



Clean Sky JTI

**The continuation of Clean Sky under Horizon 2020:  
Clean Sky consultation for stakeholders - Report**

**Independent Rapporteur:**      **Dr David Dunford** CEng, FRAeS, FIMMM

## **Executive Summary**

Inputs from all reviewed sources support the view that the Clean Sky JTI is proving to be an effective vehicle to mature and demonstrate promising greening technologies. Its structure, with 6 separate Integrated Technology Demonstrators (ITD's) covering Green Rotorcraft, Regional Aircraft, Eco-Design, Engines, Smart fixed Wing and Green Operations, each led by two "industry" leaders has proven to be effective. To date via its open, broad but targeted programmes, it has involved ~500 participants, with ~200 of these having no prior involvement in current or previous framework programmes. Particularly successful through the Calls for Proposal (CfP's) process have been the SME (38%, ) and academia (21%,) which indicates a high level of potential innovative solutions. In addition, participants from 24 different countries have been contracted. The CfP process has matured effectively and lessons learnt from earlier calls incorporated. CfP's will be an important mechanism for technology capture and demonstration in Clean Sky 2.

The goal of bringing viable contributing technologies to a high level of maturity is being met with many of the Clean Sky ITD's now entering significant demonstration phases before programme completion in 2017. Implementation of a Technology Evaluator (TE) is seen as a positive role, providing both industrial and public accountability. Significant inputs during the consultation process have considered the future of this role with its potential to support EC strategic decisions. The recent TE review, utilising the developed toolset, has indicated average reductions of 30% for CO<sub>2</sub> and noise when compared to year 2000 aircraft. Concerns exist however in the transparency of data across ITD's and this will need resolution if the TE role effectiveness is enhanced in Clean Sky 2.

Consideration of a continuing JTI under Horizon 2020 received positive support from all consultation inputs. Clean Sky 2 should be a separate programme comprising an autonomous CSJU central core structure with structured participant levels. In a clear statement of industrial support, 14 major European companies and organisations committed to advance the aims and objectives of Clean Sky 2 contributing to Horizon 2020 and Flightpath 2050. High level objectives have been defined by ACARE in its Strategic Research and Innovation Agenda for European Aviation, (SRIA) presented at ILA Berlin. The new Clean Sky 2 programme structure will comprise a mixture of 3 IADP's (large aircraft, fast rotorcraft and regional aircraft) led by European integrated platform manufacturers and 3 ITD's (Airframe, Engine, and Systems) with the retention of the Technology Evaluator. There is a level of concern that Clean Sky 2 might not be open enough during the definition phase to all valuable participants however all IADP and IST leaders have requested inputs and support to help shape the programmes. It is intended that a larger proportion of funding will be open to competition. The importance of achieving technology acquisition breadth and attracting further SME involvement potentially from outside aerospace sector aligned companies is mentioned. Stakeholder comments reflect the importance of attracting potential technologies with different initial TRL levels then, via effective maturation, moving successful technologies rapidly to demonstration assessment. Stakeholder bodies (NSRG, EASN & EREA) have all requested a higher level of involvement. The NSRG would like an earlier insight into Clean Sky 2 activity plans, with increased involvement in dissemination activities and support to the CSJU. Not surprisingly, EASN would like to see more technology innovation and EREA would like provision of major facilities (wind tunnels, noise test, etc) tests treated as

## Clean Sky 2 consultation outcomes

service contracts with 100% funding. Both stakeholders would like a uniform 60% overhead rate applied. Major test facilities are recognised as a critical requirement to effective technology demonstration.

In assessing outputs from the EU Public Consultation and Clean Sky Stakeholder questionnaires innovation and the need to sustain necessary R&D investment were regarded as key priorities needed to support maintenance of European Industries strong position in an increasingly competitive global market. Feedback focussed on impacts to current Clean Sky players but several responses urged inclusion of both small and business aircraft industries within Clean Sky 2. Consideration should be given to a more flexible demonstrator programme with activities not aligned to full programme timescales and with the concept of associates not joining for the whole period. The selection of associates through open calls is also viewed positively.

The Clean Sky JTI is developing into a very important vehicle, with a structure and funding suited to effective technology assessment and demonstration. This should be developed under Horizon 2020 to meet future European environment and industrial competitiveness requirements as identified in Flightpath 2050.

## Clean Sky 2 consultation outcomes

### Contents

### Introduction

#### Chapter 1 Stake holder Consultation covering ILA Berlin event (12<sup>th</sup> September 2012) and stakeholder position papers

1. Introduction
2. Clean Sky presentation
3. Clean Sky presentation – Questions and Answers
4. Clean Sky 2 programme presentations
  - 4.1 Introduction
  - 4.2 General Overview
  - 4.3 Programme Content
    - 4.3.1 Large Aircraft IADP
    - 4.3.2 Regional Aircraft IADP
    - 4.3.3 Fast Rotorcraft IADP
    - 4.3.4 Airframe ITD
    - 4.3.5 Engine ITD
    - 4.3.6 Systems ITD
    - 4.3.7 Summary
5. Views of stakeholders
  - 5.1 Member States
  - 5.2 European Research Establishments in Aeronautics
  - 5.3 European Aeronautics Science Network
6. Clean Sky 2 presentations; Questions & Answers

#### Chapter 2 CSJU Stakeholder Questionnaire Summary

#### Chapter 3 European Public Consultation on the Preparation of the Clean Sky JTI under Horizon 2020

### Appendices

- |            |  |
|------------|--|
| Appendix 1 | Consultation on Clean Sky and Clean Sky 2 Agenda   |
| Appendix 2 | Continuation of the JTI instrument under Horizon 2020 for Aeronautics and Air transport – National States Representatives Group    |
| Appendix 3 | Association of European Research Establishments in Aeronautics (EREA) Position on Clean Sky 2 (as presented at ILA Berlin Airshow) |
| Appendix 4 | European Aeronautics Science Network (EASN) Position on a successor to Clean Sky in Horizon 2020                                   |
| Appendix 5 | CSJU Stakeholder Questionnaire   |
| Appendix 6 | Useful links   |

## Introduction

This document was prepared for the Clean Sky Joint Undertaking (CSJU). It covers the continuation of the Clean Sky Joint Technology Initiative (JTI) under Horizon 2020, with inputs generated by and received from;

