of smaller research type wind tunnel tests have been prepared to mature various concepts of passive and active flow control technologies for the design of the smart wing; new loads control concepts, and the design of Riblet surface coating. In one wind tunnel test on advanced active flow control flap design which will be conducted and exploited in cooperation with a partner in a dedicated Call for proposal topic will be completed in early 2013. More test sessions will follow.
To test the long term robustness of selected innovative surface coatings against wear and aging, a "long duration" flight test campaign on two in-service A340-300 Lufthansa long-haul aircraft, initially planned for an end in June 2012 have been extended by 12 months due to success of the work package and the expected extra value of further data. Started in 2011, this test has been conducted in the frame of a CfP-topic with CleanSky partner Lufthansa Technik.

In early 2012, large scale ground "feature" demonstrators for the smart wing are in the last phases of completion for being tested form end of 2012 onwards. This includes an integrated structural demonstrator equipped with all major systems for the leading edge design. Dedicated test articles have been and will be prepared for bird strike and lightning strike tests as well as repair concepts. Many of the activities for the ground demonstrators have been carried out with strong support of Call for proposal partners who already joined in the years 2010 and 2011.

Twenty-Eight CfP- topics have been found a winner during the evaluations of Call #11, #12 and #13. The scope of topics of calls #11, #12 and #13 ranged from design and testing of individual components and systems for the laminar wing, surface coatings and repair methods, contribution to design and manufacturing of laminar wing ground demonstrator parts, as well as the preparation and qualification of new flight test instrumentation.
Further topics have been already partially prepared for Call#14 through Call#16 in order to be launched in 2013 and 2014. Among them a wide range of topics deals with innovative measurement technique, the development of optical systems, and a Blade deformation measurement system. Further subjects that have been prepared deal with the treatment, and repair and testing of surfaces for laminar wing panels, the design and development of laminar wing high speed performance test and the integration of a new, enhanced AFC system in a large scale W/T test model.
2012 and also 2013 Call topics have been and will contain major work packages to attribute to the design and build parts of the laminar wing's flight test articles and topics related to a manufacturing concept for the outer wing with special paint and coating, as well as the integration of Krueger flaps into a business jet wing.

Major achievements of the year 2012 were:

- Launch of the detailed design for the "High Speed demonstrator Passive" (HSDP)
- Start of manufacturing of the laminar wing flight test articles for the "High Speed Demonstrator Passive"
- Closure of maturity "MAT B" gate of the High Speed Demonstrator Passive
- First part of the CROR feasibility study
- Major wind tunnel tests on the full span 1/7 model completed to select a CROR engine – blade target design.
- Completion of the smart wing leading edge structural demonstrator including test preparation
- "Smart Flap" and "Innovative Rear Empennage" large ground demonstrator Launch Design Review
- Initiation of ground and flight tests to prepare the "Low Speed Demonstrator"
- "Low Speed Demonstrator" - Review performed with external evaluators
- Wind tunnel tests with concepts for the integration of innovative engines in Business Jets.
- Wind tunnel tests with 2.5D active flow control high performance high lift concepts for laminar wings.
- In-flight testing of surface coatings for laminar wings
- Evaluate, select and contract new partners for work packages published in subsequent CleanSky call for proposals.
- Finalization of concept aircraft models for the evaluation of SFWA and other ITD technologies, primarily SAGE (SGO first loop planned in 2013), for use by the Technology Evaluator
- SFWA-ITD Annual Progress Review meeting on 21/23 March in Bucharest
- Preparation of the 2013 Consortium Plan
- Conduct the work specified in SFWA Consortium Plan 2012 including the envisaged milestones and deliverables

5.2 GRA – Green Regional Aircraft ITD

2012 was a critical year for revising the global planning of GRA activities.
Due to the slow start GRA suffered from under-spending of yearly budget initially planned for this ITD over the first half of Clean Sky duration. The work requested by CS JU related to "multi-year" planning in order to cover the period of time 2013-2016 opened an opportunity for re-definition of GRA activities.
At the same time a strategic decision in respect to demonstration of GTF on 130 pax configuration has been implemented and a new "master schedule" emerged. On top of that, year 2011 resulted in significant delays in terms of pending deliverables, 31 out of 89 have been pending at the end of the year (85% of 89 deliverables). Approximately 11% of all delays have been caused by CfPs on the basis of the 2011 Technical Report.
Therefore, year 2012 became a critical one from the point of view of successful accomplishment of GRA targets.

Over 2012 the GRA did significant effort in order to reduce risk caused by delayed deliverables. This resulted in relatively small impact of delays on milestones related to Low Weight and Low Noise domains. Anyway, ground and flight demonstrations are under control and more likely would be finalized by the end of 2015. However a small probability of shift to 2016 by some 3 month still exists. An exception is cockpit demonstrator controlled by Eads-Casa, which requests an extra budget in order to be finalized by 2015. There is also a risk

related to Environmental Control System for flight testing, which needs some extra budget for the equipment provider (Liebherr).

Due to strategy changes, GRA has to deliver to TE only two GRASM models; the first one for advanced turbo-prop and another one for aircraft powered by GTF (Geared Turbo-fan). This plan seems to be plausible and neutralizes dependency of the models for TE on engine data.

In total, GRA's utilization of resources in 2012 was around 88% of planned value (1555/1767 MM, an estimate) vs. 80% progress in deliverables. The reason is a discrepancy between actual expenses for producing hardware and intermediate test results, reflecting real needs and risk mitigation against pre-programmed value of work and formal process of deliverables approval.

It is also worth to mention that in the course of the year, GRA has significantly improved process of controlling of CfPs. At present, not only negotiations but also implementation of critical CfPs is monitored by Steering Committee, in particular as a part of risk analysis related to demonstrators.

Interdependencies represent critical factor from the point of view of risk of delays. SGO becomes the most critical source of inputs to GRA. In previous year also contribution from SAGE contributed to it.

0. Management

Deliverables status:
Nr of deliverables due in 2012: 7
Nr of deliverables pending by the end of 2012: 2

1. Low Weight Configuration (LWC)

In 2012, apart from PDR of Ground and in-Flight Demonstrators the Second Down- Selection of low weight technologies was a major event of Low Weight Domain. The manufacturing of stiffened flat large panels with different technologies selected by the First Down Selection was completed. All panels representative of fuselage and wing architectures have been instrumented. Static and fatigue tests were carried out. The respective test results analyses were performed. The definition of technical solutions on fwd fuselage, fuselage and wing of the future generic regional aircraft utilizing the selected technologies was progressing. The general layout of the structural component to be integrated on test A/C for flight demonstration was developed. The respective preliminary test plan for demonstration in-flight was defined. The general layout of ground demonstrators (fuselage barrel & wing box) and the respective tooling for ground test activities has been developed. The respective preliminary test plan for demonstrations on ground has been defined. The detailed design of the structural component to be integrated on test A/C and flight tested for demonstration has started. The detailed design of the fuselage barrel and wing box demonstrators to be tested on ground was started as well.
Work Package LWC has afforded its goals and should not be continued in 2013.
GRA ITD effort and staff involved in LWC has switched his activities to ground and flight demonstrations.

Milestone status:

2 milestones have been planned and 2 have been successfully performed.

Deliverables status:

Nr of deliverables due in 2011 at the beginning of 2012: 16
Nr of deliverables due in 2011 at the end of 2012: 0
Nr of deliverables due in 2012: 24
Nr of deliverables pending by the end of 2012: 8

CfP status:

In 2012, GRA LWC has launched 9 successful Topics. In a significant part they will support preparation of ground demonstrators, for example manufacturing of floor for full scale fuselage barrel and cockpit.

2. Low Noise Configuration (LNC)

In 2012 LNC continued with definition of requirements and architecture of GRA conceptual aircraft.
In particular:

i) aerodynamic optimisation, aero-elastic modeling and preliminary structural layout of the Natural Laminar Flow (NLF) wing baseline configuration tailored to top-level requirements and general architecture of a green regional rear-fuselage engine Geared Turbo-Fan (130 pax) aircraft,
ii) aerodynamic design of the baseline High Lift Devices (HLD) architecture for the Geared Turbo-Fan A/C wing configuration and
iii) Updating of the V&V plan document to verify the achievement of HLD airframe noise reduction, wing highly efficient aerodynamics and load alleviation targets and validate relevant addressed concepts/ architectures/ technical solutions in a multi-physics view.

A work on enabling technologies (high lift devices, nose and main landing gear as well as load control and alleviation) was continued. The main planned event achieved was second down-selection of mentioned technologies.

Work on definition of Demonstrators has been performed. Specification of requirements for high speed Wind-Tunnel tests demonstration of aerodynamic performance at transonic cruise design point and in off-design conditions of the NLF wing design integrated with LC&A concepts, tailored to a GTF 130-seat A/C configuration has been done.
Work Package LNC has afforded its goals and should not be continued in 2013. GRA ITD effort and staff involved in LNC has switched his activities to ground and flight demonstrations.

Milestone status:

1 milestone has been planned and 1 has been successfully performed.

Deliverables status:

Nr of deliverables due in 2011 at the beginning of 2012: 9
Nr of deliverables due in 2011 at the end of 2012: 0
Nr of deliverables due in 2012: 16
Nr of deliverables pending by the end of 2012: 8

CfP status:

In 2012, GRA LNC has launched 1 successful topic regarding WTT addressing Natural Laminar Flow and Loads alleviations and control solutions. (topic: GRA-02-019)

3. All Electrical Aircraft (AEA)

Implementation of Level 1 (Architectural level), Level 2 (Functional level) and Level 3 (Behavioural level) simulation models have advanced and integration of models into the Prototype Shared Simulation Environment (SSE) has been initiated. Those topics are essential for modeling and simulation of on-board systems.

Regarding "Application studies" number of steps has been achieved:

- Analysis of function and performance of on board systems for an All Electrical future regional A/C. (Activities were based on the input from WP 3.1.1 and WP 3.1.2 as well as data from GRA New Configuration Domain - A/C configuration definition).
- Implementation, analysis and Integration of Electrical Energy Management Functional logics for Future Regional Aircraft
- Analysis of functions and performance of on-board systems interested to in-flight demonstration, including definition of the modifications of the A/C demonstrator in order to integrate and to test in flight the innovative technologies for selected on-board systems:
    - Electrical Environmental Control System (E-ECS),
    - Electrical Energy Management (E-EM),
    - Hybrid Wing Ice protection System (H-WIPS) – CANCELED (after analysis of technical aspects as well as cost and availability of the test aircraft)
    - Electro mechanical actuation for LGS (Landing Gears: main and nose) and FCS (Flight Control System).

In a significant part those activities have been performed through research at COPPER Bird® (development of common ITDs (GRA, EDS, SGO).

Definition of the related other modifications such as Flight Test Instrumentation (FTI) introduction and the modification of the A/C Electrical Power Generation for the Demo purposes.
Implementation analysis and integration of Energy Management functional logics for ground and in flight demo.
Definition of a Simulation model of the Electrical Power Generation and Distribution of the Demo Electrical channel of the A/C demonstrator.

Preparation of flight Demonstration for AEA has been advanced by performing:

- Initial preparation of the "Verification and Validation Plan for the Flight Test activities.
- Start of design of systems, parts and structural modification for the modifications to be implemented on the A/C demonstrator:
- Electrical Environmental Control System (E-ECS),
- Electrical Energy Management (E-EM),
- New Electrical Power Generation for Demo Supply Channel,
- EMA's Loads and associated Bench Test introduction on-board.
- Innovative FTI

Milestone status:
1 milestone has been planned and 1 has been successfully performed.
Deliverables status:
Nr of deliverables due in 2011 at the beginning of 2012: 0
Nr of deliverables due in 2011 at the end of 2012: 0

Nr of deliverables due in 2012: 5
Nr of deliverables pending by the end of 2012: 1

CfP status:

In 2012, GRA LNC has launched 2 successful topics regarding flight test equipment (electro-mechanical actuators for rudder and console for power management system). (topics: GRA-03-009; GRA-03-010)

4. Mission and Trajectory Management

The update of MTM functionalities and operational scenario has been continued (relevant input coming from SESAR (WP 4.1.1))
The preparation of upgraded prototyping tool architecture definition has been started;
The development of green FMS has been continued: a first release (including a subset of MTM functionalities) of green FMS was finalized (WP4.3).

Milestone status:

1 milestone has been planned and 1 has been successfully performed.

Deliverables status:

Nr of deliverables due in 2011 at the beginning of 2012: 0
Nr of deliverables due in 2011 at the end of 2012: 0
Nr of deliverables due in 2012: 7
Nr of deliverables pending by the end of 2012: 0

CfP status:

In 2012, GRA MTM did not launch a CfP.

5. New Configurations

In year 2012 GRA has performed:

1. TLAR (Top Level Aircraft Requirement) – the last definition and power plant specifications (Loop 2)
2. Sizing and performance estimation for O/R (Open Rotor), T/P (Turbo – Prop) and T/F (Turbo-fan) configurations (2nd loop end)
3. GTF sizing finalization for two different configurations (trade-off between: under wing and rear engine installation). However, only under wing engine installation has been performed. Trade-off studies are due in 2013.
4. Calculation of relevant data (trajectories, mission results, etc.), noise and engine emissions evaluation for the Technology Evaluator for Green A/C (Main results of Loop 2 activities by means of proper tools) for Turboprop and for the best Geared Turbofan configurations. Modified GRASMs (simulation models of Green Regional Aircraft were provided to TE)

Milestone status:

Initially, 1 milestone has been planned for GRA NC but it has been cancelled due to change in strategy.

Deliverables status:

Nr of deliverables due in 2011 at the beginning of 2012: 5
Nr of deliverables due in 2011 at the end of 2012: 1
Nr of deliverables due in 2012: 15
Nr of deliverables pending by the end of 2012: 5

CfP status:

In 2012, GRA NC has launched 1 successful topic regarding WTT addressing overall architecture of 130 pax. turbo-jet and installation issues related to power plant. (topic: GRA-05-007);

6. *Milestones*
   5 out of 5 milestones have been performed (100% success rate), with acceptable delays.
   At present, milestones start to be more dependent on interfaces (external feedback) from other ITDs, in particular from SGO and SAGE and to some extend from SESAR.

7. *Deliverables*
   Deliverables planned for 2012 at Q4 (31 of 2011 + 96 of 2012 = 127 deliverables at Q4); total deliverables issued = 102 --------> (102/127=80,3%)

5.3 GRC – Green Rotorcraft ITD

Progress over 2012 can be summarized through the following table, giving the comparison between the level of achievements (via deliverables and milestones) and resources assigned to the project.
Expenditure matches achievements with a level of 80% for both.

	Deliverables		**Milestones**		**Effort**	
					(Man Months)	
	Due	*Released*	*Due*	*Released*	*Forecast*	*Spent*
GRC0	4	3	1	1	53	60
GRC1	13	11	11	10	312	204
GRC2	12	12	5	2	306	232
GRC3	38	33	44	33	224	172
GRC4	14	3	24	24	285	254
GRC5	12	11	23	21	227	200
GRC6	5	3	3	2	98	90
GRC7	3	3	3	3	110	86
Total	101	79	114	96	1,614	1,298
Synthesis %	**78%**		**84%**		**80%**	

Main GRC deliverables and milestones are as follows:

- For innovative blades (GRC1): active twist specimen tests; preliminary design of 3D optimised blade shape (PDR); design of major components for full scale rotor with active Gurney flaps (PDR);
- For airframe drag reduction (GRC2): wind tunnel component tests completed (TRL4) concerning the optimised hub caps and the synthetic jet flow control system and the active empennage. Comprehensive analysis completed for air intakes and exhaust nozzles integration.
- For on-board energy (GRC3): equipment design specifications at preliminary design or critical design levels, agreed between integrators and suppliers (TRL3).
- For the Diesel-powered helicopter (GRC4): demonstrator engine critical design review (TRL 3); first power pack delivered for ground test article; frozen configuration and specification of the optimised helicopter.

- For environment-friendly flight paths (GRC5): helicopter flight profiles optimised for low emission; low level/narrow IFR routes for noise abatement with feasibility assessed (TRL3); on-board flight management available; in-flight validation started.
- For eco-design for rotorcraft airframe (GRC6): design of demonstration articles completed; parts manufactured (partially).
- Concerning the GRC contribution to TE (GRC7): second annual release of rotorcraft software and data packages for the SEL and TELU1 were delivered to TE.

Activities performed in 2012 are detailed here after and the description is given against each work package of the ITD GRC, from GRC0 to GRC7.

0. GRC0 – ITD Management

Main activities concerning the ITD Consortium Management performed in period P5 (2012) were performed through the preparation of the following Management Committees, Interim Progress, Steering Committee meetings and annual review:

Call for Proposal
Three calls were planned in 2012. GRC submitted a total amount of 12 topics in the three calls for proposals (CfP) published: CfP n°11 – 4 topics (total budget: 1, 45 M€; CfP n°12 – 5 topics ((total budget: 4, 59 M€; CfP n°13 – 5 topics (including 2 resubmitted topics) :

Shared Information Repository
The GRC on-line repository is hosted and maintained by AgustaWestland, with support to two CfP projects (TRAVEL and ANCORA) and to activities on Active Gurney flap - GRC1. All documents (deliverables) are uploaded.

1. GRC1 – Innovative rotor blades

In 2012, GRC1 activities proceeded to plan except for a delay in committing the required resources to the full scale blade design activities.

The Active Twist technology advanced significantly with the successful CDR (Critical Design Review) for the new system and maturing to TRL3.

Some trial manufacturing using the newly developed actuators within a model scale blade was achieved. Design of a complete blade, optimised at all radial sections for the inclusion of active twist elements was completed. Detailed design and planning for bench testing of a full scale blade section now continues.

The CDR for the Twente wind tunnel test of an Active Gurney Flap system was delayed to February 2013. Similarly, the Preliminary Design Review for the model rotor blade. Work with CfP partners for actuation system continues.

A PDR was completed on an optimised full scale passive rotor blade and detailed design work is proceeding to plan.

A further assessment of the performance and acoustic benefits of GRC1 technologies, along with mass and electrical power penalties, was also completed and supplied to GRC7.

Three new CfP partners were successfully chosen (innovative rotor blade production tooling, at full scale and model scale; support 2D dynamic wind tunnel testing).