- Public consultation organised by the European Commission from early July to early October, via their website
- Consultation for Stakeholders held at ILA Berlin Airshow on the 12<sup>th</sup> September 2012 and associated questionnaire completed by registered parties
- Stakeholders, who expressed their views through position paper, as follows:
  - “Continuation of the JTI instrument under Horizon 2020 for Aeronautics & Air Transport (Final draft) – Initial view of the Member States and Associate States representatives in the ACARE Member States Group and the Clean Sky National -States Representative Group (NSRG) (Appendix 2)
  - Association of European Research Establishments in Aeronautics (EREA) Position on Clean Sky 2 (as presented at ILA Berlin Airshow) (Appendix 3)
  - European Aeronautics Science Network (EASN) Position on a successor to Clean Sky in Horizon 2020 (Appendix 4)

Clean Sky is a Public-Private partnership, 50% funded by the European Commission under the 7<sup>th</sup> Framework programme and 50% by Industry. It has been designed to support delivery of the ACARE goals on greening aviation. The Clean Sky Joint Undertaking (CSJU) is a dedicated entity to implement and manage the JTI in an integrated and coherent way under the leadership of Eric Dautriat, Executive Director and a small but effective core team.

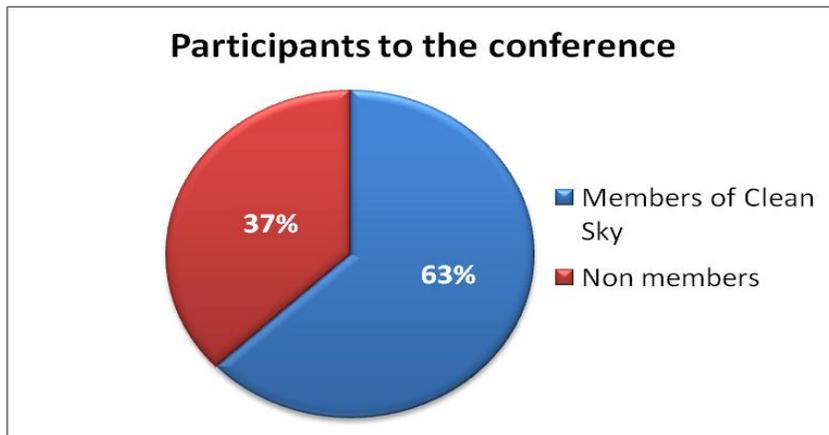
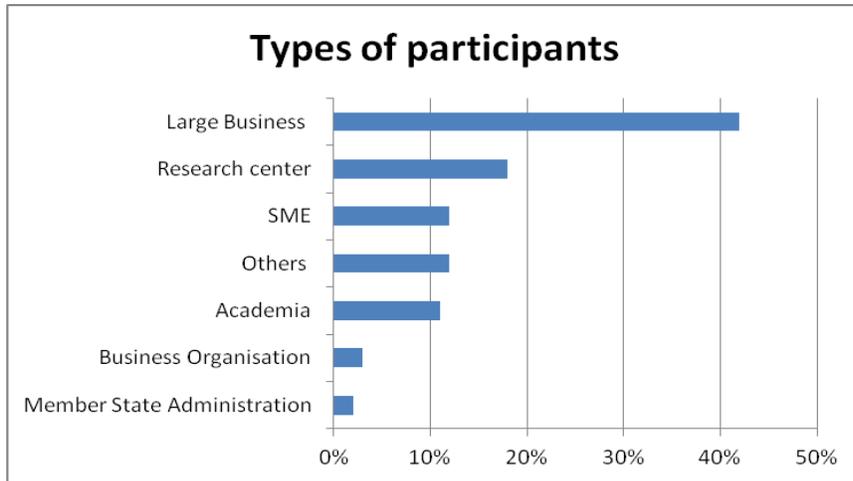
This document represents a synthesised view of relevant stakeholders on the current status and operation of Clean Sky and the creation of a follow on vehicle (Clean Sky 2) to support realisation of aspects of Horizon 2020 and Flightpath 2050, as defined in the Strategic Research and Innovation Agenda (SRIA) for European Aviation. This new vehicle could be incorporated in the current Clean Sky JTI via an extension of the regulation under Horizon 2020, the next EU Research and Innovation Framework programme.

## Chapter 1 Stake holder Consultation covering ILA Berlin event (12<sup>th</sup> September 2012) and stakeholder position papers

### 1 Introduction

Attendance for the ILA Berlin sessions varied between 80 – 120, with the higher attendance aligned to the Clean Sky 2 session. The agenda is attached (Appendix 1).

Participant profile for the event is shown below



Each registered participant was provided with an electronic questionnaire for completion. Attendees were also given a paper version in their document pack. Returned questionnaires are summarised in this report (chapter 2) and will be used to inform the final proposal.

A short introduction was provided by Dr Tiit Jurimae, Head of Aeronautics Unit as Dr. András Siegler, Head of Directorate Transport, DG research and Innovation, European Commission, was delayed. Dr Jurimae stressed that the development of Clean Sky 2 should be an inclusive process. All interested parties should work together to achieve the best results for the European Aeronautics sector rather than just their individual companies or organisation.

## **2. Clean Sky presentation**

Eric Dautriat (Clean Sky Joint Undertaking (CSJU) - Executive Director) gave a summary of progress to date. Clean Sky has created a broad and open participation programme currently with ~ 500 participants and growing. From assessment of contracted programmes (total value ~€ 200M), the 11 completed Calls for Proposal (CfP's) involved ~ 400 partners with ~50% having no prior involvement in either FP6 or FP7 programmes. Funding analysis revealed significant involvement from Small and Medium Enterprises (SME's) (38%, ~€76M) and Academia (21%, ~€42M). He stressed the importance this attributes to capturing and assessing technologies which will deliver required environmental impacts.

Demonstrator programmes are on schedule and the first large Engine Turbo shaft demonstrator has just commenced. Results from the first Technology Evaluation programme review, using its unique technology evaluation process, has reconfirmed game changing potential technology advances in assessed environmental performance (when compared to year 2000 aircraft) with average targets for CO<sub>2</sub> and noise reduction of 30%.