2. GRC2 Reduced drag of airframe and dynamic systems activities

In GRC2 (Reduced drag of airframe and dynamic systems activities), main tasks focused on the optimisation of the rotor hub, the fuselage and the engine installation. The first wind tunnel campaign to measure the baseline configuration of the EC135, including fuselage cabin, landing skids and rotor head, has been concluded in the context of the ADHERO project. Moreover the aerodynamic and structural design of a new full scale hub cap for light helicopter progressed and the one for the heavy helicopter started. Concerning the reduction of airframe drag, especially for blunt aft bodies and for the tail, improved aerodynamic design of the common helicopter and tilt rotor platforms had been conducted, incorporating passive and/or active flow control systems. Concerning the common tilt rotor platform, optimization of nose, sponsons and, wing-fuselage junction was completed, while the wing-nacelle and empennage optimization is still on-going. The optimized tilt rotor geometry will be tested in wind tunnel within the next period.

Concerning engine installation tasks, aerodynamic studies and noise propagation analysis about new side air intakes integrations for the light helicopter of ECg was performed.

As far as the common tilt rotor platform is concerned, a study for evaluation of emission, engine performance and noise had been accomplished in order to reach TRL3 in 2013.

In 2012 GRC2 supported GRC7 in defining the aerodynamic characteristics of fuselage and empennage of the Single Engine Light (SEL) and Twin Engine Heavy (THE) helicopter models for the "Y2020 reference" and "Y2020+CS conceptual" fleets, whereas the Twin Engine Medium (TEM) model for the "Y2000 reference" was revised and corrected.

In 2012, GRC2 delivered 100% of planned reports but only 40% of the planned milestones, which reflects on budget under-spending. The main reasons are personnel availability and bureaucratic delays in authorizing wind tunnel model manufacturing.

3. GRC3 Integration of Innovative Electrical Systems for Rotorcraft

In GRC3 (Integration of innovative electrical systems activities), analysis reports covering technologies across differing helicopter types were delivered and data regarding system mass and future electrical power requirements provided to GRC7.

The Brushless Starter Generator Preliminary Design Review (PDR) was achieved in early 2012, work then concentrated on the associated power electronics and a preparatory CDR which was held in November 12. The final CDR is rescheduled to early 2014.

The previously unsuccessful Call for Proposal's for Power Convertor and Energy Storage systems were merged, and subsequently awarded and launched in July 12 as REGENESYS.

Regarding the energy recovery systems, RECYCLE progressed to parts manufacture, and the RENERGISE has undergone a revised topology to ensure weight targets are realised.

The Electromechanical Actuators (EMA) for the very light helicopter has been re-planned using a new supplier following a failure to proceed with the originally selected partners. The EMA for Landing Gear delivered an overall characteristics document early in the period, passed it's CDR in October 12, and was also declared to TRL3 in October 12. EMA for the Rotor brake HERRB achieved a successful PDR in December 12. Joint technical reviews have been held between AW, HERRB & REGENESYS CfP partners to establish technology interoperability to maximise the system efficiencies and benefits.

The conventional Electric Tail Rotor also successfully completed a PDR in November 12. The Fenestron Electric Tail Rotor study identified and investigated concept issues and now plans to provide a deliverable progress report in 2013.

The Piezo Electric Power activities included the issuing of an overall characteristics report and the ongoing closure of PDR actions.

Preparatory work for the demonstration of GRC3 technologies on the Electric Test bench has included the provision of interface definition documents, and detailed test plans for the technologies to be demonstrated. Additionally the selection of the partner for the HEMAS adaption kit was concluded.

Overall in 2012 GRC3 progressed well against its work plan, and delivered 90% of its planned reports.

4. GRC4 – Integration of a Diesel engine on a light helicopter

Regarding definition of the "Optimal Helicopter Architecture", the study of an advanced ideal Diesel engine to be installed onto the optimized helicopter, all milestones - base data to continue PZL tasks in 2012 were achieved. The delay in issuing deliverables by PZL's Partner LUT - basis for continuing PZL's work– the ideal Diesel design was recovered by the end 2012. Due to delay of studies the consumption of the budget in 2012 was under requested value.

Regarding Demonstrator Helicopter and its accordingly developed Powerpack, the forecasted milestones have been achieved, with slight delay for Preliminary Design Review (Powerpack and Helicopter PDR were done together in February 2012), and on-time for Critical Design Review (Powerpack in June 2012, Helicopter in September 2012). Both Powerpack and Helicopter have achieved TRL3 at their respective CDR Milestone.

The total requested budget has been totally consumed in 2012 (with slight overspending) thanks to the delay recovery from beginning of the year and due to additional effort of Eurocopter to support activities under Partners responsibility.

5. GRC5 – Environment-friendly flight paths

To respond to JU request to focusing the organization of the activities on specific and well-defined Technology Products, in 2012 GRC5 (Environment-friendly flight paths) was heavily reviewed and restructured, with some significant impact on subproject technical productivity and deliveries. Relevant modifications to the initial activities are: higher focus on instrumental flight procedures with respect to visual ones (due to higher expected benefit on vehicle operational capability); re-scoping of final tilt rotor demonstrations from flight tests to piloted simulations (due to test bed vehicle unavailability in GRC5); diversion of gas emission experimental measurements from the AW139 (due to unavailability of combustor numerical model) to the SW4 single-engine light helicopter (combustor model available to partners). TPs are grouped in four Technology Streams: eco-Flight Procedures, eco-Flight Planner, eco-Flight Guidance and eco-Technologies.

For eco-Flight Procedures, computational tools for helicopter low-noise procedures were completed; trajectory optimization mostly finalized and tilt rotor activities started. AW139 acoustic tests are now confirmed for spring 2013.

For eco-Flight Planner, the development of numerical tools started, with the deployment of the first version capable of tilt rotor mission analysis and the computation of preliminary low-pollutant mission profiles for helicopters and tilt rotors.

For eco-Flight Guidance, the planned upgrades were completed and systems are ready for the integration of the advanced guidance concepts under study. EC135 "tunnel-in-the-sky" in-flight validation is scheduled in spring 2013. The Low-Noise on-board Algorithm developed is ready for delivery and integration into the AW139 experimental FMS.

For eco-Technologies, most of the expected numerical tools for sound diagnosis and synthesis were deployed; preliminary ground tests for pollutant measurements were performed on the SW4 with positive results, and final flight test activity is expected to take place in mid-2013.

6. GRC6 – Ecodesign Rotorcraft Demonstrators

In GRC6 the definition of the demonstrators has been the main topic during 2012. Specific designs, stress analysis and production details have been defined for all four demonstrators. These demonstrators are two thermoplastic composite structures (A stiffened helicopter tail cone and an aerodynamic fairing) for composite manufacturing technologies and two metallic demonstrator groups (a tail rotor gear box including a thermoplastic drive shaft and a main rotor gear box) for new treatment methods. The most important milestones and deliverables of 2012 were the "Demonstrator definition" and the creation of "(Pre-) designs" as well as manufacturing documents.

Two new Calls for proposal were started, both focusing on the end-of-life solution for the affected demonstrators, one for thermoplastic components and one for metallic parts.

One deliverable, the assembly of the main rotor gear box, had to be delayed until March 2013 because manufacturing in a serial production environment cannot always get a high priority during strong production periods. Mitigation for this issue is among others an intensified outsourcing of demonstrator production to external partners.

Budget and time consumption developed as planned with no substantial under spending.

7. GRC7 – Interface with the Technology Evaluator

GRC7 had three deliverables and milestones relating to delivery of the Phoenix platform V2.1 for the Technology Evaluator's (TE)'s Second Assessment. The data and software packages deliverables for the Twin Engine Light update (TELU1) and Single Engine Light (SEL) generic rotorcraft were delivered to the TE in early June 2012 as planned. Following the long awaited resolution of the IPR agreement issue in period 5, Phoenix platform V2.1 GSP engine model outputs were verified by Turbomeca (TM). GRC7 milestones are based on the receipt and integration of the Phoenix V2.1 into the TE's platform and the generation of their assessment results.
The successful completion of 100% of all GRC7 deliverables and milestones were as a result of a Project Management decision to stagger GRC7 outputs to a more realistic, achievable and manageable level.
GRC7 although completing 100% of the planned deliverables and milestones had a 15% estimated under-spend.

5.4 SAGE – Sustainable and Green Engine

2012 has been a key year for the SAGE, when critical decisions have been made and projects have started to come to fruition and deliver engine demonstrations.

The focus in the programme has been largely expended in preparing for demonstrations: defining technology demonstration requirements and validation strategies, managing the risk to engine demonstrations by raising the Technology Readiness Level of selected technologies through sub-system rig testing, developing engine test component designs and enabling manufacturing technologies and reviewing the demonstrator plans.

Key decisions and significant commitments have been made in 2012 to freeze the demonstrator configurations and finalise the technological designs.

Components have been manufactured and demonstrators assembled and delivered for test: the first engine demonstrations in SAGE3 (advanced dressing), SAGE5 planned end of 212 but postponed to beginning of 2013 for technical reasons.

A Lean Burn Demonstrator was introduced into a new SAGE project called SAGE 6.

SAGE1 has continued to develop Geared Open Rotor Technology.

The significant technologies to be developed and finally demonstrated are the open rotor assembly including the counter rotating blades, the blade pitch control and the transmission systems.

The CROR technology acquisition effort under SAGE 1 proceeded in parallel to the SAGE 6 Lean Burn demonstration, to assist in the outstanding SFWA CROR key decisions in 2012 and 2013. As such, support to the rule making process for CROR flightworthy assessment including associated engineering effort was provided to enable definition of key technologies to be demonstrated and to enable CROR demonstration after the current Clean Sky. An installation Functional Hazard Analysis for the demonstrator engine has been carried out in 2012 to identify major installation risk and design recommendations for future ground and flight test demonstration. Evaluations of CROR blade design and material options as well as aeromechanical implications and methods have been progressed. Design and manufacturing methods for the rotating structures have been further investigated. Aero- acoustic design and prediction methods related to Far Field and Near Field Noise as well as Transposition to Flight methodologies linked to test data for validation has been further developed in close cooperation with SFWA activities.

The programme of work is focussed on the R&T necessary to develop the TRL of the fundamental enabling technologies and assess the feasibility of the open rotor concept for full demonstration. This will be achieved by both on-going design studies, methods and tool development and validation and component rig test programmes. Additional rig testing at aircraft level will be carried out in the Smart Fixed Wing Aircraft ITD in 2013 and 2014.

For **SAGE2**, a Concept Review took place in 2012 to consider the feasibility and configuration of the open rotor demonstrator. The Preliminary Design Review has been postponed to mid-2013. Configuration and installation feasibility studies have been performed in the period leading up to the review, together with gas generator adaptation and open rotor propulsor design studies. These studies encompassed the composite propeller, pitch control, power gearbox, power turbine, rotating nacelle and structures, lubrication and cooling and control sub-systems and the integration of the sub-systems into a full engine system.

The design of two sets of propellers has been performed. Propeller mock-up tests have been done in 2012 in the framework of SFWA. Combined with high speed tests performed in 2011,

they enabled aerodynamic and acoustic design tools calibration. Low and high speed wind tunnel tests of demonstrator propeller have been prepared and the test matrix has been defined. Several proposals have been launched through CfP to support the demonstrator.
The **SAGE3** project demonstrates technologies for large 3-shaft turbofan engines and has delivered its first engine demonstration in November 2012 and has completed a large proportion of the preparation for the second engine build.
The first technology for engine demonstration is the advanced dressings, which will be demonstrated in two phases, through trial builds and subsequently through engine testing. The second engine test, to demonstrate the composite fan, is scheduled to commence in 2013 and work in 2012 has focused on preparing of components manufacture and completing associated rig tests.

Technologies to support higher temperature capability and lower weight intercase structures have been demonstrated through a series of rig tests. Demonstration of low pressure turbine technologies commenced through rig testing in 2011 and tests have continued in 2012, both in preparation for the engine tests and to provide validation data. Preliminary design of the LP turbine module for engine demonstration has been completed and long lead item procurement has been launched in preparation for assembly of the turbine in 2014.
Project **SAGE4**, the Geared Turbo Fan Demonstrator Project, has started the procurement activities to ensure its readiness for the engine demonstrator test, whose starting is now postponed to the first quarter of 2015. The demonstrator design has been frozen during Critical Design Review. Preliminary engine design and detailed design work has been delayed to 2013.

Project **SAGE5** has delivered its first engine demonstration, but First Engine Test Trial has been postponed in early 2013 for some technical issues. Final parts for the first build has been delivered, engine has been assembled, and delivered for test.
Preparations for the second engine build incorporating hot section technologies has continued with final detail design activities being completed and manufacturing of components for the second build launched during 2012, although final delivery of parts is not due until 2013.
The aim of the **SAGE6** lean burn project is to demonstrate a lean burn whole engine system to a TRL6 maturity level, suitable for incorporation into civil aerospace applications in the 30,000lb to 100,000+ thrust classes.

Lean burn combustion is a vital technology acquisition for the European aerospace industry to remain competitive in the world marketplace and comply with future CAEP & ACARE emissions legislation.
Significant technologies that have started to be developed in 2012 consist of, but are not limited to, Combustion, hydro-mechanical fuel control, control laws and associated sensing devices, whole engine thermal management, acoustic attenuation, turbo machinery thermo-mechanical integration and system health monitoring and maintenance functions. To increase current TRL levels of subsystems from typically TRL 3-4 to TRL-5 a proposal has been made to develop a new demonstrator vehicle based on a Rolls-Royce Trent 1000 engine for ground test and suitable for installation on a flying test bed.
The LEVER project (through CfP call 8) has completed the design activities for a System Test Facility in support of the engine tests, hardware has been ordered and commissioning is planned for summer 2013.

5.5 SGO – Systems for Green operations

In 2012 SGO has been focussed on achieving progress on all developed technologies to prepare the major demonstrations – both in flight and on ground – which are planned between end 2013 and 2015.
For all technology streams, significant steps forward have been made, as described in each work-package below and positively assessed by the external reviewers, both during the Annual Review in June and in the mid-term meeting end of November. In line with the recommendations of the reviewers the relevance of various work streams has been reviewed and some major decisions concerning the redefinition of objectives have been taken:

- The activities on the Fuel cell domain have been significantly reduced, and the effort focused on more promising technologies (Wing Ice Protection, Environmental control system)
- The development of the Atmospheric Data Transmission System including a Vapour Sensor has been stopped after TRL3, due to an inconclusive model for the operation of the system by different stakeholders (airline, Meteo Office, etc.) and the indirect link to the environmental objectives.

With reference to the annual grant agreement, the currently estimated overall consumption of resources amounts to 88% of the planned value. This reduction is partly due to the modifications in the work plan and partly to resource issues for some beneficiaries. This has been mitigated by a complete re-estimation of the cost to completion and associated planning of the program carried out in the second half of 2012.

For large aircraft, WP1 has completed the V&V master plan for the Management of the Aircraft Energy. The update of requirements and V&V strategy for cycle 2 has been shifted from end 2012 to March 2013. Indeed, the aim of cycle 2 is to take advantage of cycle 1 lessons learnt in order to improve the green benefits of the SGO concepts, which is mainly given by technologies maturity. As some technologies maturity gates have been delayed, it was decided to postpone cycle 2 documents to take full benefits of cycle 1 findings. This resulted in a slight under consumption as the work has been postponed.
For regional aircraft, WP1 has delivered the final document that contains the reference configuration data for the green regional aircraft. This achievement materialises the end of WP1 activity dealing with regional aircraft.
In WP1.3, exchanges with SESAR have been increased in 2012. Some relevant SESAR documents as for mission and trajectory functions analysis have been identified by WP1.3 and provided by SESAR. In addition, material has been prepared to present the SGO green functions that are potentially impacted by SESAR concepts in view of a bilateral meeting to exchange between the two projects.

In WP2 – Management of Aircraft Energy (MAE), work on technologies for energy management intended for demonstration activities has moved on. Throughout 2012, the designs based on frozen architectures for cycle 1 have been completed and first equipment and subsystems are now prepared and have been delivered to test benches for demonstrator testing.
In 2012, WP2.4 was focused on the final quantitative large aircraft level assessment of cycle 1 technologies, which gave promising results but without delivering targeted benefits. Also, based on that evaluation a workshop was organised to gather improvement topics for cycle 2 that could increase environmental benefits of the More Electrical Aircraft.

For electrical and thermal systems, demonstrations were planned to be assembled during 2012, and WP2 delivered some equipment for these platforms.
Zodiac ECE completed the detailed design of the electrical power distribution centre. The detailed design review with Airbus, Thales and Liebherr was passed and the manufacturing was launched.
The MAE Wing Ice Protection technology demonstrators have been delivered to NASA Glenn Research Center in October 2012 in order to support the icing tunnel tests which have been carried out in November 2012. The test campaign was successfully completed for all partners end 2012 and will be finally assessed during the TRL4 gate in the first quarter of 2013.

First equipment intended for flight testing such as a prototype skin heat exchanger subsystem is on the way. The manufacturing of the heat exchanger is close to completion. The flight test campaign is planned in the fall 2013.

The development of the electrical ECS pack was facing technical challenges in 2012. In order to withstand all performance and safety of flight requirements design modifications on the turbo machines are required. Finally this will contribute to a delay of the flight test by one year into 2015. The associated mitigation road map has been agreed.

First hardware for the first large scale ground tests was delivered to the COPPER Bird. Engine nacelle systems such as the nacelle actuation system have been tested and passed TRL3 and TRL4 reviews. The generator specifically developed for the nacelle anti-ice system passed the TRL3 review, however, it failed to pass TRL4, leading to the decision to stop this activity within CLEAN SKY.

After the Saab withdrawal from the thermal management function this work package was re-organized. The new scope and the related dedicated interfaces have been re-defined by the remaining partners Airbus, DLR and Liebherr. The final TRL target has been reduced to TRL4 in 2014 following the TRL3 milestone end 2013.

A key result of the Method and Tools work package WP2.1, the "Model-based energy system design process", has reached TRL 3 in November 2012. The Use Case implementations proceeded well and several tests were conducted. Finally, in the Modelica Benchmark, it was proven that modelling and simulation of electric power system components and subsystems with Modelica is feasible in industrial quality.

In the field of WP3 – Mission and Trajectory Management (MTM), 2012 has brought major progress towards the main demonstrations planned in 2014 and 15.

Flight management functions have progressed towards TRL4, with some pilot-in-the-loop validations. An implementation into a product prototype has been achieved for the take-off phase and the initial specification for the cruise function has been issued. Both functions will reach TRL4 by mid-2013. Concerning the descent and approach phase, a TRL4 has been passed for the Time and Energy Managed descent, whereas the adaptive Glide Slope - targeting the final approach - has reached TRL3.

TRL4 for mission optimisation functions have been successfully passed, paving the way to prototype implementation and demonstrations in 2013 and 14.

In the field of the Smart Operations on Ground, the TRL3 at system level has been achieved in January 2012, followed by a number of gates in various sub-parts of the work, like the detailed Aircraft model and the brake cooling fan. In the last quarter, a TRL4 on the fast-time simulation supporting the environmental benefit analysis was passed successfully. This will lead to the TRL4 at system level in April 2013.

Using the inputs from SESAR gathered by WP1.3, an updated analysis of the SESAR Concept of operation was issued.

The major 2012 achievements of WP5 in the field of industrial exploitation was to down select a first set of topics to be worked out in the next steps: the impact of Electronic Flight Bag (EFB) on the airline operations, certification issues for the more electrical aircraft, as well as specific technological topics like e.g. impacts of new cooling fluids, the management of regenerative energy in power quality aspects, etc.

In the domain of system and aircraft level assessment of SGO results, a further exchange of information with SFWA has been prepared, to allow integration of models of SGO systems into conceptual aircraft models. The list of targeted SGO technologies has been agreed and first models will be provided in 2013.

Main SGO deliverables and results in 2012:

In WP2/ MAE

- Quantitative assessment of Cycle 1 technologies for Large Aircraft has been done. Based on promising results cycle 2 has been kicked-off
- IWT test campaign for the MAE WIPS technologies has been successfully completed. The TRL4 reviews for each technology are now planned for first quarter 2013
- Design Reviews for electrical power generation and conversion equipment have been held end of 2012 in view to upcoming deliveries of prototypes in 2013 and 2014 to other ITDs
- Development of flight test demonstrator of the skin heat exchanger is close to completion. Following the TRL 5 review mid 2013 the flight test campaign is scheduled in fall 2013.
- TRL 4 of nacelle actuation has been passed. TRL5 is planned mid-2013. TRL3 of the nacelle anti-ice generator has been past but TRL4 gate has not been reached. It was decided to stop this development.
- The work on the electrical load management architecture has been completed in 2012, followed by a TRL3 review in January 2013
- After Saab withdrawal from thermal management end of 2011, this work package has been re-planned by Airbus, DLR and Liebherr. TRL3 review is now planned end 2013.
- TRL3 for "Model based energy system design process" has been successfully passed end of 2012

In WP3/ MTM

- First TRL 4 milestone for vertical Flight management functions has been passed. Significant progress has been made for all flight phases, with TRL4 being planned in second half of 2013.
- A first TRL 4 milestone for Smart Operation on Ground System has been passed. The complete TRL4 at system level is now foreseen in the first half of 2013.
- TRL 4 milestones for on board trajectory optimisation were successfully completed
- TRL 3 milestone for the Atmospheric Data Transmission System and Water Vapour Sensor was passed but led to the decision to stop the development in Clean Sky for this concept.

5.6 ED – Eco-Design

The Eco-Design ITD used around 85% of the resources planned for 2012, according to the end-of-year estimate.

It is organized in the two major areas of EDA (Eco-Design for Airframe) and EDS (Eco-Design for Systems (small aircraft)).

The **EDA** part of the Eco-Design ITD is meant to tackle the environmental issues by focusing on the following challenges:

- To identify and maturate environmentally sound ("green") materials and processes for a/c production.
- To identify and maturate environmentally sound ("green") materials and processes for a/c maintenance and use processes.
- To improve the field of end-of-life a/c operations after several decades of operation, including reuse, recyclability and disposal ("elimination") issues.
- To provide means for an eco-design process on order to minimize the overall environmental impact of a/c production, use/maintenance, and disposal.

In 2012, the work performed in the frame of **EDA** was a continuation on the following Work Packages:

1. WP A.1 Alternative Solution Requirements,
2. WP A.2 Technology Development,
3. WP A.3 Application Studies,
4. WP A.4/A.5/A.6 Ground Demonstration.

The activities in WP A.1.5 ended at end of 2011. This WP was meant to analyse social/societal requirements and to identify key socio-economic aspects of A/C Eco Design.

In WP A.2, the work was dedicated to continuation of the maturation of the most innovative technologies selected at the end of 2010. The end of the development phase is planned for T0+60, i.e. beginning of October 2013.

In WP A.3, WP A.3.1, A.3.2 and A.3.3 were active:

- In WP A.3.1, the work continued in the field of LCA. A first simplified LCA tools will be made available in March 2013. Eco-assessments were carried out on baseline technologies and reference alternatives, using LCA databases tailored for aerospace industry, and starting from October 2012. Interactions with TE and Vehicle ITDs have been fully formalised. The Bill of Materials (BoM) associated to each kind of A/C have been produced for airliner and business jet; the Bill of Processes (BoP) is not requested by the extrapolation method developed in collaboration with TE.
- At the end of 2011, activities also started in WP A.3.2 which is meant to extrapolate the technologies developed in WP A.2 to industrial conditions, thus validating these technologies for industrial applications. Activity continued along 2012 with launch of 6 topics on CfP 13.
- The activities in WP A.3.3 started in 2011 continued on 2012 to develop Eco-Design Guideline to optimize the A/C design, production, and end of life phase from an overall environmental perspective. Two topics were launched on CfP 11 and 13.

In WP A.4/A.5/A.6, ground demonstration activities were carried out, especially for the equipment parts for which demonstrators manufacturing started late 2011. For airframe

demonstrators, only preparation i.e. CAD drawings, sizing, Test Plan preparation were undertaken.
The general objective of the Eco-Design ITD **EDS** part is to gain a valuable and comprehensive insight into the concept of all-electric aircraft. It is expected that the use of electricity as the only energy medium, by removing the hydraulic fluid and by the use of on-board power-by–wire will offer significant benefits in terms of aircraft maintenance and disposal environmental impact, and will yield new possibilities in terms of energy management (e.g.: intelligent load shedding, power regeneration on actuators, sharing of Electrical Control Unit over actuators…).

The work performed in 2012 consisted in pursuing the common activities (WP S.1), performing the characterization of the business jet sub-systems architectures (WP S.2) and continuing the preparation of the bench related activities (WP S.3 and WP S.4).

The WP S.1 activity led to the final laying out of the simulation process (WP S.1.1). After the preparation on first half of the year, the modelling activities started in the second half (WP S.1.6). The definition of the Generic Architecture (WP S.1.3) was finalised even if the synthesis will be produced beginning of 2013. The activities pertaining to the definition and the development of the subsystems populating the architectures which will undergo tests (WP S.1.5) continued throughout 2012.

On WP S.2 main activity was the characterization of the main sub-systems populating the Business Jet architecture candidates (WP S.2.3). The definition and the development of the associated equipment items which populate the test architecture continued (WP S.2.4). The modelling activities related to the Business Jet configuration were initiated end of 2012 (WP S.2.5).

The WP S.3 (Electrical Test Bench) activities continued in 2012. The definition of the ground infrastructure (WP S.3.1) has been finalized in the first half of the year, and the early manufacturing operations continued (WP S.3.3) to get prepared for the integration of the components in 2013 (WP S.3.4). The definition of the electrical tests was undertaken to come to closure on May 2013 (WP S.3.2).

The WP S.4 (Thermal Test Bench) activities also continued in 2012 with definition of the bench systems (WP S.4.1) and continuation of their manufacturing (WP S.4.3). The preparation of the integration of the thermal mock-ups and their supporting systems (WP S.4.4) has been initiated in the second half of the year. The final definition of the thermal tests to be performed continued on 2012 (WP S.4.2).

5.7 TE – Technology Evaluator

All TE Work Packages had activities and deliverables (or outputs) in 2012:

- WP0: TE Management and Coordination
- WP1: TE Requirements and Architecture
- WP2: Models Development and Validation
- WP3: Simulation Framework Development + IVV
- WP4: Assessment of impacts and Trade-off studies

In WP1, during 2012 the definitions of the aircraft (fixed wing and rotary wing) missions were updated. The metrics for the Assessment were further refined based on the learning done in 2011, and the requirements for the „Airport" and Air Transport System (ATS) evaluations were refined.
In WP2 major obstacles needed to be overcome in the preparation and delivery of aircraft conceptual models by the vehicle ITDs (namely GRA and SFWA).

Several milestones as defined by the TE AIP 2012 for the delivery of the aircraft models to the TE were missed, with delays of up to 7 months. As a consequence, the scope of the 2012 Assessment was slightly reduced during the course of the assessment preparation in the 4th Quarter of 2012, and a number of work-arounds were deemed necessary in the preparation of ITD data for the Assessment (SFWA concept aircraft for Short-Medium Range). Moreover, it was necessary to delay the delivery of the 2012 Assessment Report to the JU until (now estimated) April 2013.

These scope changes for 2012 included:

- SFWA LR (Long Range)
- SFWA SMR (Short and Medium Range) / CROR evaluation reduced to one conceptual aircraft / engine combination only and use of a simplified approach to the noise analysis. In addition, the NOx results were deemed insufficiently reliable / representative to be included in the report
- Updated SFWA business jet aircraft: both the 'Low-Sweep' and 'High-Sweep' configurations were now included
- The evaluation of rotorcraft was expanded from one to two conceptual vehicles (TEL, Twin Engine Light, and SEL, Single Engine Light)
- Limiting the number of airports used for the Airport Evaluation for fixed wing aircraft to 4
- Performance of the evaluation of the updated GRA-90 Turboprop
- Performance of the evaluation of the GTF-powered GRA130 including noise

Below the results of the TE 2012 Assessment are shown in tabular form. Overall, we can conclude that good progress can be shown towards Clean Sky's environmental objectives as stated in the Clean Sky Development Plan (CSDP).

The next TE Assessments will complete the full range of Clean Sky concept aircraft [with the remaining rotorcraft concepts – see overleaf]; equally, they will focus on the updates of the concept aircraft as provided by the 'Vehicle' ITDs GRA, GRC and SFWA.

Clean Sky Concept Aircraft	Noise area (take off)	CO_2	NO_x
Low Sweep Biz-Jet (Innovative Empennage)	-68%	Up to -32%	Up to -28%
High Sweep Biz-Jet	-36%	-22%	-26%
TP90 (Regional Turbo-prop)	-48%	Up to -23%	Up to -43%
GTF130 (Regional Jet – Geared Turbo-fan)	-75%	Up to -23%	Up to -46%
Short-Medium Range / CROR Engine	Up to -37%	Up to -30%	N/A
Long Range / 3-shaft Advanced Turbo-fan	Up to -28%	Up to -20%	Up to -21%[1]
Single Engine Light	-47%	-30%	-76%
Twin Engine Light	Up to -53%	-26%	-74%

[1] This estimate excludes any SAGE6 'Lean Burn' benefits which should lead to up to 55% NOx reduction in total

It must be noted that in WP2 the TE consortium operates as a de-facto supply chain manager: all the major component conceptual models are delivered by the 'Aircraft ITDs'.

In this respect, these first two assessments of 2011 and 2012 continue to show delivery challenges from the Clean Sky ITDs into the TE, in many cases caused by the 'Tier-2' effect of deliveries of data from SAGE into the Aircraft ITDs SFWA, GRA and GRC.

Taking the lessons learnt from 2011, the interfaces with SFWA, GRA and GRC have accordingly been scrutinised and control documents defining the delivery of models (specification, content and timing) created. A tighter control cycle has been put in place to monitor the progress (including inputs from other ITDs). Nonetheless performance was only modestly improved in 2012. Further lessons learnt and a tight monitoring by the JU of the deliverables in the ITDs (towards the TE) will continue.

In WP3 the TE-Information System was further developed with an updated database structure, role and usage. The foreseen extensions were defined and results of the 1st assessment

integrated. Configurations and versions of all data and software used for the 2012 Assessment were documented including all ITDs deliveries to the TE.

WP4, or 'Assessment of Impacts and Trade-Off Studies', contained the key output from the TE to the JU, i.e. the 1st Assessment Report (2011 Assessment).

Leading up to the actual (2012) Assessment, other key activities and deliverables included:

- Detailed specification report of the mission-level assessment
- Detailed specification report of the airport level assessment
- Detailed specification report of the ATS level assessment
- Detailed specification of the life-cycle analysis and a demonstration of the calculation using reference aircraft.

Overall, the execution of the 2012 plan has remained a significant challenge for the TE.

It must be noted that the late supply of crucial inputs was the overriding factor in the delivery performance. The supply chain issues originated in the SFWA and GRA ITDs (in this order in terms of contributing delays); noting that SFWA had major interface challenges with SAGE.

Despite the difficulties encountered the TE, with the support from the JU, managed to put in place reinforced planning and control mechanisms for 2012.

The 1st Assessment planned for 2011, which was delayed due to late delivery of models from the ITDs was ultimately successfully completed in February of 2012 and well received, despite its limited scope.

The delivery of the delayed 2012 Assessment in April 2013 constitutes a good step towards the full spectrum of Clean Sky concept aircraft, with now only additional rotorcraft due in the coming two years (Twin-Engine Medium, Twin-Engine Heavy and finally, the Diesel-powered Light Helicopter). The phasing of these rotorcraft concepts has been agreed in close cooperation with GRC and the performance of the GRC/TE joint assessment activity is exemplary.

However, the overall timeliness of the TE Assessments remains disappointing; and this will remain closely monitored by the JU. The deliveries from the ITDs (in particular SFWA/SAGE and GRA) will be checked and discrepancies acted on promptly.

As a consequence of the delays encountered in 2012 and technical difficulties in the provision of conceptual aircraft models from SWFA (in particular the 'SMR/CROR') the JU has scheduled an independent technical review of the 'model chain' and workflow from SAGE/SFWA into the TE in early 2013; the results of this review will be taken into consideration for the 2013-2016 period.

6 CALLS FOR PROPOSALS

At least 25 % of the EU funding to the CS JU must be allocated to Partners selected via Calls for Proposals. Topics are defined by each ITD. They serve the dual purpose of widening the participation to Clean Sky to other organisations and to identify R&D performers called in to participate to the mainstream activities of Clean Sky. Partners selected via Calls for Proposals are being funded in compliance with the upper funding limits set in the Rules of Participation of the 7th Framework Programme.

Activities to be carried out by Partners selected via Calls are an essential part of the core R&D activities of Clean Sky and have to lock in with the activities carried out by CS JU members other than the European Community.

What is peculiar for Clean Sky Calls for Proposals 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).

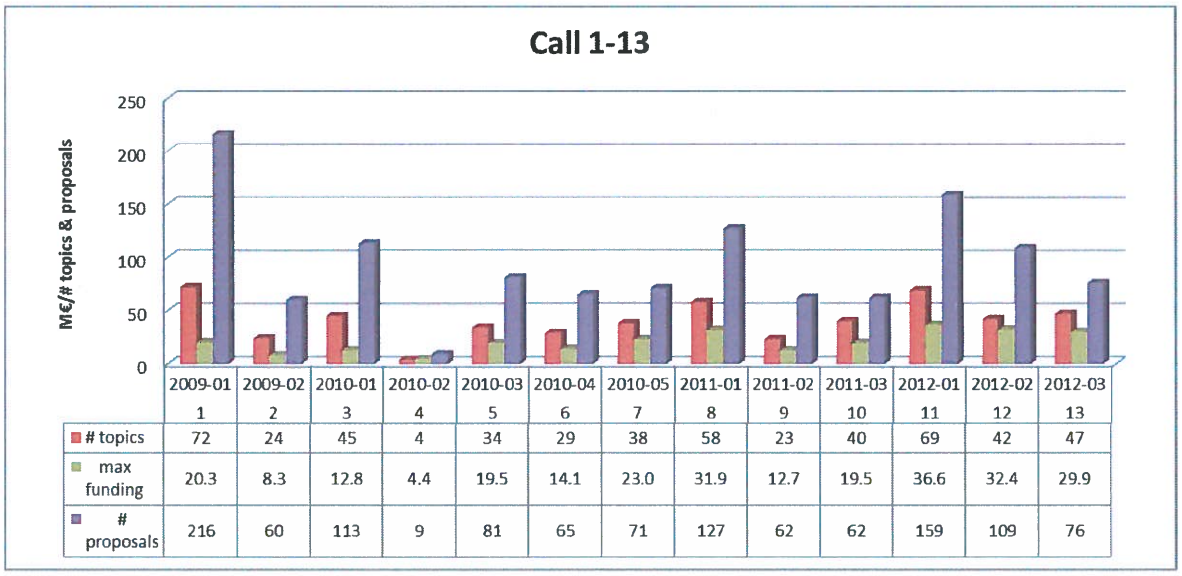
Another difference from collaborative research calls is that the budget is defined by the topic value, and not by the maximum funding: this to allow a wider participation from all types of entities, independently from the actual eligibility for funding. Furthermore, a single entity can present proposals, with no need for a consortium to be created. Differently from Collaborative research, there is always one winner per topic, provided suitable proposals are submitted and positively evaluated.

6.1 Statistics

Clean Sky Calls for Proposals results, from Call 1 to Call 13, at a glance:

- ***Total cost: 353.4 M€***
- ***Total funding: 265.2 M€***
- ***Average funding rate: 69%***
- ***Number of topics successfully applied to: 416***
- ***Number of winning participations: 800***
- ***Average number of participants by topic: 1,974***
- ***Number of partners: 474 (NB: there are less partners than "winning participations", because of entities being multi-winners, in several topics along time)***
- ***Average SME share: 35.1% in funding***
- ***Average Academia share: 18% in funding.***

The details relating to each of the 13 Calls launched by Clean Sky up to now are shown in the following figure:



	2009-01 1	2009-02 2	2010-01 3	2010-02 4	2010-03 5	2010-04 6	2010-05 7	2011-01 8	2011-02 9	2011-03 10	2012-01 11	2012-02 12	2012-03 13
# topics	72	24	45	4	34	29	38	58	23	40	69	42	47
max funding	20.3	8.3	12.8	4.4	19.5	14.1	23.0	31.9	12.7	19.5	36.6	32.4	29.9
# proposals	216	60	113	9	81	65	71	127	62	62	159	109	76

Response to the 13 Calls for Proposals, including the 3 issued in 2012

In the first 13 calls published, the total max funding value is more than 230 M€; the number of topics is 471, whereas the proposals received are 1210.