In summary, he stated that Clean Sky, as a Joint Technology Initiative, was ready to meet Horizon 2020 innovation needs. In making this statement he assessed that the CSJU through its control of investment and vision is providing a robust and stable platform with flexible funding streams focused on demonstrating innovations needed to deliver stated environmental goals. This has been achieved by a small central team whose content, practices and skills, developed and refined over 4 years, are objectively used in bringing together industry and public bodies to a common understanding but with clear compliance to European public funding rules.

Guiseppe Pagnano (CSJU Coordinating Project Officer) then provided a comprehensive review of each Integrated Technology Demonstrator (ITD), highlighting achievements to date and remaining demonstration activities with associated programme milestones and timelines.

## **3. Clean Sky presentation – Questions & Answers**

Q; Are the Clean Sky objectives of reduced CO<sub>2</sub>, NO<sub>x</sub> and noise on track and what are the current numbers?

A; Eric Dautriat. Only a global order of magnitude, ~30% reduction for CO<sub>2</sub> and noise, can be assessed at this stage of the programme. Specific savings are platform dependent, with some models still being optimised. The most promising technologies required to deliver these reductions have been down-selected and original estimates confirmed using the Technology Evaluator's toolset. Clean Sky's targets are not the ACARE 50% reduction targets but focussed on making a significant contribution (in principle around 75% of the vehicle-centric targets, e.g. 75% of the ~40% for CO<sub>2</sub> specified in the ACARE SRA).

Q; Are there published dates for reporting on Clean Sky progress and is a mid term progress report going to be generated?

## Clean Sky 2 consultation outcomes

A; Eric Dautriat. Annual Clean Sky reports are published which together with scheduled information days provide up to date progress. The annual Clean Sky General Forum, open to all stakeholders, is arranged for 21<sup>st</sup> November 2012. The CSJU is also prepared to arrange dissemination events when requested in any participating country.

Q; Can you provide information on the number of member states involved in the Clean Sky CfP process and comment on feedback mechanisms for applicants?

A; Guiseppe Pagnano. Participants from 24 different countries have been contracted through the CfP process. Unlike many FP7 calls, the Clean Sky CfP's are focussed topics often at higher TRL levels. All applicants, including the winning proposals, receive positive written feedback. SME and Academic partners are a strong element of the winning proposals. These can be single applicant programmes. To date 400+ projects have been contracted. Contractual mechanisms have developed over the life of the project focussed on efficiently reducing contracting times.

Q; How does Clean Sky work successfully with other European Commission initiatives?

A; Guiseppe Pagnano. Clean Sky is committed to support all applicable initiatives. For example the Systems for Green Operation ITD leader and Clean Sky Project Officer have close links to SESAR. The Technology Evaluator has also been supporting SESAR, monitoring environmental impacts achieved from Clean Sky and their technology integration activities and ensuring the reported results are consistent.

Q What is the interaction with current European Level 1 and Level 2 projects?

A; Guiseppe Pagnano. Clean Sky interacts where appropriate with relevant level 2 programmes through periodic meetings and workshops. For relevant level 1 projects, Clean Sky interacts with the European Commission. In addition, Clean Sky CfP's applicants are required to be aware of any EC projects which support their programme.

## **4 Clean Sky 2 programme presentations**

### 4.1 Introduction

Eric Dautriat provided a short introduction highlighting the initial public consultation (June 2012, hosted by Clean Sky), the importance of today's event in preparation of a formal proposal submission linked to the Commission's proposed Regulation (scheduled for November 2012), and the continued need for inputs from all interested parties. Clean Sky 2 is designed to be a separate but seamless extension programme incorporating lessons learnt during Clean Sky and received inputs from this consultation and other related stakeholder activities.

### 4.2 General overview

Charles Champion (Chairman CSJU Governing Board & Airbus Executive Vice President and Head of Engineering, Airbus) provided a very positive and clear message; "Clean Sky 2 will contribute significantly to the European environmental, social and economic challenges". He

## Clean Sky 2 consultation outcomes

highlighted industries commitment, demonstrated through a signed Letter of Intent from 14 major European partners (including all of the European integrated platform manufacturers), to commit to advance objectives of Clean Sky 2 and its contribution to Horizon 2020, the ACARE Strategic Research and Innovation agenda and the vision of Flight path 2050 and beyond. Aerospace is a European growth industry but in a very competitive global market space. Step changes are required in technologies, systems and architectures to meet key targets of noise and emissions and to enhance European industries competitive position. This requires involvement from all elements in technology and engineered platform “supply” chains (OEM’s, Tier suppliers, SME’s, Research Organisations and Academia). Clean Sky has been a European success with competing partners working together. Clean Sky 2 plans to build on this with an increased level of investment.

Clean Sky 2 will be a flexible open architecture programme clearly focused on effective technology assessment, demonstration and integration supported by the Technology Evaluator. Clean Sky 2 will maintain a similar core and project structure but will comprise three Innovative Aircraft Demonstration Platforms (IADP’s) (Rotorcraft, Large Aircraft and Regional Aircraft) and 3 ITD’s (Airframe, Engines and Systems).

### 4.3 Programme Content

Industry representatives then provided an outline for each IADP and ITD. These will pull through technologies from Clean Sky, FP7 (and 8) and relevant Level 2 programmes and will be a mix between continuation of existing technologies and the development / assessment of new technologies. All programme presenters stressed the openness of the process with input required from all interested parties shape the program and influence structure.

#### 4.3.1 Large Aircraft IADP (presenter, Airbus)

Aim to exploit the full potential of synergies by integration of breakthrough technologies to realise step change innovation towards new generations of aircraft configurations. The programme envisages inputs from all proposed ITD’s covering new tail, wings, cockpits, systems, engines, cabins, methods, tools and certification

Three major demonstration areas planned

- Integrated demonstration for engine and new aircraft configurations
- Innovative physical integration; cabin, systems and structure
- Integrated systems demonstration; cockpit, avionics, all electric systems

#### 4.3.2 Regional Aircraft IADP (presenters Alenia Aermacchi and EADS CASA)

Plan to integrate and validate new technologies and systems at aircraft level to de-risk significantly integration into future products and improve EU global industrial leadership in this competitive market sector. This will require inputs from Clean Sky 1 (GRA and other ITD’s), other EC Level 2 projects, FP7 / Horizon 2020 and National programmes.