A total of 158 topics were published in 2012, in the different calls as in the table above (Calls 11 to 13, namely 2012-01, 2012-02, 2012-03).

The average response in the year is confirmed at 2.2 proposals per topic, i.e. more than 344 proposals in total for 158 topics.

The success rate of topics in the average is again 79%, as in 2011, due either to no proposals submitted or to negative evaluation of proposals.

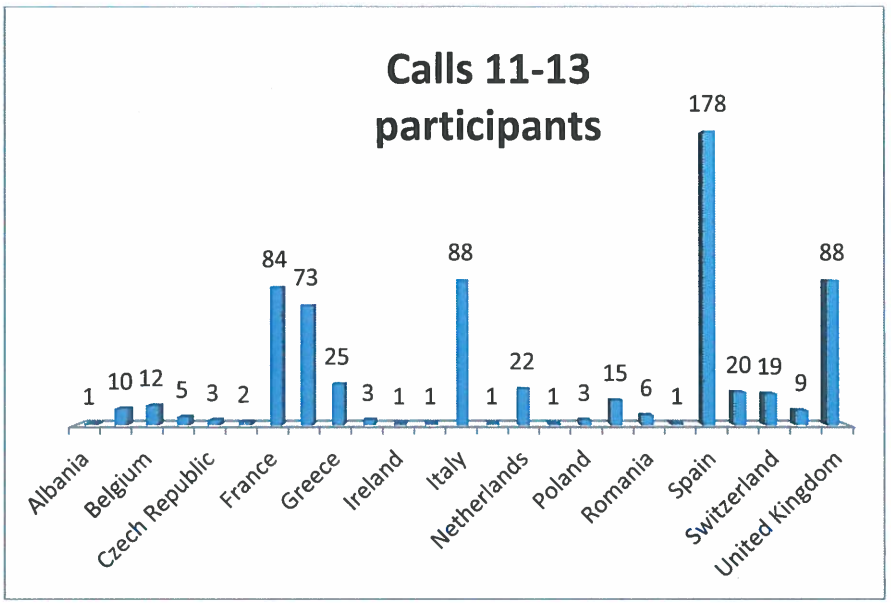
The JU has taken all available actions to improve participation, like more accurate description of some topics, a still wider dissemination, and a dedicated, early communication with potential applicants for the most critical topics. Several Info Days have been performed, with successful participation

The eligibility has worsened compared with 2011, from 12 proposals to 26; however, in a few cases this is a consequence of the cancelation of the topic during the evaluation, and not of the actual ineligibility of the proposals themselves.

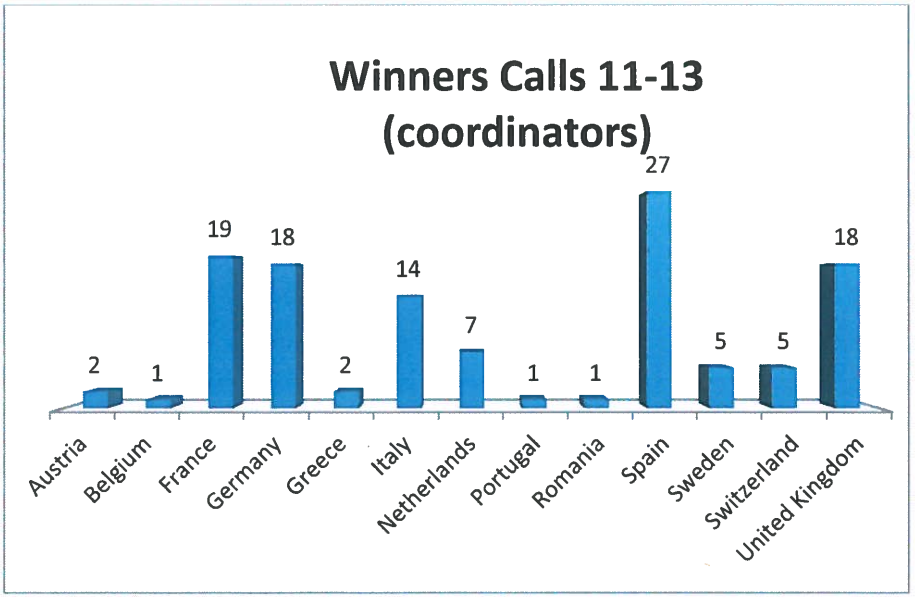
The monitoring of associates involvement in Calls has continued in 2012, with proper action to be taken at JU level in 2013. The rebalance will take place at global level, between member and CFP budget.

6.2 Evaluations outcome

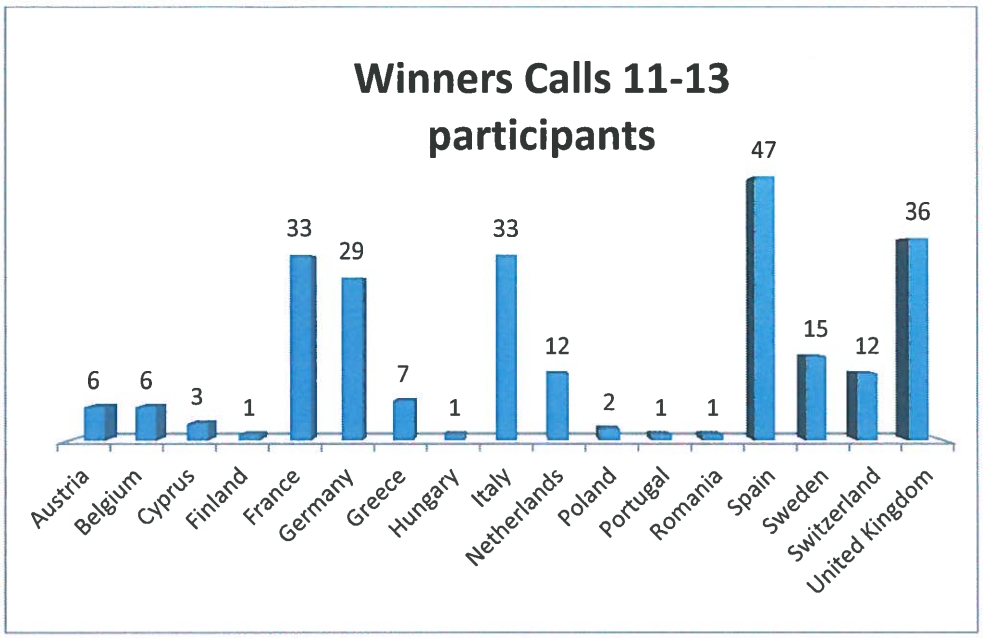
Below, graphs providing statistics per country in terms of participants to all proposals submitted.



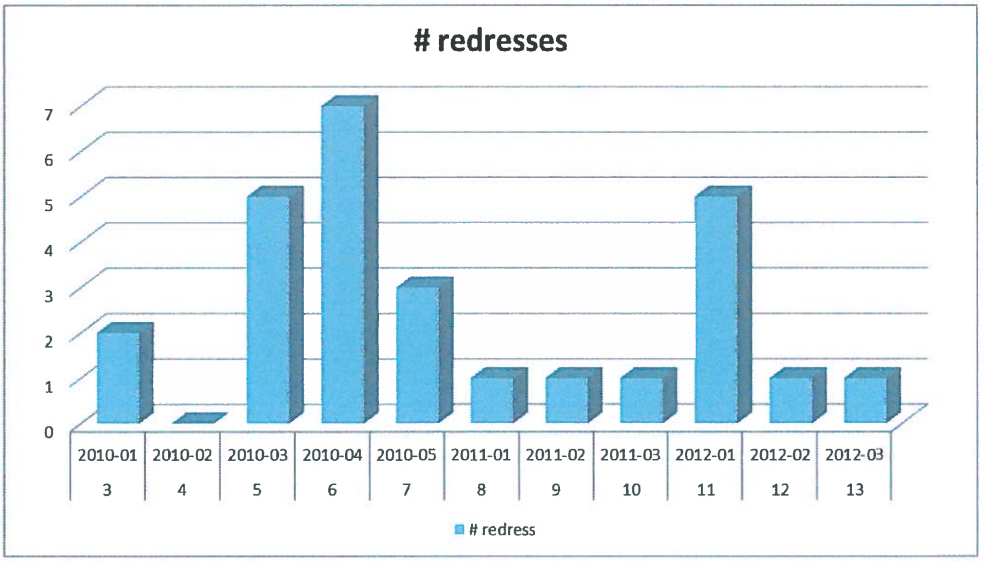
Below, graphs providing statistics per country in terms of coordinators of winning proposals is set out in a graph.



Below, graph providing statistics per country in terms of participating partners in winning proposals (both coordinators and participants).



6.3 Redress statistics



In calls 12 and 13 published in 2012, only one redress per call was submitted, as in the previous year; only Call 11, scored 5 requests for redress. This is basically explained by the largest number of topics (69) and related proposals (159), while no other correlation appears to be applicable (each redress is a specific topic, in different ITDs).

In all cases the Redress Committee judged the relevance of the complaint: in all case no change occurred to the ranking list as resulting from the evaluation.

Apart from the peculiar case in Call 11, the effectiveness and correctness of the evaluation process is confirmed.

6.4 Evaluation and negotiation processes

To ensure a high degree of transparency, the CS JU invited two different observers in 2012, one for the Calls 11 and 12 (Fulvia Quagliotti) and one new call 13 (Arrigo Mezzano).

Each observer had full access to all stages of the evaluation and to consensus meetings. Their Evaluation Reports are available on the website (http://www.cleansky.eu).

Since Call 5, a dedicated Negotiation Kick-off meeting involving the winners of the topics and the related topic managers is held by the JU after about 4 week after evaluation, in order to expedite the dialogue between the future partner and the topic manager, and the preparation of all documents needed for the signature of the Grant Agreement for partners.

In 2012 the JU performed another 'reporting and closure of GAPs meeting' with partners who had already been invited to report or who were about to report to the JU in line with the grant agreements signed with the JU. This meeting allowed reaching those partners who needed technical, administrative or legal assistance with the reporting for their grant agreements. As many actors are new to Clean Sky and some are even new to the FP7 research funding, this session was very useful for all concerned. This initiative will continue for all future calls.

7 COMMUNICATION ACTIVITIES

The communication activities are managed according to the Communication Strategy adopted by the Governing Board, and updated when necessary. The last update dates back to December 2011. On the basis of this strategy, identifying objectives, target audiences, messages and tools, an annual communication plan is built.

The awareness of the European institutions about Clean Sky achievements is considered as a priority, concerning both the satisfactory progress to the objectives and the wide participation. It has been noticed that the high level of SME participation in the programme, through the Calls for Proposals, was not recognized enough. Actions have been taken in this direction, for instance through appointments with MEPs.

Information Days were held in Madrid, Turin, and Brussels. An effort was also made to raise the interest of students to aeronautics, environment and Europe: mainly thanks to the involvement of STAB members, successful conferences took place in Amsterdam, Bristol, Paris and Berlin, with audiences of up to 150 students.

Clean Sky participated in the "Innovation Zone" in Farnborough Air Show; the stand was visited in particular by Rt Hon David Willetts, the UK Minister for University and Science.

The "Skyline" newsletter was continued, with four issues per year, as well as frequent e-news. The website was improved; in particular the technical information on each ITD, which were deeply revised and updated; besides that, the official information about the beneficiaries of grant agreements is periodically updated.

The possible continuation of Clean Sky in Horizon 2020, usually called Clean Sky 2, was subject to a lot of activity from the industry and the European Commission. The Joint Undertaking was mandated to coordinate this action, in particular to contribute to the public consultation. A large consultation day took place in ILA in Berlin, in September, where the general outline of the draft programme was presented and where external inputs were provided. Clean Sky 2 is now inherent to any communication activity, given the high expectations from any target audience: on the political side as well as from the potential industrial and scientific stakeholders.

8 SUPPORT ACTIVITIES

8.1 HR management

General HR management issues:

Establishment Plan – constraints:

Clean Sky JU is composed of 18 temporary agents and 6 contract agents (24 staff). Due to the rejection of an increase of posts in its MSPP 2012-2014 and 2013-2015, the JU could not enlarge in staff numbers. This situation has brought the JU's objectives of timely grant management into question as foreseen. In order to demonstrate the volume of work within the JU, a few key figures are shown below:

The team of 7 Project officers, 2.5 Financial Officers, 1 Legal Officer were responsible for:

- → Grant Agreements for Partners (GAPs) under negotiation: 184
- → Finalised negotiations for GAPs: 98
- → Signed GAPs in 2012: 102
- → Amendments of grant agreements: GAPS= 45, GAMs = 9
- → Payments to Partners: 142
- → Payments to Members: 14 (covering individual payments to 210 beneficiaries)

Lastly, the JU administrates all of its running costs internally, e.g. salaries, mission costs, utility invoices, experts reimbursements (over 250 individual payments),

Snapshot of future workload:

- Number of grant agreements to be established for Partners:
  - → *Calls 1 to 13*: 88 GAPs are still in negotiation (currently dealt with by 6 Project officers who already have on average 50 on-going grant agreements for Partners each to manage
  - → *Call 14:* 54 projects are foreseen to be negotiated
- Total number of interim or final reports from Partners to be treated:
  - → 508 for the currently existing GAPs - this number is growing as more GAPs are signed.
  - → 428 for grants presently in negotiation or for still ongoing calls. The number is based on 171 topics to be launched at 2.5 periods per GAP.

  Total reports foreseen: 936
- Number of grant agreements to be amended and monitored for Members:
  - → 4 annual and 3 multiannual amendments (annexes 1A and 1B), which entail a total number of 210 beneficiaries
  - → 7 annual reports for a total number of 210 beneficiaries.

Since no long term solution is reachable under the current situation, CSJU has opted to make use of interim staff as a temporary mitigation action. Due to the lack of continuity and the inefficiency caused by frequent changes of staff, the core business processes dealing with the operational and financial grant management face important risks of underperformance. Since the JU's management cannot compromise on the legality and regularity of its transactions in particular in respect of payments to third parties, timely delays are inevitable.

Lean management efforts:

Since the beginning of its autonomy, the JU's management has assessed the potential for saving posts and increasing efficiency through establishing leaner processes to the extent possible.
The JU shares the IT infrastructure maintenance and support costs with 4 other JUs residing in the same building by using a common IT helpdesk and support contract. In addition, the JUs share and run common facilities such as meeting rooms and mail collection.
The JU handles crucial HR processes, like recruitment procedures, departures of staff, performance evaluation and the entire administration of the existing team of more than 24 people, through an HR assistant, who is at the same time Assistant to the Executive Director.
The pool of 3 secretaries has been reduced to 2 staff by allocating the tasks relating to calls support and administration to one former secretary.
The Internal Auditor is performing a coordination and management role for the increasingly heavy burden of the ex-post audit process. In addition this function is combined with the role of quality management officer for the JU.

By organising its staff and tasks in the way described, the JU is saving 4.5 posts, which would normally be covered individually in a similar structure.

Staff movements in 2012:

In 2012, 16 of the Temporary Agents posts available from the initial Governing Board decision were filled for the full year. 2 Temporary Agents (Legal officer and Accounting officer) left and were recruited within the year. 4 of the 6 contract agents positions were also filled for the entire year.

In June, the CA FG IV (Ex-Post Audit Officer) left and the recruitment was started. The successful applicant started his contract on 15/1/13. In addition, in September one CA FG II (secretary) left and the recruitment process initiated. This was still on-going at the end of the year as the JU received over 500 applications for the position.

In August, the Communication Officer (TA AD7) left and the recruitment of the successor was achieved in 2012; the selected candidate started on 1/2/2013.

External service provider – Interim agency (Start People):

During the year 2012, the expected increase of workload materialised and could not be covered by the current team, as already anticipated. It became necessary to make use of 3

interim staff for 2012 in order to give assistance to the Project Officers and Administration, which concerned the following functions:

1 Administrative Assistant

2 Project Support Officers to help the Project Officers in the management of projects and the calls for proposals.

Trainees:

Clean Sky JU has hired 2 trainees in 2012, one as support for the Communication officer and one for the secretariat from September, when the related posts were not occupied and the recruitment not completed yet.

8.2 Housing

The JU continued to use its allocated space on the 4th floor of the White Atrium building, sharing this with the FCH JU and the other 3 Jus for common meeting facilities. This is working well and the 5 Jus constructively discuss day-to-day management of the premises as necessary.

8.3 ICT

The year 2012 was one of on-going development in the area of Information and Communications Technology (ICT) in Clean Sky. In addition to the regular support, software updates and refinements, some notable advances were made.

Clean Sky joined several more framework contracts of the European institutions for ICT hardware and service procurement. This provides more options and flexibility to meet future requirements.

An agreement was concluded in January 2012 with DG RTD to use their ICT facilities to access essential systems for key Clean Sky staff in the event of a disaster situation impacting the Clean Sky ICT facilities. These facilities were successfully tested in June 2012. This forms an important part of the business continuity options from an IT perspective for the CS JU.

A new I.T. system for managing the grants for members was developed and implemented (GMT). This required the setup of a new server to host the application and security measures and certification for the on-line user interface.

Further measures were implemented to improve the safekeeping of data. On the server side, a second tape drive was purchased and installed to improve the speed and robustness of the tape backups. On the client side, all desktops and laptops with upgraded with software to backup and synchronise local data with the server to protect against PC hardware failure or accidental deletion.

The Wi-Fi network was improved in several ways. A large project was started to redesign the document file structure and the new architecture was largely in place and more than two-thirds of the documents migrated by the end of 2012.

A lot of progress was made in further integration with the relevant I.T. systems of the European Institutions. System testing of access to the CORDA data warehouse was completed in 2012 ready for implementation in January 2013.

A pilot for the uploading of electronic versions of financial certificates (CFS) and reports (FormC) from partner grant beneficiaries was successfully completed. In November 2012 automatic generation of invoices was implemented in the contract management system for partner grant beneficiaries (CPM / PDM). This is in turn integrated with the budgetary system (ABAC) in which those invoices are now automatically created at data entry level in the workflow.

Clean Sky staff has regularly participated in the discussions concerning the new I.T. systems to be implemented for the CfP process in Horizon2020. Clean Sky requirements have been integrated and the first of those systems (SEP) has already been tested in 2012 and is now in use for the submission of proposals in the 14th Clean Sky call for proposals.

Concerning management, a more formal structure has been put in place for the governance of the ICT facilities shared between the JTIs. A road map has been developed to plan the evolution of the ICT facilities over the coming years.