The programme requires advanced bleed less engines, improved aerodynamics and new fuselage, cockpit, avionics and maintenance concepts. Proposed demonstrators are

## Clean Sky 2 consultation outcomes

- Two flying test beds (High speed / Low speed)
- Ground demonstration for full scale fuselage and cabin systems

### 4.3.3 Fast Rotorcraft (presented by Eurocopter / Augusta Westland)

For Rotorcraft the market place is very competitive, particularly from the US. The key issue for industry is scalability of demonstrator activities (performance and cost) to commercial platforms. There are significant technical and financial risks in transitioning technologies to TRL 6 ready for platform insertion and assessment. This is an industry issue and requires a shared approach.

Two major demonstrators planned

- Tilt rotor next generation- mission efficiency assessment
- Compound platforms (utilising fixed wings and propellers)

### 4.3.4 Airframe ITD (presented by Dassault but also involving SAAB)

Key objectives

- Introduce innovative airframe architectures
- Introduce technologies covering all aspects of a more efficient airframe (drag, weight, cost, environmental acceptance, passenger well-being, maintenance, servicing etc)
- Enhanced efficiency of engineering / manufacturing processes.
- Cover the complete technology cycle (concept to certification)
- Technologies developed to TRL 6
- De-risking of IADP requirements.

### 4.3.5 Engine ITD (presented by Rolls-Royce but also involving SAFRAN and MTU)

Key objectives

- Fully validate (to TRL6) novel configurations for new narrow body aircraft meeting fully ACARE goals targeted for 2020 for engines
- Validate innovative engine technologies across whole market (turbo-shaft to large commercial aircraft) to achieve full environmental ACARE goals targeted for 2020 for engines.
- Validate new technologies to enable development of a new generation of turboprop engines to enhance European competitiveness.
- New / improved architecture propulsion systems to support new aircraft opportunities post 2025.
  - Open rotor for new narrow bodied aircraft
  - Geared turbofan for regional and new narrow bodied aircraft
  - Ultra High By-pass ratio propulsion system
  - High performance gas generator for turboprop and rotorcraft types
  - Propulsion system for radical design options
- Demonstrators for ground and potential flight test.

## Clean Sky 2 consultation outcomes

### 4.3.6 Systems ITD (presented by Thales Avionics but also involving Liebherr)

#### Key objectives

- Validation of innovative technologies in representative environment and/or flight tests (TRL 5/6).
- Integration of existing or new systems for assessment at platform level.
- Development of customised “ready to fly” systems for IADP’s
- Aircraft integration in future Air Traffic systems (Interface with SESAR 2)

#### Main target areas

- Electrical subsystems
- Flight & mission management
- New cockpit and interaction environment
- Landing systems demonstration
- Platform and Networks
- Integrated systems demonstration; cockpit, avionics, all electric systems

### 4.3.7 Summary

Eric Dautriat then provided a short conclusion. Focused goals have been set covering environment, competitiveness and mobility targets and he welcomed inclusion of the small aircraft sector. The programme budget still requires confirmation but estimate is currently €3.6bn with an anticipated 60% open to competition. It is intended to hold an open competition for core partners selection (currently scheduled for first half 2013) to ensure effective programme start up. Some Level 2 programmes may be included in the new programme (managed by the CSJU but using the current FP7 evaluation process). Technology Evaluator role will build on Clean Sky improving both interaction and efficiency.

He ended with a clear message. This will be an open programme and requires inputs from stakeholders and interested parties now.

## **5 Views of Stakeholders (including position papers)**

### 5.1 Member States (presented by Gerben Klein Lebbink)

The Member States are supportive of the current Clean Sky programme and Clean Sky 2. Since its inception, the Clean Sky JTI is proving to be a very effective and efficient instrument to mature and demonstrate promising greening technologies and innovations. In preparing Clean Sky 2, successes and lessons learnt should be considered and combined with continued programme “openness”.

Specific recommendations cover governance, content, initiation / set up, and processes and are included in detail in appendix 2. Summarising key points for governance the legal framework

## Clean Sky 2 consultation outcomes

should be in place prior to the start of Clean Sky 2. Clusters should be promoted and accepted as viable programme entities. The National States Representative Group (NSRG) should become more involved. It should be given earlier insight into activity plans and will respond with recommendations. The number of ITD's should be increased with ITD duration periods less than full Clean Sky 2 programme period. Higher TRL topics should remain the main focus for calls, with one partner proposals being accepted. Clarity on the end of Clean Sky and start of Clean Sky 2 with clear separation of the programmes is required. The bipartite funding model (50% EC / 50% private funding) should be considered and current JU programme management approaches and IP rules continued. Work programmes and calls for topics should be developed in a comparable but more interactive way. The number of associates should be increased and a clear selection process put in place. Tier 1 and 2 companies should be allowed to drive technology demonstration in a non prescriptive way. With regard to costs the structure should allow for at least 50% funding of full costs in line with Horizon 2020 rates. Also internal management costs of founding members should not be charged to other participants.

### 5.2 European Research Establishments in Aeronautics (ERAe) (presented by Dr Catalin Nae)

The presentation is attached (Appendix 3). Members are supportive of Clean Sky 2 and its focus on developing, integrating and demonstrating high TRL technologies. In addition, there should be consideration of radical (X-plane) configurations.

Regarding funding they would like the same funding rules applied as Horizon 2020. They suggest that having institutionalised ERAe seats in the governing board would reinforce development of the partnership between ERAe and industry. Use of research and test facilities and associated hardware should attract 100% (full cost) funding and treated as a service for industry. All Clean Sky participants should be able to apply for all open funded calls.

### 5.3 European Aeronautic Science Network (EASN) (presented Dr Michael Papadopoulos)

The EASN position paper is attached (Appendix 4). Members via a questionnaire are supportive of Clean Sky 2. Fully support focus on technology demonstration.

They welcomed the continued use of focused CfP's but stated that current budgets appear too low for tasks offered, which may result in insufficient innovation to project outcomes. All project titles and successful abstracts should be published. They noted that project funding success trends favoured classical aeronautical institutions. They would like to see FP7 / Horizon 2020 rules used as a common EC funding model with 60% overhead rate applied. Level 1 and level 2 projects should remain separate from Clean Sky 2. EASN also requested representation on the governing board to provide an academic view on issues. They would also like to contribute to implementing lessons learnt and have an active role in dissemination.