8.4 Legal

A revision of the GAMs model core GA and Annex II was carried out since the Commission has decided to commit the remainder of the funds dedicated to the Specific 'Cooperation' Programme[7] of the Decision No 1982/2006/EC on FP7[8]. As a consequence of the multi-annuality and on the request of some ITDs, the Grant Agreements for Members ('GAMs'), concluded on a yearly basis, need to be revised. This global commitment allows the CSJU to set-up multi-annual GAMs, either on a two, three or four-year basis, as from 2013 to 2017. The revisions concerned the reference to programme duration, reporting periods and payment modalities (pre-financing, interim and final payments); they were revised based on the model of FP7 grant agreement.

The JU left open the possibility of either scheme (multi-annual GAM annual) to each ITD. The model Grant Agreement is adapted in such a way as to accommodate any solution. The revised models were approved by Decision of the GB on 13 December 2012 (GB-2012-12-13-12 doc7a Core GA-Annex II).

The Executive Director adopted a decision (no. 69) on the funding of third parties established outside the EU and FP7 Associated countries (ED Decision n° 69). The JU had to assess some requests and, after consulting DG RTD, decided for legal certainty and equal treatment of beneficiaries to establish a procedure to assess such cases.

The GB approved a transitional mandate to the Executive Director to ensure overall continuity of the JTI activity and the coordination of the preparatory phase of Clean Sky 2 Programme (CS-GB-2012-12-13 doc9 Mandate_ED_CS2)

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7 http://eur-lex.europa.eu/LexUriServ/site/en/oj/2006/l_400/l_40020061230en00860242.pdf

8 http://eur-lex.europa.eu/LexUriServ/site/en/oj/2006/l_412/l_41220061230en00010041.pdf

Procurement Procedures, contracts signed in the year 2012 (see table below)

Contractor	Selection procedure	Document Reference	Subject	Signature Date	Duration	Amount >5000 Euro
Start People/CSJU	Framework Contract IMI JU 2011.SC.137	Purchase Order n°25	Interim PO Assistant Exceptional activities long term	24/01/2012	01/03/2012 - 31/08/2012	40.473
Start People/CSJU	Framework Contract IMI JU 2011.SC.137	Purchase Order n°26	Interim Communication Assistant	24/01/2012	4h/day for 4 weeks 30/01/2012 - 31/03/2012	5.622
PriceWaterHouseCoopers EU Services EESV	Framework Contract association to BUDG FC	No: 30-CE-0227323–Lot1; Specific Contract No: 01_01_29	Accounting advice and assistance to the contracting authority (2011 final accounts)	07/05/2012	20 days (from 07/05/12)	25.124
PriceWaterHouseCoopers EU Services EESV	Framework Contract association to BUDG FC	No: 30-CE-0227323–Lot1; Specific Contract No: 01_01_29	Accounting advice and assistance to the contracting authority (2011 final accounts)	13/06/2012	8.5 days (from 13/06/12)	11.492
Start People/CSJU	Framework Contract IMI JU 2011.SC.137	Purchase Order n°65	Interim Legal Officer	11/05/2012	01/08/2012 - 31/10/2012	21.922
Start People/CSJU	Framework Contract IMI JU 2011.SC.137	Purchase Order n°86	Interim PO Assistant Exceptional activities long term	11/05/2012	01/08/2012 - 21/12/2012	33.726
Start People/CSJU	Framework Contract IMI JU 2011.SC.137	Framework Contract IMI JU 2011.SC.137 Purchase Order n°100	Interim PO Assistant Exceptional activities long term	30/05/2012	04/06/2012 - 31/08/2012	48.902
Start People/CSJU	Framework Contract IMI JU 2011.SC.137	Purchase Order n°145	Interim PO Assistant Exceptional activities long term	07/08/2012	01/08/2012 - 30/09/2012	13.490

Contractor	Selection procedure	Document Reference	Subject	Signature Date	Duration	Amount >5000 Euro
Start People/CSJU	Framework Contract IMI JU 2011.SC.137	Purchase Order n°147	Financial Assistant Exceptional activities long term	03/08/2012	20/08/2012 - 21/12/2012	23.719
Start People/CSJU	Framework Contract IMI JU 2011.SC.137	Purchase Order n°148bis	Interim PO Assistant Exceptional activities long term	01/09/2012	01/10/2012 - 21/12/2012	20.236
JK Events/CSJU	Framework Contract SCIC-D1-C.C 001/2008	Purchase Order No. 164	General Forum 2012	07/09/2012	until 27/09/2012	33.341
EFE Group/CSJU	Framework Contract EC n°HR/H3/PR/2011/012 lot1/2	Purchase Order No. 236	Team Building 2012 Trainings	21/11/2012	2 days	5.855
Hotel Thon/CSJU	Low Value Negotiated Procedure - art. 91 FR, 126 IR	Clean Sky 2012/10 Service contract	CS2 Consultation event	5/12/2012	3 days	26.968
FMD Consulting SPRL/CSJU	Low Value Negotiated Procedure - art. 91 FR, 126 IR	Contract Clean Sky 2012	Ex-post audit service contact	17/12/2012	8 days	5.000
Nuxos Publishing Technologies/CSJU	Low Value Negotiated Procedure - art. 91 FR, 126 e) IR	Contract Clean Sky 2012-Extension of Contract 2011/05	CSJU "GMT" data base development	17/12/2012	Until 30/06/2013	48.000

9 FINANCIAL REGULATION AND IMPLEMENTING RULES

On 25 October 2012, the European Parliament and the Council adopted Regulation (EU, Euratom) No 966/2012 on the financial rules applicable to the general budget of the Union repealing Council Regulation (EC, Euratom) No 1605/2002 (hereinafter "Financial Regulation")[9]. This Regulation introduces new rules applicable as from 1 January 2013.

The Commission plans to adopt in 2013 a revised Framework Financial Regulation for EU Agencies (revision on-going) and a specific PPPs model Financial Regulation for bodies under art. 209 of the Financial Regulation that would be in the future specifically applicable to the CSJU.

The CS JU will assess the immediate impact of the new EU Financial Regulation and will monitor the on-going preparation of the two above mentioned texts in order to assess the opportunity to proceed, for legal certainty and consistency with procedures and revised models for procurements and grants, to a timely revision of its Financial Rules.

10 INTERNAL CONTROL FRAMEWORK

10.1 Manual of financial procedures – financial circuits and workflows

The Executive Director adopted the last update to the Manual of financial procedures in December 2011. In the meantime, further improvements were drafted and a new manual will be adopted in the first quarter of 2013. The addition of the project controller as financial verifier officer helped to better distribute the number of files dealt with by management. In addition, the budget officer took over some verifying and authorising officer responsibilities through a delegation from the Executive Director for running costs. During the first half of 2012, specific delegations were put in place as the Head of Administration and Finance was on maternity leave. Further improvements in the processes for dealing with amendments to grant agreements for partners were introduced by the new Legal Officer in an effort to further smoothen the workflow for GAP amendments.

10.2 Specific controls on operational expenditure

At the beginning of 2012, the new IT tool for effectively managing beneficiary data relating to the grant agreements for members was put in place. This tool named 'Grant Management Tool' or 'GMT' was developed with the purpose of providing a reliable depository and workflow for the processing of the financial and technical reports of the ITDs' GAMs. Following the first development, the JU was able to enter all submitted Forms C (i.e. beneficiaries' financial statements) in the tool and work directly in the database to process the technical and financial reports from the ITDs for the year 2011.

As GMT was still under development during 2012 and the processing of reports could not be suspended, some interim workflows and steps were set out in addition to the financial workflows already reflected in the Manual of Financial Procedures.

[9] OJ L298, 26.10.2012, p.1

For the exercise of processing and validating the financial statements filed by the members for the GAM execution 2011 and adjustments proposed for previous years' GAMs, the JU used a combination of the GMT application and manual files to compile the amounts to be validated.

In 2012, and building on the steps taken in 2011, the JU has put further efforts into the objective of strengthening the business processes which monitor both the technical program execution and the financial budget implementation. In particular, through the GMT application, the two processors of the basic technical and financial reports are inextricably linked before a beneficiary's report can be fully validated by the JU.

This linking of the two arms of the validation process (technical and financial) has provided an intrinsic means, as part of the process, to have a close cooperation between the different aspects of the ITD GAM reporting to the JU.

As a result, procedures have been established, which aim at a shared responsibility for the validation of cost claims between the operational and financial units of the JU and which enhance the internal supervision of the final approvals taken. The new procedures have been applied for the assessment of GAM execution 2011 and for all on-going GAPs.

Financial controls:

In accordance with its GAMs, the JU expects to receive the technical and financial reports within 60 days of year end for year n-1. In 2012, the JU suffered a major delay in the submission of the Forms C and technical reports relating to the year 2011. This led to an overall delay for the JU to receive process and validate amounts for the 2011 cost claims in particular. Several adjustments were also received by the JU for previous years with these reports.

However, the JU exercised its control functions with respect to the financial and technical reports in a thorough way despite the existing delays. The financial officers checked in detail the Forms C and the certificates on financial statements and having lessons learned from previous exercises, were able to bring a more comprehensive feedback where necessary to the ITD coordinators and beneficiaries. Indeed, at the end of 2011 and 2012, the JU provided the ITD coordinators' financial contacts with workshops on the general findings detected by the JU during its validation exercise (for previous years), in an effort to actively encourage beneficiaries' with examples of how to improve the quality of the reporting to the JU, in line with the signed GAMs. It was also an opportunity to answer queries from coordinators or their respective beneficiaries. A similar exercise was held for the participants to the first "Reporting Info Day" which was held for GAP beneficiaries. The idea for the GAMs workshops in particular was to provide the guidance in a timely way for the preparation of the 2011 and 2012 cost claims (due to the JU by end of February of the subsequent year).

2012 saw the first year where the JU had at its disposal the results of the ex-post audits launched in 2011. It therefore had to integrate the results of these audits, where there were recoveries in favour of the JU, into the payments being processed during the year 2012. As the process was immature, the need for close coordination between the ex-post audit work and the financial assessment of the financial officer was very important. Individual procedures were established in order to accurately capture the necessary information which was relevant for the ex-ante control of the most recent form C but also for the adjustments submitted

relating to previous periods. For each ITD, reports were established setting out the detected errors of the concerned beneficiaries and the financial impact of the extrapolation of systematic errors. The process was hampered by the significant delay in finalising the ex-post audit reports, which was caused by resources constraints of the external audit firms and the JU team. For further information relating to the implementation of ex-post audit results in the payments' exercises of 2012, see section 10.3.

Operational controls:

The Annual Reviews of each of the ITDs were the most important events in the year for the ITDs to present and explain the status of technical progress, use of resources, achievements and implementation of the recommendations from the previous Annual Review as formulated by the external reviewers and the JU.

The Project Officers, besides the continuous monitoring and the approval of the deliverables and the annual reports, were involved in the ITD Steering Committees and participated to the most significant technical meetings like Preliminary Design Reviews, Critical Design Reviews, other Technical reviews, etc.

Periodic monitoring of ITDs was performed through the Quarterly Progress Reports (according to the Management Manual) as already started in 2011; the QPRs provide information on the progress of activities with respect to the Milestones and Deliverables planned for the period, and the associated Resources spent. The Project Officers judged the content of the reports, together with the Financial Officers and the Project Controller. A summary of the QPRs for all ITDs were presented to the Governing Board after the internal assessment.

The check point at Mid-Year was a fundamental element of the assessment of progress of operational activities, as the ITDs had to state the actual situation of project execution and consistency of actuals achieved against plan for the year, confirming the expected efforts and targets for the end of the current year; when the deviation is significant, an amendment to the GAM can be required. The POs played an essential role in revising the ITDs' statements.

With a view to Partners' activities, the POs followed the evaluation of calls for proposals, the approval of ranking of selected proposals, the negotiation phase until the signature of the Grant Agreement for Partners; specific care is then dedicated to the monitoring of execution of the projects.
The JU organised Kick-Off meetings for the selected Partners at start of negotiation, as well as technical reviews of the on-going projects; the continuous monitoring of activities was ensured through the cooperation of Project Officers, Topic Managers and the Partners.

In 2012 the role of the STAB (Scientific and Technological Advisory Board) continued in the assessment of technology and strategy of the different ITDs; the STAB members were again acting as external reviewers in the ITDs' Annual reviews. The STAB was also requested to check, by sampling, the Quality of deliverables. The dedicated Working Groups within the STAB completed their assessment of TRL usage in the ITDs and the revision of environmental targets. In the second part of 2012, STAB has been also involved in the discussion on content and scope of H2020 and related continuation of a Clean Sky initiative. Where applicable and needed, the POs are fully involved in these tasks, supporting STAB.

The interaction with ITDs about transversal issues, like CFPs (topics, evaluation, GAP management), preparation of documents for GAMs; budget revisions; technical reviews, is dealt with at the ITD Coordination Group, which meets at least quarterly, involving all ITD Coordinators and POs.

10.3 Ex-post control of operational expenditure

The results of the Ex-Post Audit (EPA) process represent a significant element of the Internal Control System of the JU.

The main objectives of the EPAs are:

- Through the achievement of a number of quantitative targets, assess the legality and regularity of the validation of cost claims performed by the JU's management
- Provide an adequate indication on the effectiveness of the related ex-ante controls
- Provide the basis for corrective and recovery activities, if necessary

On the basis of the Clean Sky Ex-post audit Strategy, as adopted by the CS Governing Board, three audit exercises have been performed in the year 2012, which are in the process of being finalised:

(A) 4 audits stemming from the first EPA exercise of the year 2011 are included in the audit process of the year 2012. The concerned audit reports were delivered by the responsible external audit firm with a delay and results could not be reflected in the calculation of error rates of the year 2011.

(B) The batch assignments EPA 04, 05 and 06/2012 were launched in March 2012. Scope of the audits was 5 Grant Agreements for Partner and one Grant Agreement for Member. The audits were assigned to three external audit firms. Results from these audits are final and either pre-final or final audit reports have been received.

(C) The second EPA exercise 2012 comprised of two batch assignments, EPA 07 and 08/2012, and was launched in October 2012. Subject to audit were 90 cost claims pertaining to 20 Grant Agreements for Member. Two external audit firms were involved. For 8 reports the audit results were not final at the time of this report and could not be included in the calculation of the error rates 2012. There were several reasons for these delays. In most cases the timely execution of the audits was hampered by organisational issues at the auditees or at the audit firms; in some cases the requested information or evidence was not provided by the auditees in the given time frame.

The total audited value of audits launched in 2012 amounted to Euro 58.562.767(reported costs), which is equivalent to a JU contribution of Euro 29.661.653.
However, after excluding the audits, for which no final audit results have been received until the closing of the Final Accounts 2012, the remaining audited value is Euro 39.495.744 (Euro 20.128.141 JU-contribution. The presentation of the audit coverage and the calculation of the error rates for the EPA exercise 2012 is based on this lower audited value.

Based on the results of the pre-final and final audit reports, recovery of overpayments including the financial impact of extrapolation of systematic errors has been performed and completed until the end of May 2013. As there are no open controversial cases with auditees, a recovery rate of nearly 100% has been achieved until the end of May.
Final representative and residual error rates have been calculated and are considered by the Executive Director in his final annual assurance declaration 2012, see Annex 1.

Audit sample and coverage

The sample considered in the ex-post audit exercise 2012 was composed of three parts:

(A) 4 remaining audits stemming from the EPA exercise 2011 not included in 2011 error rates
(B) Audits launched in March 2012
(C) Audits launched in October 2012

Table 1:

Audit exercise	Totals	GAMs 2008	GAMs 2009	GAMs 2010	GAMs 2011	GAPs 2009
(A)						
audited value	4,626,432.49	155,487.00	2,915,048.00	1,555,897.49	0	0
number of cost claims	6	2	2	2	0	0
number of audits	4					
(B)						
audited value	8,241,151.67	553,298.51	2,228,821.89	4,698,493.77	0.00	760,537.50
number of cost claims	10	1	1	3	0	5
number of audits	6					
(C)						
audited value	26,628,159.55	1,307,827.97	9,716,838.35	14,692,345.46	911,147.77	0
number of cost claims	46	9	15	16	6	0
number of audits	12					
total						
audited value	39,495,743.71	2,016,613.48	14,860,708.24	20,946,736.72	911,147.77	760,537.50
number of cost claims	62	12	18	21	6	5
number of audits	22					

The sample consisted mainly of validated cost claims from GAMs stemming from the years 2008 to 2011. A small number of the selected items concerned validated cost claims for the execution of GAPs (signed in the year 2009).

For the calculation of the audit coverage, the accumulated audited value covered by the EPA exercises 2011 and 2012 is compared to the accumulated total amount of validated cost claims at the date of the closing for the Final Accounts 2012.

Table 2:

Audit population and selected sample		Euro
audited value from EPA exercise 2011 (sample)		44,266,850.86
audited value from EPA exercise 2012 (sample) (A+B+C)		39,495,743.74
Total audited value of the years 2011 and 2012	(a)	83,762,594.60
Total audit population	(b)	413,646,763.84
Coverage	(a) / (b)	20%

The sample was established according to the methodology described in the JU's ex-post audit strategy considering the following elements:

- Most significant cost claims (all CCs until a certain coverage starting from the biggest ones)
- Representative sample selected at random
- Risk based sample (3 beneficiaries have been selected on the basis of a risk assessment)

External audit firms under contract

Audits have been assigned to external auditors in line with the EPA framework contract in batches. In 2012 specific contracts have been signed with 3 individual audit firms for 5 batch assignments as follows:

Table 3:

Audit Firms	Number of audit engagements	Number of cost claims	Audited value
PWC NL	2	2	197,446.04
KPMG Germany	7	22	10,426,321.87
Littlejohn UK	9	34	24,245,543.22
Total	18	58	34,869,311.13

The 4 audits stemming from batches 2011 had been assigned to PWC NL:

Table 4:

Audit Firms	Number of audit engagements	Number of cost claims	Audited value
PWC NL	4	6	4,626,432.49

Materiality

The following materiality thresholds were applied by the audit firms:

- Overall materiality for qualification of the auditors opinion: adjustment of 2% of total audited value of cost claims included in the audit report
- Reporting materiality for adjustments to be listed in the audit reports: Euro 150
- Sampling approach: the auditor's sample includes the most significant cost items of the audited cost claims and a judgemental sample of residual amounts.