## 6. Clean Sky 2 presentations - Questions & Answers

Q. In order to prepare the full proposal leaders are required for each element. It was not clear in all of the presentations who the leaders are?

## Clean Sky 2 consultation outcomes

A. Eric Dautriat. The CSJU is currently in the process of defining leadership and leadership rules. The positive involvement of industry as shown by the signed Letter of Intent (which included major EU based OEM's) shows clearly industry commitment to the programme. Leaders are in place for each IADP and ITD but this is not a closed process. Leaders will be evident in the final proposal (Mid November 2012). Each IADP and ITD welcomes inputs at the earliest opportunity.

Comment. The European Small Aircraft Manufacturer's are supportive of the proposed programme and are currently preparing documentation to cover their key points.

A Eric Dautriat welcomed their involvement and would attend a scheduled workshop to align activities and support to the Clean Sky 2 programme.

Q Jim Lawler (Member States Chairperson). I am supportive of Clean Sky 2. The programme needs clear thinking but the process in place looks effective. The problem is the appearance and actual transparency of industry activity. The industry Letter of Intent and proposal deadline took me by surprise. Care needs to be taken when constructing and submitting the proposal to mitigate the statement that the programme looks like a "closed shop". There is therefore a need to ensure openness; Who can become involved? How will core partners and associates be confirmed? Will all parties be able to influence?

A. Each IADP and ITD responded with a final comment from Eric Dautriat.

Engines ITD. Fully supports openness requirement. There is a current natural grouping of European engine manufacturer but welcomed contributions and involvement from all parties.

### Regional Aircraft IADP

Fully supports need for openness but have to deliver a proposal in very short timescale. Committed to open call for inputs to shape / deliver programme. Supports open process for selecting core partners.

### Systems ITD

High-level requirements and processes are open and transparent. Inputs from all stakeholders and interested parties are welcome. ITD is cross cutting so committed fully to this.

### Airframe ITD

Short time frames have necessitated focus but fully committed to the open nature of delivering inputs to and setting of key objectives. ITD will need significant support from all stakeholders to achieve a strong flexible programme.

### Fast Rotorcraft IADP

Vision goals are defined, but detailed content on programme structure requires inputs from all interested parties.

### Large Aircraft IADP

Have set outline framework and now working through the programme storyboard. Open to input from all parties and stakeholders.

## Clean Sky 2 consultation outcomes

Eric Dautriat. We are following the schedule set by the European Commission. It is important for industry that the proposal is detailed and submitted on schedule. Immediate support from all interested participants focused to the relevant IADP and ITD is required. It is intended that the full proposal will be consistent and comprehensive but with flexibility (content, participation and structure). Mechanisms will be in place to ensure the programme is not “closed”. There will be a selection process for core partners in the second half of 2013.

Q How do we get involved?

A Sebastien Dubois CSJU Project Officer. Complete the questionnaire provided at the earliest opportunity either by hand now or by email. These will be collated and taken into consideration as the final proposal is developed. Contact directly the relevant IADP's and ITD's with your inputs. If you require contact details please email [CS2@cleansky.eu](mailto:CS2@cleansky.eu)

## **Chapter 2 CSJU Stakeholder Questionnaire Summary**

19 completed questionnaires returned to date. The majority (16) were from participants currently involved in Clean Sky. Respondent profile covered large industry (7), SME's (6), Academia (5) and an independent

Question proforma is shown in Appendix 5

### **Suggestions for improving the proposal for continuation of Clean Sky when compared to current Clean Sky programme**

- Be realistic not optimistic.
- Continue and enhance focus on flight demonstration at TRL 6/7
- Development of innovative aircraft architectures as systems of systems
- Capture and increase SME involvement to drive novel innovative solutions.
- Reduce administrative burden for SME's
- Consider mechanisms (clusters?) where SME's can contribute more effectively
- Keep level 0,1 and some level 2 programmes outside Clean Sky 2.
- Insert concept of manufacturing readiness levels (assessed by similar role to Technology Evaluator)
- Consider separate transverse ITD covering Simulation
- Demonstrate value of ITD's to IADP's. Consider clear ITD structure incorporating supply chain. Show clear link from Eco-Design to IADP's or demonstrators.
- Show clearly impacts with flight safety
- UAV's and other UAS should be considered
- Improve integration with SESAR.
- Ensure Calls for Proposal are open to all applicants and review process is transparent. Represents best possible solution and value for money
- 60% overhead flat overhead rate (instead of 20%)
- Create effective tools for periodic assessment of programme results

### **Ranking of Clean Sky priorities as regards Horizon 2020 and Flight Path 2050 objectives.**

The priorities for Clean Sky are ranked in priority order 1 is the highest ranked priority, 4 the lowest

#### Industrial Competitiveness

1. Innovation and Research
2. Competitiveness of the supply change
3. Job Creation
4. SME involvement

## Clean Sky 2 consultation outcomes

### Societal challenges

1. Fuel consumption
2. Congestion
3. Mobility

### Other priorities for consideration

- seamless , green, affordable, safe and secure travel in a resilient multimodal set up
- manufacturing readiness levels
- environmental compliance

### Comments

- Need to consider direct pull through from military technologies / national programmes to prevent duplication.
- Use Life Cycle Analysis (LCA) for technology optimisation and incorporate supply chain in this process

### **Ranking of the main drivers to achieve successfully the continuation of Clean Sky in relation to programme objectives**

ranked in priority order 1 is the highest ranked priority, 6 the lowest

1. Improving the maturity of promising technologies in a real environment
2. Improving maturity of promising technologies at aircraft level
- =3 Implementing an objective driven approach
- =3 Contributing to the reduction of the environmental footprint of new aircraft
- 5 Fostering innovation and the study of long-term perspective technologies
- 6 Working on the integration of the aircraft in the ATS environment

### Other

- Innovative / new aircraft configurations and architectures (X-planes?)

### Comments

- Assess and emphasise importance of manufacturing readiness levels in programme
- Coordination with other Horizon 2020 relevant activities (transport – car initiatives, energy (fuel cells etc), fuel, IT, etc
- Coordination with National States Programs, SESAR, Eurocontrol, etc
- Include General Aviation and small aircraft technologies
- Environmental needs!

### **General suggestions and comments on how to improve the current proposal for continuation of the Clean Sky programme**

- Need to address all 5 challenges of Flight Path 2050 aligned to maintaining global leadership and serving society's needs
- Providing the best products and associated services in aeronautics and air transport

## Clean Sky 2 consultation outcomes

- Ensuring the competitiveness of European Industry, supported by a strong research network and balanced regulatory framework, in the face of fierce competition from both established and emerging rivals
- Maximising the aviation sectors economic contribution and creating value
- Attracting the best people and talents
- Meeting societal and market needs for affordable, sustainable, reliable and seamless connectivity for passengers and freight with sufficient capacity
- Contribute to major Strategic Research and Innovation Agenda goals in each of the above challenges, meeting the main focus of customer satisfaction
- Technology Evaluator needs to be aligned to above goals
- Integrate aircraft design and operations in a seamless manner addressing issues associated with airport capacity
- Budgets for breakthrough technologies have to be sufficient
- Implementation of technologies and ideas in legacy programmes (not just 2050!) to create short term wins and strengthen value of programme
- Link FP8 to Clean Sky 2 in a structured way
- Look at how SME's can be involved in influencing Clean Sky 2 outcomes and structure not just through Calls for Proposal. (cluster approach?). Consider having specific Call for Partners limited to SME's and Academics
- Greater coherence across ITD's (consider IPR / Data sharing)
- Increased focus on Technology TRL's and risk / effort required to effectively mature technologies
- Simpler and more effective administration across ITD
- More flexible and agile mechanisms for recruiting third party organisations (Call for proposal process can sometimes appear slow and onerous)
- Wider involvement of the European SME community (not just aligned "Aerospace" SME's)
- Incorporate Manufacturing readiness levels and their assessment in the proposal
- Open as much as possible the core industry teams to new industries and supply chains prior to the start of Clean Sky 2. Tier 1 and 2 companies to influence programme direction and structure.
- Funding for pre enabling networking between potential partners or programme contributors.
- Make sure Clean Sky 2 impact assessment are done by independent experts

### **Chapter 3 European Public Consultation on the Preparation of the Clean Sky JTI under Horizon 2020**

The European Commission performed a web-based public consultation between 11<sup>th</sup> of July 2012 and 4<sup>th</sup> of October 2012 on the preparation of the Clean Sky Joint Technology Initiative under Horizon 2020. 91 responses were received from participants from at least 17 different countries where the most represented are France (23%), Spain (23%) and Germany (15%). Greater than 90% were familiar with the Clean Sky Joint Undertaking with the majority of respondents who indicated they had applied for funding being successful.

All respondents supported the relevance of the aeronautical industry in addressing societal challenges in transport (emissions, mobility, fuel consumption, congestion, etc) noting the challenges industry faces globally in maintaining its position in a growth sector. Assessment of the most relevant challenges facing the Aeronautical sector showed strong support for all topics. “Sustaining necessary R&D investment” and “Strong international competition” were rated as the two most relevant challenges followed by “Emission reduction”, “Ensuring safety and security”, “Noise reduction” and finally the “Ability to cope with increasing traffic demand”. Specific comments included,

- management of the risk of materials availability and use (REACH legislation)
- step changes in aircraft fuel efficiency, optimised on board energy and economic efficiency
- maintain sufficient and efficient up to date research and test infrastructure (e.g. wind tunnels, simulators, flying test beds,...) and to educate the necessary work force at all levels

Analysing the challenges in Aeronautical research respondents considered lack of public R&D funding and lack of qualified research personnel as important areas to address but they regard European Aeronautical research as competitive. When assessing European added value, responses supported the requirement that it is essential that public support is provided at all levels to achieve major innovations. Comments recognised that industry alone could not maintain Europe’s strong global position but programmes like Clean Sky can significantly balance industries investment to successfully mature technologies through effective demonstration. There was strong (88%) agreement for Europe’s new vision for aviation, Flightpath 2050 with all areas (Reduce air transport environmental impact, Support industrial leadership of EU in the sector, Ensure safety and security, Enhance mobility of passengers) regarded as important.

The development of a Public Private Partnership (PPP) in Aeronautics (under Horizon 2020) was strongly supported for both short (2020) and medium (2035) terms with the main thrust being larger scale demonstration of promising new technologies. Assessing the main thrust for demonstration revealed engines, large passenger aircraft, regional aircraft, systems & equipment and the airframe being important (94.5%+), rotorcraft achieved 80% support but business jets are only considered important by ~60% of respondents. Comments included the potential use of unmanned air systems to assess lower TRL technologies in small scale earlier in the demonstration cycle. Respondents also considered that a PPP in aeronautical research under Horizon 2020 should do more than the current Clean Sky to ensure appropriate involvement should be more focussed on large industry before SME’s or Public Research Organisations and

## Clean Sky 2 consultation outcomes

Universities. This may have been a direct reflection of the participant profile. Major benefits of the PPP would impact favourably on “European aeronautics industry competitiveness” and “reducing environmental impact” with “growth and jobs in Europe” and “efficient use of natural resources (fuel, etc) just behind. Comments reflect significant support for the role Clean Sky has delivered to date in maturing and de-risking promising technologies. Clean Sky 2 objectives need to align with Flightpath 2050 and SIRA topics and continue to develop the strong participant “supply chain” achieved in Clean Sky.

In assessing the current value add of the Clean Sky initiative there was very strong support for all objectives together with the proposal evaluation system. Areas of success include,

- addressing key environmental targets in aeronautical research
- increasing European competitiveness in the areas of aeronautical research
- bringing together main stakeholders in aeronautical research
- aligning the aeronautical stakeholders towards collaboration in large scale demonstrators
- effectively engaging with SME’s
- effectively engaging with Public Research Organisations and universities

Importantly 93.4% of respondents were aware of the technological successes of Clean Sky.

Nearly 80% of respondents indicated that they have sufficient experience with Clean Sky to be able to comment on PPP options. Opinion was positive or neutral with the preferred option being a dedicated legal structure similar to the current JTI but with a lighter approach. Opinions on whether activities not primarily R&D but contributing to achievement of goals should be supported was divided equally.