As a preliminary result based on the first versions of the DARs and some PARs, 13 out of 24 opinions have been qualified by the auditors because of material adjustments in favour of the JU and of the beneficiaries (over 2% of respective total declared costs audited).

Audit results

Quantitative results (indicators):

1. Audits launched, on-going, closed

Table 5:

Status of audits	number	share of total launched
Launched in 2012	26	
Draft audit reports received (1.version)	20	77%
Pre-final reports received (final version)	18	69%
Final reports received	10	38%

For the 4 audits stemming from batches 2011 all Pre-final audit reports have been received.

2. Adjustments and detected error rates

Table 6:

Audit exercises - individual and accumulated until 2012	Audited value including not received reports	Total audited value/requested contribution of reports received (A)	Adjustment in favour of CSJU	Adjustment in favour of the beneficiary	Detected error rate in favour of the beneficiary	Detected error rate in favour of CS JU	Representa-tive error rate in favour of the beneficiary	Representa-tive error rate in favour of CSJU	Systematic error in favour of CSJU	Systematic error rate in favour of JU	Unaudited cost claims of auditees	Unaudited requested contribution of auditees	Total unaudited cost claims of audited beneficiaries (E)
Batches 04, 05, 06/2012 partners	760,537.41	760,537.50	0.00	17,271.28	2.27%	0.00%	2.27%	0.00%			598,426.22	412,590.70	412,590.70
Batches 04, 05, 06/2012 members	7,480,614.20	7,480,614.20	-39,431.37	0.00	0.00%	-0.53%	0.00%	-0.53%			12,267,377.66		12,267,377.66
Batches 07, 08/ 2012 (detected results incl. non representative)	45,695,183.95	26,628,159.55	-1,743,202.55	335,936.42	1.26%	-6.55%			-679,606.01	-2.55%	25,188,045.64		25,188,045.64
Batches 07, 08/ 2012 (representative results excl. risk based items)	29,499,333.72	20,030,660.77	-735,225.41	335,396.27			1.67%	-3.67%	-679,606.01	-3.67%	14,720,306.12		14,720,306.12
batches 07, 08/ 2012 Risk based sample:	16,195,132.75	6,597,498.78	-1,007,977.14	540.15	0.01%	-15.28%	0.01%	-15.28%	0.00	0.00%	10,467,739.52		10,467,739.52
Remaining audits from batches 2011	4,626,432.49	4,626,432.49	-5,648.12	61,803.39	1.34%	-0.12%	1.34%	-0.12%	-7,346.67	-0.16%	27,408,821.18		27,408,821.18
Results audit exercise 2012 (detected results incl. non representative)	58,562,768.05	39,495,743.74	-1,788,282.04	415,011.09	1.05%	**-4.53%**			-686,952.68	-1.74%	65,462,670.70		65,276,835.18
Results audit exercise 2012 (representative results excl. risk based items)	42,366,917.82	32,898,244.96	-780,304.90	414,470.94			1.26%	-2.37%	-686,952.68	-2.09%	54,994,931.18		54,809,095.66
Results audit exercise 2011	44,266,850.86	44,266,850.86	-2,686,685.42	1,117,319.63	2.52%	-6.07%	2.52%	-6.07%	-2,186,524.10	-4.94%	43,363,736.30		43,363,736.30
Accumulated results all audit exercises (detected results incl. non representative)	**102,829,618.91**	**83,762,594.60**	**-4,474,967.46**	**1,532,330.72**	**1.83%**	**-5.34%**			-2,873,476.78	-3.43%	108,826,407.00		108,640,571.48
Accumulated results all audit exercises (representative results excl. risk based items)	**86,633,768.68**	**77,165,095.82**	**-3,466,990.32**	**1,531,790.57**			1.99%	**-4.49%**	-2,873,476.78	-3.72%	98,358,667.48		98,172,831.96

The (ex-post) detected error rate (DetER%) is an indicator of the quality of the ex-ante controls as it gives an estimate of errors that remain undetected after the ex-ante controls have been performed. It is calculated as the rate of errors actually detected in the audited sample related to the total value of the audited cost claims in the sample.
The accumulated DetER% in favour of CSJU identified in the audited population in the EPA exercise 2012 is 4.53%. The accumulated rate for the audits performed in 2011 and 2012 is 5.34% (see table 6).

The representative error rate (RepER%) indicates the error rate, which can be inferred on the entire population of cost claims (audited and unaudited) based on the results of the DetER%. For calculating the RepER%, errors detected in the non-representative part of the sample are taken out. Non-representative are audits of beneficiaries, which have not been selected on a random basis, e.g. the risk based audits. The RepER% for 2012 is 2.37%, the accumulated rate for the audits performed in 2011 and 2012 is 4.46% (see table 6)

The DetER% and the RepsER% are both calculated as a weighted average of the individual rates detected[10]. They reflect errors incurred before corrective measures are taken by the JU to recover the identified overpayments.

The **(ex-post) residual error rate (ResER%)** indicates the "net-errors" that remain in the total population after implementing corrective actions by the JU, i.e. recovery of overpayments including extrapolation of systematic errors to non-audited cost claims.
Taking into account the systematic adjustments proposed by the auditors in the audits performed in the years 2011 and 2012 and considering, that the recovery mechanisms have been performed, the ResER% is calculated according to the following formula:

$$ResER\% = \frac{(RepER\% * (P-A) - (RepERsys\% * E)}{P}$$

The ResER% pertaining to the representative audits carried out in the EPA process 2012 is calculated as shown in table 7a:

Table 7a:

Calculation of residual error rate (ResER%): EPA 2012 (excluding risk based sample):	
Total population (P) =	177,832,919.76
Audited population (A)=	32,898,244.96
total non-audited cost claims of audited beneficiaries (E) =	54,809,095.66
Representative error rate (RepER%) =	-2.37%
Systematic error rate (RepERsys%) =	-2.09%
ResER% =	-1.29%

[10] According to the CSJU Audit Strategy, the average representative error rate is calculated as simple average of all individual rates detected. In our view, the result of this simple average error rate is misleading. Using a non-weighted average of all error rates discovered in each of the cost claims, irrespective of the value of the total amounts involved, would require a sufficiently big sample size and population to arrive at a meaningful representative result.

The accumulated ResER% for the years 2011 and 2012 shows the results of all representative audits carried out so far and is calculated as follows in table 7b:

Table 7b:

Calculation of residual error rate (ResER%): Accumulated EPA 2011 and 2012(excluding risk based sample)	
Total population (P) =	413,646,763.80
Audited population (A)=	77,165,095.82
total non-audited cost claims of audited beneficiaries (E) =	98,172,831.96
Representative error rate (RepER%) =	-4.49%
Systematic error rate (RepERsys%) =	-3.72%
ResER% =	-2.77%

Extrapolation

The extrapolation of systematic errors for the audit exercise 2012 has been performed for all beneficiaries, for which audits have identified a net systematic error rate of all cost claims included in the audit of an individual beneficiary exceeding 1%. The process has been started as soon as the pre-final audit reports had been agreed with the audit firms. The extrapolation for the audit batches of 2011 and 2012 is in its final stage; see section *Implementation of audit results.*

Qualitative results:

In the ex-post audits performed in 2012 the auditors identified errors resulting in adjustments mainly in 3 cost categories, i.e. personal costs, subcontracting and indirect costs. The audit results revealed, that often the methodology used for calculating the personal and the indirect costs does not sufficiently take into consideration the requirements of the eligibility criteria of the CSJU grant agreements and of the rules applicable for FP7 contracts but refers rather to pricing requirements of national authorities and/or other big customers.

As far as the errors represented systematic mistakes or control weaknesses, the JU took care, that these systematic errors were considered by its Financial Officers and if necessary excluded during the validation of fresh cost claims submitted by the concerned beneficiaries.

The JU has already provided guidance on eligibility of costs under the FP7 program and in particular for CS grant agreements to the financial contact points of the JU's members and will continue these efforts.

Implementation of audit results

EPA exercise 2011:

Overpayments identified in the ex-post audits carried out in the year 2011 have been recovered during the year 2012 through payments of pre-financing 2012 or final payments for GAMs 2011 to the ITD coordinators.
Likewise, the financial effect of the extrapolation of systematic errors detected in the ex-post audits 2011 on unaudited cost claims has been withheld from the same payments.

The status of the implementation of corrective actions at the date of this report is reflected in the following table.

Table 8a:

Correction of audited financial statements of EPA exercise 2011				
Audited value	Adjustments in favour of CSJU per audit reports (100%)	related overpayment (50 % of total adjustment)	recovered overpayment	recovery rate for overpayments (%)
44,266,850.86	2,686,685.42	1,343,342.71	1,257,897.42	93.64%
Correction of unaudited financial statements				
Value of unaudited financial statements of audited beneficiaries	total value of actual extrapolation launched (100%)	related overpayment based on extrapolation launched (50%)	recovered overpayment	recovery rate for overpayments (%)
43,363,736.30	1,184,228.66	592,114.33	549,128.98	92.74%
Total corrective action implemented				
Total value of financial statements of audited beneficiaries	total value of corrections (100%)	related overpayment (50%)	recovered overpayment	recovery rate for overpayments (%)
87,630,587.16	3,870,914.08	1,935,457.04	1,807,026.40	93.36%

The remaining 6.4% of the detected errors will be recovered on the occasion of the next payment performed to the ITD coordinators.

EPA exercise 2012:

As opposed to the approach taken for the EPA results 2011, overpayments identified in the ex-post audits carried out in the year 2012 have been recovered during the year 2013 directly through individual recovery orders on the level of the beneficiaries concerned.
Likewise, the financial effect of the extrapolation of systematic errors detected in the ex-post audits 2012 on unaudited cost claims has been recovered in the same way.

The status of the implementation of corrective actions at the date of this report is reflected in the following table.

Table 8b:

Correction of audited financial statements for EPA exercise 2012 all batches				
Audited value	Adjustments in favour of CSJU per audit reports (100%)	related overpayment (50 % of total adjustment)	recovered overpayment	recovery rate for overpayments (%)
39,495,743.74	-1,788,282.04	-894,141.02	-889,284.90	99.46%
Correction of unaudited financial statements				
Value of unaudited financial statements of audited beneficiaries	total value of actual extrapolation launched (100%)	related overpayment based on extrapolation launched (50%)	recovered overpayment	recovery rate for overpayments (%)
65,936,546.70	-452,697.67	-226,348.84	-226,348.83	100.00%
Total corrective action implemented				
Total value of financial statements of audited beneficiaries	total value of corrections (100%)	related overpayment (50%)	recovered overpayment	recovery rate for overpayments (%)
105,432,290.44	-2,240,979.71	-1,120,489.86	-1,115,633.73	99.57%

Assessment of the ex-post audit results

The present results of ex-post audits performed on validated cost claims pertain to GAMs and GAPs of the years 2008 to 2011.
As described in the materiality criteria in Annex 3 of the AAR 2011, the control objective of the JU is to ensure for the CS program, that the residual error rate, which represents the remaining level of error in payments made after corrective measures, does not exceed 2% of the total expense incurred until the end of the program.
Up to now, the accumulated audit coverage of the validated financial statements pertaining to GAMs and GAPs for the years 2008 to 2011 is 20 %.

The indicators established from the sample covered in the 3 audit exercises carried out in the years 2011 and 2012, reflect an accumulated detected error in favor of the JU in the total validated operational expense of -5.34%. This rate is the combined result of the audits performed in the years 2011 and 2012.
When comparing the individual annual results for the detected errors, a positive trend can surely be identified (2011: -6.07 %, 2012: -4.53%).

As opposed to the first EPA exercise in 2011, the sample in the year 2012 comprised of some audits, which were not selected at random but based on a risk assessment. By excluding the results of the risk based audits, the representative error rate is established at -2.37% for the

audits carried out in 2012, which confirms the above positive tendency and comes close to the objective to limit the residual error rate at a maximum of 2%.

The specific population of GAPs is covered by a comparatively low sample (6.77%), which identified errors detected in favour of the beneficiaries only. At present the results do not indicate a significant risk for undetected overpayments to Partners.

Under the assumption, that audit results are properly implemented, which means overpayments in audited cost claims are recovered and systematic errors are corrected in unaudited cost claims of audited beneficiaries, it appears justified to look at the error rate after cleaning mechanisms have taken place, i.e. the residual error rate.
The same favorable development as for the detected error rate can be noted for the residual error rate, which improved from -4.22% (EPA 2011) to -1.29% (EPA 2012).

The corrective measures for the first audit batches, carried out in the years 2011 and 2012, have been implemented up to now with 94% respectively 100%; the financial risk is covered to 100% as open claims of the concerned beneficiaries with even higher amounts are kept on hold.

Due to the specific situation of the CSJU with its named beneficiaries receiving 75% of the entire operational funds, and with a view to the comparatively high share of systematic errors detected (RepERSys% = 3.72% versus RepER% = 4.49% accumulated values for 2011 and 2012), the potential for excluding errors from not audited cost claims in the future is high.

With a view to the stable population of beneficiaries (named beneficiaries for GAMs) until the end of the CS program, we expect a further decrease also in the detected errors in the following years through experience made by the beneficiaries and following guidance provided by the JU. The rules and guidelines for FP7 projects foresee measures (liquidated damages) to penalize beneficiaries, who include the same systematic errors in future cost claims already identified through previous ex-post audits.

By sharing the information on systematic and non-systematic errors detected in the EPA process with the Financial Officers of the JU, the quality of the ex-ante validation of cost claims for GAMs and GAPs will be further improved.

The results of the EPA process 2012 reflect the legality and regularity of the validation process for GAM and GAP execution 2008 to 2011. Thus, they do not directly relate to the entire expenditure incurred by the JU until the end of year 2012.
However, the JU's EPA strategy is implemented through an ongoing process, which provides representative results applicable to the accumulated operational expense incurred for the CS program as recorded in the JU's Final Accounts.

The identified error rates have to be evaluated with a view to the multiannual EPA strategy, which will further evolve during the entire duration of the program. Under this multi-annual aspect, the accumulated scope and results of the EPA process 2011 and 2012 are considered relevant and adequate to provide assurance for the operational expenditure as recognized in the Final Accounts 2012.

10.4 Audit of the European Court of Auditors

In 2012, the JU was audited by the European Court of Auditors as set out in the Statutes. The results of these audits were published in the Court's Report on the Annual Accounts 2011[11]. In its Statement of Assurance, the Court issued to the CSJU a positive opinion on the reliability of the annual accounts 2011, and a qualified opinion on the legality and regularity of the underlying transactions. The qualification made reference to the detected error rate established through the ex-post audits performed by the JU on validated cost claims pertaining to GAMs for the year 2008 to 2010.
Findings and comments raised by the Court during the 4 audit visits performed until September 2012 have been taken on board by the JU and actions have been developed to further improve the procedures of the JU and enhance controls.

10.5 Internal Audit Activity

Internal Audit Service (IAS):

Based on its Strategic Audit Plan for the years 2012-2014, the IAS has performed in November 2012 an assurance audit on the topic "Grant Management – Annual Planning (GAMs and topics of the calls)". In March 2013 the JU has received the Final Audit Report, which contained 1 very important and 7 important recommendations. The JU's management has provided comments to the auditors' findings and has accepted the recommendations. An action plan for implementing the auditors' recommendations has been agreed upon.

In June 2012, the IAS provided its annual internal audit report 2011, in which a summary of the risk assessment and of the planned audits for the years 2012 to 2014 is presented. The report further contains an action plan for the JU's management for enhancing controls in processes with high residual risk levels.

The results of the IAS' update of its risk assessment since 2011 have not been communicated to the JU at the date of this report.

Internal Audit Officer (IAO):

The IAO of the JU has summarised her main activities and conclusions drawn from an update of the IAO's risk assessment in the IAO's Annual Report 2012[12].

Similar to the previous years, the IAO has focused in 2012 on consultancy services rather than on audit engagements, in order to advise the JU's management on further improving the processes and enhancing the necessary controls.

Therefore, no audit recommendations have been made by the IAO in the year 2012 and no opinion has been issued by the IAO on the status of the Internal Control framework of the JU.

[11] Report on the Annual Accounts of the Clean Sky Joint Undertaking for the financial year 2011, dated 13.11.2012
[12] Annual Report 2012 of the Internal Audit Officer, dated 04.02.2013

In the year 2012, main areas of activities for the IAO have been:

- Risk assessment of the IAO, covering the entire internal control system of the JU
- Ex-post audit process of the JU
- Consultancy services in the field of
  - Accounting and financial reporting
  - Ex-ante validation process for operational expense
  - Implementation of Ex-post audit results
  - Risk assessment of the JU

As a result of the risk assessment, the IAO concluded, that the control environment of the JU became more complex compared to previous years and did therefore not always allow to reduce the residual risk levels. This was in particular the case for:

- the budgeting and accounting cycles, where a new system for Grant management has been introduced, which needs to be further developed and reliable interfaces with ABAC and SAP have to be established; in addition the carry-over mechanism for unused appropriations requires enhanced controls;

- annual and multiannual planning processes, which require a strong role of the JU in managing the completion of the program in technical and budgetary respect;

- payment and recovery transactions, which have become more demanding with a view to implementing ex-post audit results;

- management of the reporting cycle for GAPs, where the JU faced delays incurred by partners in submitting final reports (operational and financial)

- validation of cost claims, which have been provided with a significant delay by the JU's members in the year 2012 and which require more stringent assessment as a response to the comparatively high error rates detected through the ex-post audits.

- the ex-post audit process, which is still hampered by resources constraints and manual data preparation

The IAO identified core processes, which require further attention of the CS management team. Actions were identified and agreed with the JU's management to mitigate very important risks impacting the accomplishment of the business objectives of the JU's core processes. Several of these mitigating actions were partially implemented by the end of the year 2012.

Due to repeated involvement in management tasks, the IAO disclosed to management and GB a lack of objectivity in respect of some specific activities and operations of the JU, for which the IAO took over direct operational responsibility. The activities concerned were:
- establishing the Annual Accounts 2009, 2010 and 2011,
- validation of cost claims 2008 to 2012
- ex-post audit process 2011 and 2012.

Instead of assurance audits, consultancy services are provided by the IAO in order to develop the concerned processes further and establish the necessary controls until the objectivity of the IAO related to these processes is ensured again.

As required by the CS Financial Rules, the Executive Director of the JU has drawn up and sent his report to the Discharge Authority on internal audits carried out in 2011[13].

11 BUDGET EXECUTION AND FINAL ACCOUNTS

11.1 BUDGETARY IMPLEMENTATION

Budget management in general:

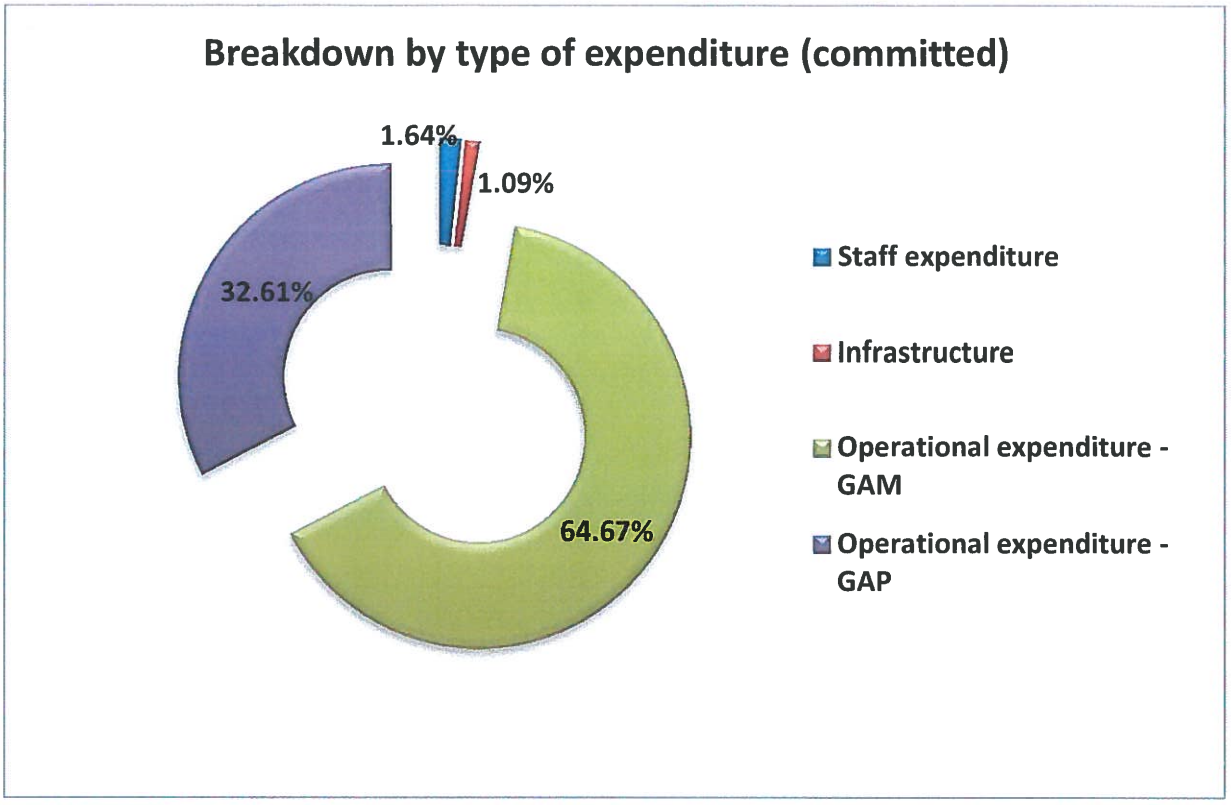
The JU managed its largest ever budget in the year 2012 for commitment appropriations (205.3m €). Compared to 2011, this represented a 7% increase of available commitment appropriations. Of this, it executed 90%[14] through new financial commitments.

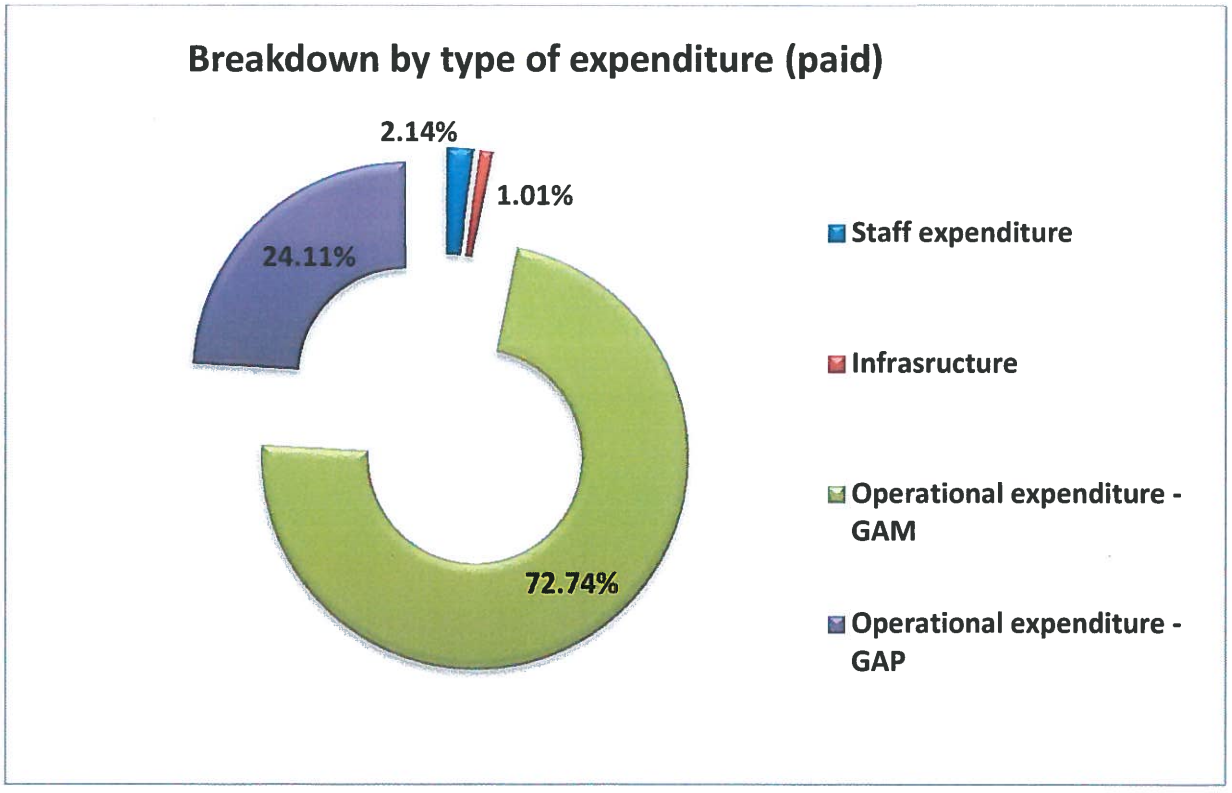
On the other hand, the available payment appropriations decreased by 13% compared to the previous year to 167.9m €. Of this amount, 75% was paid out during 2012.

At a glance, a breakdown of the areas of commitment and payment is illustrated.

[13] Annual Report of the Executive Director to the Discharge Authority on internal audits carried out in 2011, Art. 73(5) CS Financial Rules, *not dated.*

[14] *Excludes the appropriations which were foreseen to be unused at year end*


Breakdown by type of expenditure (committed)
1.64%
1.09%
32.61%
64.67%
Staff expenditure
Infrastructure
Operational expenditure - GAM
Operational expenditure - GAP


Breakdown by type of expenditure (paid)
2.14%
1.01%
24.11%
72.74%
Staff expenditure
Infrasructure
Operational expenditure - GAM
Operational expenditure - GAP

Facts and figures by title of the budget:

Title 1 & 2	Budget (m €)	Executed (m €)	% rate
CA	4.7	4.7	100
PA	4.7	3.9	84

Title 1 & 2: The running costs of the JU had a very high rate of use in 2012 showing a reliable budgetary planning for this part of the JU budget. Staff expenditure budget (Chapter 11) was mainly used for the statutory staff of the JU (18 people at 31.12.12), although other external support was also hired in by the JU to cope with the increased workload (Chapter 12 used). The JU has also contracted the services of audit firms to perform the ex-post audits to beneficiaries of JU funding in 2012 (Chapter 28).

***

Title 3	Budget (m €)	Executed (m €)	% rate
CA	187.7	168.3	90
PA	163.2	122.4	75

Title 3: The chapters relating to the ITD grant agreements for Members (chapters 30-36), show a high rate of commitment in all cases as this reflects the requested commitment appropriations for the year 2012 grant agreement. On the payments side however, as the JU pays the pre-financing of the current year and the final payment of the previous year, the execution rate ranges between 77% and 94% of the allocated amounts. The main reason for the lower execution is due to the lower than expected values of cost claims validated by the JU in combination with some compensation for recovery of over-paid pre-financing of 2011 and the implementation of ex-post audit results within these payments.

In general, the rate of payment execution is improving but 2012 was the first year the JU implemented the corrections needed due to the ex-post audit findings with the affected beneficiaries. This therefore lowered their overall payment execution during the year 2012. It is reminded that these ex-post audits covered three previous years (i.e. 2008-2010) and was the first exercise of the JU for ex-post audits.

With regard to chapter 37, which comprises of the funds allocated to the grant agreements for Partners, the budget execution has been slower than expected in 2012. This is due to a number of topics failing to have a successful proposal found following the publication of the call. In addition, the JU de-committed the amounts not needed directly within 2012 in order not to carry these forward as automatic carry forward. This allows a clearer picture of the actual budget consumption at year end for calls.

11.2 FINAL ACCOUNTS

The main tables of the Final Accounts 2012 of the CSJU are included in the Annex 5 of this report. They comprise of the Balance Sheet, the Economic Outturn Account, the Statement of changes in Net Assets and the Cash Flow Analysis. A detailed explanation to assets and liabilities of the JU and to the economic result of the year 2012 is provided in the Notes to the Final Accounts, which form part of the Final Accounts document itself.

Economic Outturn

The economic outturn account presents the economic result of the CSJU in the reporting period (01.01.2012 – 31.12.2012).

The most substantial component are the operational expenses incurred in-cash and in-kind for implementing the aeronautical research programme funded by the JU. The operating expenses ("administrative expenses") cover the running cost of the JU.

Due to the specific accounting rules applied by CSJU the funds received from the Commission and from the other members of the JU are shown as Contributions received from members in the Net Assets of the Balance Sheet and not as revenue in the economic outturn.

The Non-exchange revenues represent adjustments for contributions from members previously recognised in the Net Assets due to subsequent changes in already validated cost claims (e.g. through ex-post audits).

The financial income mainly comprises of interest earned by the JU on Commission funds, which is added to the global budget envelop of the CS program in line with the CS Financial Rules.

Balance Sheet

The balance sheet reflects the financial position of the CSJU as of 31.12.2012. Assets, comprise mainly of cash in bank balances, pre-financing incurred for the execution of the grant agreements and fixed assets; liabilities include the "Net Assets" on the one side, and current liabilities like amounts payable, accruals and provisions on the other side.

Compared to the previous year, the bank balances of the JU have been significantly reduced (2011: 50M Euro, 2012: 26M Euro) due to the efforts put in place to introduce more rigorous cash management regarding the Commission subsidy.

The increase in fixed asset is mainly due to the development costs of the grant management tool (GMT), which the JU has introduced in the year 2012.

The balance of the Net Assets at the end of the reporting period present the accumulated contribution received by the JU from its members (Commission, industry and research organisations), which has not been spent yet for funding the research program.

The Net Assets in the Balance Sheet of the JU's Final Accounts 2012 show a negative balance of 52.25 Million Euro.

Due to the delay in reporting and in the validation process for GAMs 2012, the operational expense 2012 has been recognised in the Economic Outturn Account, while the related in-kind contribution could be only partly validated by the JU's management and approved by the Governing Board.

The in-kind contributions for those cost claims not yet approved by the Governing Board are reflected in the liabilities of the Balance sheet as "contributions to be validated". Following validation of cost claims by management and approval by the Governing Board later in 2013, these in-kind contributions will be transferred to the Net Assets of the CSJU. Therefore, the current status of the Net Assets has to be considered as transitional and do not indicate any risk of solvency, but are the consequence of the accounting method applied according to the specific accounting rules and guidance provided by the Commission for Joint Undertakings.

12 INDICATORS

A number of key performance indicators have been used by the JU's management during the year 2012 in order to monitor achievement of targets and objectives by the JU's team and by the ITDs.

A summary of KPIs and their year-end results for 2012 is presented in a table in Annex 4.

13 CONCLUSION

In the year 2012 the JU has reached its full cruising speed. Operational and management processes have been fully deployed to ensure the implementation of the research activities and efficient use of the global budgetary envelope. However, serious human resources constraints have to be managed.

All ITDs have progressed in the maturation and assessment of technologies in order to define and develop the demonstrators. As major examples, SFWA has launched the design of the Laminar wing flight test bed modifications; GRA has finalized the scope and content of their flight test activity on the ATR flying test bed. GRC has progressed in the preparation of the diesel power plant for light helicopter demo. In the transversal ITDs, SAGE has reached already the first demonstration phases, in both SAG3 (Large turbofan) and SAGE5 (turbo shaft); SGO and ECO have finalized the test benches and related equipment to be integrated and tested starting in 2013.

The Technology Evaluator continued the integration of the conceptual aircraft models for the assessment of benefits in terms of environmental impact; the interaction with ITDs has improved as well as the consistency and completeness of results.

The operational and financial planning towards the completion of the program has successfully started. The JU is now focusing on the challenging task of coordinating the activities of the ITDs during the second half of the program. At the end of 2012, adjustments to individual ITD budgets to completion needed to be planned by the JU and agreed with the JU's members. This monitoring and coordination role of the JU is progressing and is regularly reconciled with the Governing Board.

The internal control system has been further developed. Management of the core business activities is based on a dedicated risk assessment process and monitored by a scoreboard of key performance indicators. The internal audit function of the JU contributed to identify and develop mitigating actions for very important risks.

As one of the major elements for assurance, the ex-post audit activity of the JU has been fully established. Significant inputs for improving the quality of the validation of cost claims from beneficiaries are expected. For sure, the complexity of the still prevailing rules for FP7 projects represent a major challenge for an efficient control environment and create a heavy burden for beneficiaries and the JU team.

With the introduction of a new system for the management of GAMs, the JU has enhanced the efficiency of financial reporting for the ITDs and has improved the reliability of its own internal processes.

The involvement of Partners has continued through the launch of another three Calls for proposals, whose evaluation has been performed within the year. The participation rate to calls and the success rate of topics have not evolved significantly compared with previous years. Among the winners the share of academia and SMEs has only slightly reduced, due to the higher technology level contribution required, however remaining very significant. Actions to shorten the time to signature of the Grant Agreements have been implemented, with improvement expected to take place from 2013.

It is evident that the JU is facing one of its toughest challenges to adequately process and close the reporting of the important number of GAPs, which are already delayed.

Work on the improvement of the visibility of Clean Sky continued in 2012. It is clear that further efforts are needed to inform European policy-makers about the success of Clean Sky attracting small and medium-sized companies in particular among other achievements. The JU endeavors to meet this challenge together with the support of both the public and private members.

Overall, despite the challenges which we face, the progress achieved so far is an indicator, that the JTI concept is the right instrument for implementing a complex research program. While being in a pivotal position, which is close to industry on the one side and which ensures the public interest on the other side in parallel, Clean Sky JU can be viewed as proof of a successful new model of a public-private partnership.

14 ANNEXES

14.1 Annex 1: Statement of assurance referred to in Article 10(4) of the financing agreement with the European Commission

I, Eric Dautriat, Executive Director of Clean Sky Joint Undertaking, in my capacity as authorizing officer hereby state that I have reasonable assurance that:

- the information contained in this report gives a true and fair view;

- the resources, both financial and human, assigned to the activities described in this report have been used for their intended purpose and in accordance with the principles of sound financial management, and the control procedures put in place give the necessary guarantees concerning the legality and regularity of the underlying transactions;

- this reasonable assurance is based on my own judgement and on the information at my disposal, such as

- The certificate of the Accounting Officer
- The results of my supervisory activities
- The JU's risk management process
- The key performance indicators in place
- The reporting of the Internal Control Coordinator
- The intensified ex-ante controls of our operational expenditure
- The findings of the European Court of Auditors to date
- The Internal Auditor's report, in particular the independent risk assessment and the relevant mitigation actions taken by the management
- The summary report on the implementation and results of the ex-post audit process in the year 2012
- The results of the validation of the JU's accounting systems made by the Accounting Officer
- The reporting of the Data Protection Officer

- With reference to the validation of cost claims and the related accounting data, I have taken steps to enhance controls through a dedicated application for Grant Agreements for Member and through procedures governing the coordination of the validation in the operational and the financial units;

-While the situation has improved compared to the 2011 exercise, a delay in the receipt and validation of cost claims from members occurred again for 2012. The balance sheet of the JU as at 31.12.2012 therefore shows a negative balance of the Net Assets. This negative amount is due to the accounting policies applied in line with the Commission guidance and will be adjusted as soon as the validation is finalised.

-Based on the quantitative and qualitative results established through the ex-post audit exercises performed in 2011 and 2012, I have enhanced controls to improve the effectiveness of the underlying processes for validating cost claims by the JU team (ex-ante). Together with increased guidance provided by the JU to its members and partners regarding the eligibility of costs, this will contribute to further reduce errors in the coming years and to achieve the multiannual control objective of the JU. The final results of the ex-post audit exercise 2012 confirm this assumption through the reduction of the representative and residual error rates compared to 2011.

I am not aware of anything not reported here which could harm the interests of the Joint Undertaking

The information provided is, to the best of my knowledge, accurate and exhaustive.

Eric Dautriat

14.2 Annex 2: Assessment of the Annual Activity Report by the Governing Board of the Clean Sky Joint Undertaking

GOVERNING BOARD OF CLEAN SKY JU
ASSESSMENT OF THE ANNUAL ACTIVITY REPORT 2012

The Governing Board of Clean Sky JU took note of the Annual Activity Report 2012 (Authorising Officer's report), the provisional version of which was made available on 10th February 2013, and the final version on 3rd June 2013.

The Board is of the opinion that this document sets out the relevant highlights of the implementation of the 2012 work programme from both an operational and administrative point of view.

The progress of technical activities is in line with the Clean Sky objectives. Most of the milestones scheduled for 2012 have been achieved. The first demonstrators have been readied. Many new partners have been successfully involved through the calls for proposals.

A relevant risk management has been implemented, for technical and financial risks, and reported to the Board. The Board takes note of the postponement of the Open Rotor flight test beyond 2016, and supports the JU's management to confirm and follow an updated roadmap to this demonstration.