In summary, this consultation has given a clear view that the Clean Sky JTI has been successful and should be continued under Horizon 2020 to meet the EUROPE 2020, ACARE SRIA and Flightpath 2050 goals. Comments reflect the importance of Aeronautical R&D to Europe in an increasingly competitive global market. To support this it will be necessary to strengthen research and development infrastructure and associated skill base to achieve required technology advances. The use of unmanned and other systems to rapidly assess technologies should be investigated and consideration given to smaller transport and business jets. It will be vital to maintain and grow the SME and technology supply chains to deliver required integrated technology solutions for demonstration under the leadership of industry.



Appendix 2 Continuation of the JTI instrument under Horizon 2020 for Aeronautics and Air  
Transport

**Initial View of the Member States and Associate States <sup>1</sup>**

**Index**

**I. Introduction**

**II. Background and general view**

**III. Main successes and lessons learned**

**IV. Recommendations for a future JTI**

a) Governance

b) Content

c) Initiation and set-up of Clean Sky 2

d) Clean Sky2 processes

**V. Conclusion**

**ANNEX 1: The Successes & Lessons learned**

**I. INTRODUCTION**

This document contains the views of National States on a possible Aviation Joint Technology Initiative under Horizon 2020. It is based on inputs from France, Germany, Greece, Ireland, Italy, The Netherlands, Portugal, Romania, Spain, United Kingdom and Switzerland. The Member States views will be developed further during the discussions on H2020 and the role of JTIs therein. This document should not be considered as a formal opinion of any of the Member States. The Member States will draft their positions in the formal decision process through their national structures and this document does not therefore preclude that process in any way.

This document aims to contribute in the discussions for an Aeronautical JTI under H2020 that are presently on going. It targets the national representatives involved in the H2020 discussion, the core group developing CS2 (industry, CSJU and the Commission) as well as those representatives of the Member States and National States involved in the Clean Sky 2 discussions. It also supports the Commission to bring a proposal for Clean Sky 2 within the frame of H2020 to Council and Parliament.

The document will be distributed through representatives of the various governments via the ACARE Member States Group (MSG) and the National States Representatives Group (NSRG) of Clean Sky.

<sup>1</sup> Based on discussion of representatives of the Member States and National States in the ACARE Member States

## **II. BACKGROUND AND GENERAL VIEW**

Under the 7th Framework Programme the European Commission introduced the Joint Technology Initiative (JTI) as a new instrument to implement areas of the Strategic Research Agendas (SRAs) of a limited number of European Technology Platforms (ETPs) of key European sectors. The aim of the JTI instrument is to increase coordination for Research and Technology Demonstration in such a way that it enables the necessary leadership and coordination to achieve ambitious research and technology demonstration objectives.

One of the proposals that the Commission brought to the Council was the Clean Sky JTI. It focuses on the greening of the Air Transport System by speeding up technological developments and shortening the time to market for new solutions to be demonstrated in Integrated Technology Demonstrators (ITDs). Thus Clean Sky aims at covering a significant part of the ACARE Strategic Research Agenda.

The Council endorsed the proposal at the end of 2007 by establishing the Clean Sky Joint Undertaking (COUNCIL REGULATION (EC) No 71/2007 of 20 December 2007). The Clean Sky Joint Undertaking (CSJU) is a dedicated structure to implement and manage the JTI in an integrated and coherent way. In addition the CSJU organises calls for proposals and oversees the evaluation and selection procedures. The Clean Sky JTI governance structure includes a Governing Board, an Executive Director as well as other bodies, including advisory bodies such as the Clean Sky National States Representative Group (NSRG).

Clean Sky is due to end on 31 December 2017. Further details on the initiative can be found in [www.cleansky.eu](http://www.cleansky.eu).

Since its beginning the Clean Sky Joint Technology Initiative (JTI) is proving to be an effective and efficient instrument to mature and demonstrate promising greening technologies and innovations. Clean Sky brings clear added-value to Europe and involves a wide community of stakeholders across Europe with around 500 partners today and with a very high SME involvement in Calls for Proposals. About 40% of the activities open to calls are won by SMEs (the open call for proposals represent 25% of the total budget).

While improving further and increasing the openness of CS activities, our general view supports the preparation of a future JTI “Clean Sky 2” (CS2) within the coming Framework Programme Horizon 2020. In the preparation of this future JTI the successes and lessons learned of Clean Sky 1 should be taken into account in order to improve the JTI instrument further.

## **III. MAIN SUCCESSES AND LESSONS LEARNED**

The lessons learned in Clean Sky are listed in detail Annex 1. This section lists some general issues.

## Clean Sky 2 consultation outcomes

The technical content of Clean Sky has proven to provide a good balance for the public and private interests. Benefits for society as well as industrial competitiveness have been addressed appropriately. Clean Sky succeeded in attracting a high level of interest from companies, well above the average participation of industrial entities in the collaborative part of FP7. However, visibility of the technical programme and achievements to the National States has been weak.

Given the very complex technical content of the proposed activities, Clean Sky proved to be very successful in managing and integrating the partners' contributions towards the ambitious targets. However, the technical content could have been even better defined and correlated with the specific targets in the early stage of development of the JTI, so as to improve its' overall chances of success.

Clean Sky is a good vehicle to bring technologies to a higher level of technological maturity. However several call topics failed for a variety of reasons as listed in Annex 1. A specific issue is the effectiveness of some CfPs and their related project results with respect to the overall programme. For instance some CfPs were launched late and as a result it is difficult to fully exploit the project outcomes within the Clean Sky timescale.

The fact that the JTI instrument allows for multi-year continuity and visibility is one of the strengths of "Clean Sky" in FP7. This avoids fragmentation over many smaller short term projects, which is essential in meeting the ambitious ACARE<sup>2</sup> goals set in Vision 2020. It also contributes to achieving the roadmaps that have been jointly agreed between all stakeholders. A multi-annual approach for a JTI is beneficial and avoids unnecessary administrative burdens and should be continued in the future.

The implementation of a Technology Evaluator has been well appreciated and is seen as an essential tool both for industrial and public accountability. However the initiation of the Technology Evaluator has been difficult and its full potential has yet to be realised. The use of the Technology Evaluator to communicate results and achievements can be strengthened and its output used to shape the future programme.