As regards the Technology Evaluator, the Board is convinced of the importance of this periodic assessment, welcomes the results achieved and confirms its commitment in taking all necessary steps to make the relevant process fully mature.

The JU has fulfilled its monitoring tasks through the implementation and usage of dedicated key performance indicators for the achievement of strategic research and management objectives.

Regarding the financial implementation of grant agreements, the Board is satisfied with the further development of the processes in 2012, in particular with the implementation and usage of the Grant management tool for the 2012 cost claims process. This has also proven to assist the JU at large to more efficiently manage its resources.

Ex-post audits have been duly implemented and processed. The Board takes note of the positive trend visible in the achieved reduction of error rate levels assessed in the ex-post audit exercise 2012. Although the error rates identified concerning cost claims for Grant Agreements execution 2008 to 2011 still indicate control weaknesses, the target of reducing the accumulated errors for the entire Clean Sky programme below 2% is considered as achievable. Mitigating actions to enhance preventive and remedial measures will be supported by the Board.

The level of timeliness of the financial and technical reporting from the ITDs and beneficiaries to the Joint Undertaking is considered as correctly presented. The Board takes note, that the validation of the cost claims 2012 is expected to be finalised in 2013 at

an earlier date than in 2012. However, despite the planning actions prepared by the Executive team together with the ITDs, further improvements in the timing of delivery of information and formal documents to the JU is needed. In this respect, and also as regards the management of the Grant Agreements for Partners, the Board wishes that the understaffing of the JU, as highlighted in this Annual Activity Report, finds an adequate solution as soon as possible[15].

Done in Brussels, 2 July 2013

Massimo Lucchesini
Chairman of the Governing Board
Clean Sky JU

[15] Any increase of the JU statutory staff is not possible for the time being and its subject to the approval of the budgetray authority.

14.3 Annex 3: Materiality criteria

This annex provides a detailed explanation on how the CSJU defines the materiality threshold as a basis for determining significant weaknesses that should be subject to a reservation to the annual declaration of assurance of the Executive Director.

Deficiencies leading to reservations should fall within the scope of the declaration of assurance, which confirms:

- A true and fair view provided in the AAR and including the Annual Accounts
- Sound financial management applied
- Legality and regularity of underlying transactions

Because of its multiannual nature, the effectiveness of the CS JU's controls can only be fully measured and assessed at the final stages of the program's lifetime, once the ex-post audit strategy has been fully implemented and systematic errors have been detected and corrected.

The control objective is to ensure for the CS program, that the residual error rate, which represents the level of errors which remains undetected and uncorrected, does not exceed 2% of the total expense recognised until the end of the program (see explanations to the *weighted average residual error rate* underneath).
This objective is to be (re)assessed annually , in view of the results of indicators for the ex-ante controls and of the results of the implementation of the ex-post audit strategy, taking into account both the frequency and importance of the errors found as well as a cost-benefit analysis of the effort needed to detect and correct them.

Notwithstanding the multiannual span of the control strategy, the Executive Director of the CSJU is required to sign a statement of assurance for each financial year. In order to determine whether to qualify this statement of assurance with a reservation, the effectiveness of the control systems in place needs to be assessed not only for the year of reference but also with a multiannual perspective, to determine whether it is possible to reasonably conclude that the control objectives will be met in the future as foreseen. In view of the crucial role of ex-post audits, this assessment needs to check in particular, whether the scope and results of the ex-post audits carried out until the end of the reporting period are sufficient and adequate to meet the multiannual control strategy goals.

Effectiveness of controls

The basis to determine the effectiveness of the controls in place is the cumulative level of error expressed as percentage of errors in favour of the CSJU, detected by ex-post audits measured with respect to the amounts accepted after ex-ante controls.

However, to take into account the impact of the ex-post audit controls, this error level is to be adjusted by subtracting:

- Errors detected and corrected as a result of the implementation of audit conclusions

- Errors corrected as a result of the extrapolation of audit results to non-audited cost claims issued by the same beneficiary

This results in a residual error rate, which is calculated in accordance with the following method:

1) REPRESENTATIVE ERROR RATE

As a starting point for the calculation of the residual error rate, the representative error rate will be established as a weighted average error rate identified for an audited representative sample.

The weighted average error rate (WAER) will be calculated according to the following formula:

$$\mathbf{WAER\% = \frac{\Sigma\,(er)}{A} = RepER\%}$$

Where:

Σ (er) = sum of all individual errors of the sample (in value). Only the errors in favour of the JU will be taken into consideration.

n = sample size

A = total amount of the audited sample expressed in €.

2) RESIDUAL ERROR RATE

The formula for the residual error rate below shows, how much error is left in the auditable population after implementing the outcome of ex-post controls. Indeed, the outcome of ex-post controls will allow for the correction of (1) all errors in audited amounts, and (2) of systematic errors on the non-audited amounts of audited beneficiaries (i.e. extrapolation).

$$\mathbf{ResER\% = \frac{(RepER\% * (P-A) - (RepERsys\% * E)}{P}}$$

Where:

ResER% = residual error rate, expressed as a percentage.

RepER% = representative error rate, or error rate detected in the representative sample, in the form of the Weighted Average Error Rate, expressed as a percentage and calculated as described above (WAER%).

RepERsys% = systematic portion of the RepER% (the RepER% is composed of complementary portions reflecting the proportion of systematic and non-systematic errors detected) expressed as a percentage.

P = total amount of the auditable population of cost claims in €

A = total amount of the audited sample expressed in €.

E = total non-audited amounts of all audited beneficiaries. This will consist of all non-audited cost statements for all audited beneficiaries (whether extrapolation has been launched or not).

This calculation will be performed on a point-in-time basis, i.e. all the figures will be provided as of a certain date for the specific annual audit exercise actually performed.
However, in order to arrive at a meaningful residual error rate for the entire cumulative period covered by ex-post audits during the execution of the CS program, the weighted average residual error rate (WAvResER%) shall be calculated for the whole duration of the program until the end of each audit period according to the standard formula for a weighted average (sum of weighted terms (=term multiplied by weighting factor in relation to the population in value (p)) divided by the total number of terms) as follows:

$$\textbf{WAvResER\%} = \frac{\sum_{i=1}^{n} (\text{Res ER}_i * p_i)}{\sum_{i=1}^{n} p_i}$$

The control objective is to ensure, that the residual error rate of the overall population (recognised operational expense) is below 2% at the end of the CS program.
If the residual error rate is less than 2%, no reservation would be made.
If the residual error rate is between 2 and 5% an additional evaluation needs to be made of both quantitative and qualitative elements in order to make a judgment of the significance of these results. An assessment needs to be made with reference to the achievement of the overall control objective considering the mitigating measures in place.
In case the residual error rate is higher than 5%, a reservation needs to be made and an additional action plan should be drawn up.
These thresholds are consistent with those retained by the Commission and the Court of Auditors for their annual assessment of the effectiveness of the controls systems operated by the Commission. The alignment of criteria is intended to contribute to clarity and consistence within the FP7 program.
In case it turns out, that an adequate calculation of the residual error rate during or at the end of the program is not possible, for reasons not involving control deficiencies but due to e.g. a limited number of auditable cost claims, the likely exposure to errors needs to be estimated

quantitatively by other means. The relative impact on the Declaration of Assurance would be then considered by analyzing the available information on qualitative grounds and considering evidence from other sources.

Adequacy of the scope

The quantity and adequacy of the (cumulative) audit effort carried out until the end of each year is to be measured by comparing the planned with the actual volume of audits completed.
The data is to be shown per year and cumulated, in line with the current AAR presentation of error rates.

The Executive Director should form a qualitative opinion to determine whether deviations from the plan are of such significance that they seriously endanger the achievement of the control objective for the program. In such case, he would be expected to qualify his annual statement of assurance with a reservation.

A multiannual control strategy requires a multiannual perspective to assurance

It is not sufficient to assess the effectiveness of controls only during the period of reference to decide, whether the statement of assurance should be qualified with a reservation, because the control objective is set in the future. The analysis must also include an assessment of the likely performance of the controls in subsequent years and give adequate consideration to the risks identified and the preventive and remedial measures in place. This would then result in an assessment of the likelihood that the control objective will be met in the future.

14.4 Annex 4: Scoreboard of key performance indicator:

Indicator ID	Indicator short name	Description of indicator	Result 2012
Ind 1.4.A	SME share - value	share of SME funding in total funding	36.00%
Ind 1.4.B	SME share - numbers	number of SME participation versus total number of beneficiaries	37.00%
Ind 1.4 C	SME share in CFPs - numbers	number of SME participation in CFP versus total number of applicants	43.48%
Ind 2.5.1 B	Topics success rate	percentage of topics resulting in signature of GAP	70.80%
Ind 2.5.4 B	Redress procedures - all	Number of redress requests	7
Ind. 2.5.4 D	Selection of proposals	percentage of eligible proposals selected for evaluation	accumulated value: **91.7%** for evaluations 2012: **93%**
ind 2.5.6 A	Finalising of GAPs	Percentage of contracts signed in less than 6 months after the selection	45.00%
Ind. 2.6 A	final reporting of GAPs	Percentage of final reports due from partners behind the schedule	73.00%
Ind. 2.7.1 A	AIP execution by members - resources	percentage of resources consumption versus plan (members only)	82.00%
Ind 2.7.1 B	AIP execution by members - deliverables	percentage of deliverables available versus plan (members only)	76.00%
Ind 2.7.3 C	Annual reviews - recommendations 2	percentage of recommendations implemented in due time	79.00%
Ind 2.9 C	budget execution - payments operational	percentage of payments made within the deadlines	80.00%
Ind 3.2.5 B	budget execution - salary payments - delays	percentage of payments made within the deadlines	100.00%
Ind 3.7.3 A	Budget execution - payments running costs	percentage of payments made within the deadlines	84.00%
Ind 5.3 A	Ex-post audits - coverage (accumulated)	Percentage of operational expenses covered by ex-post audits	20.00%
Ind 5.3 C	Ex-post audits - material findings	Total amount of material findings (in favour of the JU)including extrapolation effect	accumulated adjustment in favour of the JU: **3.871 Keuro** (on the level of reported costs)
Ind 5.3 D	Ex-post audits - error rates	Detected, representative and/or residual error rates resulting from audits at the beneficiaries per year and accumulated for the programme	Accumulated Representative Error Rate for all EPA performed: **4.49%** accumulated Residual Error Rate upto 2012: **2.77%**

14.5 Annex 5: Financial Statements 2012 [16]

ECONOMIC OUTTURN ACCOUNT			
	Ref.	2012	2011
REVENUES	**2.4.1**		
NON-EXCHANGE REVENUES			
Other revenue - reversal of claims previously expensed	**2.4.1**	5.029.283,15	2.337.547,90
Exchange gains		23,44	0,00
TOTAL NON-EXCHANGE REVENUES		**5.029.306,59**	**2.337.547,90**
OPERATIONAL EXPENSES			
Operational expenses funded by CSJU in cash	**2.4.2**	130.404.787,99	109.193.774,28
Operational expenses contributed in kind by members		93.520.379,99	89.003.119,05
TOTAL OPERATIONAL EXPENSES		**223.925.167,98**	**198.196.893,33**
OPERATING EXPENSES	**2.4.3**		
Administrative expenses			
Staff expenses		2.296.415,12	2.319.741,05
Depreciation & amortisation of fixed assets		30.212,55	14.509,45
Rent of building		367.331,02	302.402,02
Rent of furniture		0,00	1.673,71
Office suppliers & maintenance		10.454,20	54.640,16
Communication & publications		184.692,13	390.081,98
Transport expenses	**2.4.3.1**	3.544,75	2.337,05
Recruitment costs		2.989,34	2.472,62
Training costs		18.616,91	46.152,87
Missions		169.845,05	161.630,64
Experts and related expenditures		557.003,72	796.975,22
IT costs - external service		87.473,31	101.151,06
Other external service provider		577.168,09	381.901,12
Provisions for other liabilities		57.922,87	0,00
Total administrative expenses		**4.363.669,06**	**4.575.668,95**
Other operating expenses			
Exchange losses	**2.4.3.2**	445,61	110,50
Total other operating expenses		**445,61**	**110,50**
TOTAL OPERATING EXPENSES		**4.364.114,67**	**4.575.779,45**
OPERATING RESULT		**(223.259.976,06)**	**(200.435.124,88)**
FINANCIAL INCOME			
Bank interest on pre-financing from EU	**2.4.4.1**	425.763,83	604.303,26
Interest on late payment (income)		0,00	29.973,93
Interests on pre-financing given to Members		13.181,68	96.448,04
Total financial income		**438.945,51**	**730.725,23**
FINANCIAL EXPENSES			
Financial expenses	**2.4.4.2**	0,30	8,87
Total financial expenses		**0,30**	**8,87**
FINANCIAL RESULT		**438.945,21**	**730.716,36**
ECONOMIC RESULT OF THE YEAR		**(222.821.030,85)**	**(199.704.408,52)**

[16] The final accounts have been transmitted for final review to the European Court of Auditors, no feedback received yet.

BALANCE SHEETS			
ASSETS		**31/12/2012**	**31/12/2011**
A. NON CURRENT ASSETS			
Tangible fixed assets (net)	**2.3.1**	81.218,68	62.747,38
Intangible fixed assets (net)		150.340,14	14.908,75
TOTAL NON-CURRENT ASSETS		**231.558,82**	**77.656,13**
B. CURRENT ASSETS			
Short-term pre-financing		**19.247.464,51**	**10.817.688,17**
Short-term pre-financing Clean Sky JU - members		6.631.081,68	0,00
Short-term pre-financing Clean Sky JU - partners		12.616.382,83	10.817.688,17
Short-term receivables	**2.3.2**	**9.223.323,87**	**3.584.271,16**
Short term receivables - recoveries from members and partners		8.770.689,69	3.355.558,13
Other short term receivables		11.768,10	0,00
Deferred charges and accrued income		440.866,08	228.713,03
Cash and cash equivalents		**25.717.633,28**	**50.706.320,57**
TOTAL CURRENT ASSETS		**54.188.421,66**	**65.108.279,90**
TOTAL ASSETS		**54.419.980,48**	**65.185.936,03**

LIABILITIES		**31/12/2012**	**31/12/2011**
C. NET ASSETS			
Contributions received from Members (EU & industry)	**2.3.3**	396.799.526,40	296.989.360,17
Contributions in kind received from Members (Industry)		223.124.982,90	133.873.225,58
Contributions used during previous years		(449.361.196,53)	(249.656.788,01)
Contributions used during the year (EOA)		(222.821.030,85)	(199.704.408,52)
TOTAL NET ASSETS		**(52.257.718,08)**	**(18.498.610,78)**

D. CURRENT LIABILITIES			
Members contribution to be validated		**74.184.690,50**	**72.423.484,08**
Accounts payable and accrued charges		**31.623.460,88**	**10.683.303,65**
Amounts payable - consolidated entities		0,00	1.073,52
Amounts payable - beneficiaries and suppliers		19.775.434,46	947.386,27
Amounts payable - staff	**2.3.4**	4.985,50	1.658,12
Other payables		3.395,36	0,00
Accrued charges		11.839.645,56	9.733.185,74
Provision for risks and charges - short term		**869.547,18**	**577.759,08**
Provision for risks and charges - short term		869.547,18	577.759,08
TOTAL CURRENT LIABILITIES		**106.677.698,56**	**83.684.546,81**
TOTAL LIABILITIES		**54.419.980,48**	**65.185.936,03**

Statement of changes in net assets 2012

Changes in Net Assets and Liabilities	EURO	EURO
Net Assets		
Balance as of 31st December 2011		**(18.498.610,78)**
Contributions received from members during the year 2012:		
EC (cash)	97.339.798,00	
Other members (cash)	2.470.368,23	
Other members contributions in kind from 2008-2012 validated in 2012	89.251.757,32	
Total contributions in 2012		**189.061.923,55**
Economic Outturn for 2012		**(222.821.030,85)**
Balance as of 31st December 2012		**-52.257.718,08**

Cash-flow analysis

Cash Flows from operating activities	
Surplus/(deficit) from operating activities	**(222.821.030,85)**
Adjustments	
Depreciation and amortisation	30.212,55
Increase/(decrease) in Provisions for risks and liabilities	291.788,10
(Increase)/decrease in Stock	
(Increase)/decrease in Short term pre-financing	(8.429.776,34)
(Increase)/decrease in Short term Receivables	(5.639.052,71)
Increase/(decrease) in Long term liabilities	
Increase/(decrease) in Payables and Accruals	20.940.157,23
(Gains)/losses on sale of Property, plant and equipment	
Extraordinary items	
Net Cash Flow from operating activities	**(215.627.702,02)**

Cash Flows from investing activities	
Acquisition of tangible and intangible fixed assets	(184.115,24)
Proceeds from tangible and intangible fixed assets	0,00
Extraordinary items	0,00
Net Cash Flow from investing activities	**(184.115,24)**

Financing activities	
In cash contributions from Members (EC & Industry)	99.810.166,23
In kind expense contribution from Members	93.520.379,99
Reduction in members' contributions due to rejected and negative claims	(2.507.416,25)
Extraordinary items	0,00
Net Cash Flow from financing activities	**190.823.129,97**

Net increase/(decrease) in cash and cash equivalents	(24.988.687,29)
Cash and cash equivalents at the beginning of the period	50.706.320,57
Cash and cash equivalents at the end of the period	**25.717.633,28**

14.6 Annex 6: List of abbreviations

AAR: Annual Activity Report
AIP: Annual Implementation Plan
ATM: Air Traffic Management
CDR: Critical Design Review
CFP: Call For Proposal
CROR: Counter Rotating Open Rotor
CS JU: Clean Sky Joint Undertaking
DAR: Draft Audit Report
EC: European Commission
ECO: Eco-Design
EPA: Ex-Post Audit
FMS: Flight Management System
GAM: Grant Agreement for Members
GAP: Grant Agreement for Partners
GRA: Green Regional Aircraft
GRC: Green Rotorcraft
IAO: Internal Audit Officer
ICT: Information and Communication Technology
ITD: Integrative Technology Demonstrator
MAE: Management of Aircraft Energy
PDR: Preliminary Design Review
QPR: Quarterly Progress Report
SAGE: Sustainable and Green Energy
SFWA: Smart Fixed Wing Aircraft
SGO: Systems for Green Operation
TE: Technology Evaluator
TRL: Technology Readiness Level