## **IV. RECOMMENDATIONS FOR A FUTURE JTI**

This section lists the recommendations for a future Aviation JTI based on to the lessons learned and successes of Clean Sky. They are structured in four main groups related to the governance, the content, the setup and the processes in a possible future JTI to follow Clean Sky.

### **a) GOVERNANCE**

1. The legal framework of Clean Sky 2 should be fixed before the start. Models of legal documents should be available. Rules of participation should, as far as possible, be compliant with the Rules of Horizon 2020 and Clean Sky 2 should only develops its' own rules when justified and clearly beneficial. The rules must be as simple as possible. [S1]<sup>3</sup>, [S2], [A1]<sup>3</sup>

<sup>2</sup> ACARE: Advisory Council for Aviation Research and innovation in Europe

<sup>3</sup> References in [brackets] refer to the lessons learned in Annex 1

## Clean Sky 2 consultation outcomes

2. Participation of national or multinational clusters of European partners should be fully accepted and the opportunity to cluster should be widely advertised [S4], [S5]. Cluster leaders should be acknowledged as representatives of the clusters. [A2].
3. Clean Sky involves close to 500 partners and mechanisms to have greater integration of all partners into the activities and the exploitation of research results should be defined, e.g. the implementation by the JU of one overall tool for information sharing within and between ITDs. [G2], [A6]
4. Programme activities and CfPs should be implemented on a multi-annual basis and a mechanism has to be implemented to shift funds and activities from one year to the next year. The preferred solution would be multi-annual financial commitments comparable to L1 and L2 projects in collaborative research. [G3], [A4]
5. For Clean Sky 2, the industrial governance structure should be based on the CS1 governance approach, which has proven to be reasonable and efficient. There should be three levels of participants in CS2 but the balance and flexibility of the levels should be significantly improved. Given the role and commitment of associates, their position in the governing board should be strengthened. [G6]
6. The governance structure for Transport R&I in H2020 should ensure that the National States have an overall view of the Transport R&I activities of H2020, with regular information communicated to the National States. The NS can also improve their internal communication and strengthen their mutual information exchanges between their representatives in the different committees, such as NSRG, TPC (Transport Programme Committee)... [G5]
7. The NSRG should discuss the PPP in detail, having an active dialogue on its progress, possible rescheduling of activities and technical details. Its advice must be sought when strategic decisions are being prepared. [G5]
8. Clean Sky 2 should ensure substantial reporting on its progress. The NSRG (or National States) should have an early insight in the activity plans, so that it can promote the CS2 activities and disseminate those results which are not confidential to European industry, SMEs, Research Establishments and academia with relevant competencies. NSRG can be given a stronger role and continue to exchange, advise and give recommendations to the JU Executive team.
9. Coordination between National Programmes and Clean Sky 2 activities should be organized on a voluntary basis and led by National States. Regarding information on national programmes, due account has to be given to commercial sensitivity and confidentiality. [G4]. Each National State owning a national programme ensures, as a general and important rule, its coherence with European Programmes, including Clean Sky. Therefore, feedback on National Programmes to the JU must be given on a bilateral basis.
10. The JU should be given a clearer role in the management of the projects within Clean Sky. In case of dispute over the need for particular activities, the JU may seek advice from bodies such as the NSRG and the Technology Evaluator.

11. The current planning process through Industrial Coordination Groups (such as IMG) for L2 works well in FP7 and should not be significantly changed in H2020. In addition, the Programme Committee, or any similar body dealing with aviation research in H2020, should continue to give its' opinion on L2 project topics and proposals. [g5]

12. If administrative and project monitoring tasks under Horizon 2020 are to be externalised for Aviation, we stress the importance of involvement of project officers with expertise in Aviation. However, our first option would be that the Commission continues to manage the administrative and project monitoring tasks for collaborative research.

13. The Technology Evaluator should be kept and have a more independent role. Its governance structure should include a more balanced involvement of all stakeholders (Industry, Research Establishments). During the initial definitions of Clean Sky 2 the TE should be taken into account. The role of the TE should be expanded towards impact considerations. Criteria used should be made clear and open and the TE should give advice to both the Commission and NSRG regarding their strategic decisions. [C6], [G9]

14. A channel must be found to strengthen the voice of the partners e.g. through the NSRG, the Clean Sky Fora or the information days.

## **b) CONTENT**

1. The scope of Clean Sky 2 should address the expectations of both the public and private stakeholders. The scope should therefore focus on societal issues as well as competitive issues. Delivering jobs and boosting economic growth, sustainable mobility and green products are considered to be major public interest issues. [P2], [G1], [C1]

2. During the development phase of CS 2, clear technological targets must be set, in line with FP2050 goals.

3. The focus and content should be communicated widely to promote its general acceptance. At the moment the visibility of the definition of Clean Sky 2 is growing and a wider audience should be involved. More information and consultation events should be used further to widen the visibility [S3]

4. In terms of CS2 structure, advanced (flying) 'air vehicle' technology demonstrators have to be considered as well as cross-cutting technology demonstrators. This will provide a large role to first tier supplier companies in decision-making positions, thus driving European competitiveness and the take-up of their systems in the market. For each technology demonstrator, a convincing case has to be made for its' overall industrial, economic and societal benefits. Before the start of the JTI, each technology demonstrator proposal should be assessed against a set of well-defined and appropriate criteria.

## Clean Sky 2 consultation outcomes

5. The number of ITDs could be increased with each ITD focusing on a well-defined and clearly understood demonstrator. In this way the number of Associates could be increased and the overhead be decreased.
6. A more flexible model with some strands lasting less than the full period of CS2 could be envisaged.
7. Clean Sky 2 should accommodate a number of cross-cutting short & mid-term technology demonstration topics, thus attracting more industrial partners including SMEs. [C1], [C2]
8. The ITD leaders need to have a stronger role with respect to technical content/targets. Current CS experience shows that meeting technical objectives in specific ITDs is only possible with clear responsibilities and powers at ITD level.
9. A clear roadmap of technical progress should be established including decision-making points, technological milestones and activities for the different types of members. This roadmap should be included in the Clean Sky proposal and the National States Representative Group should be involved in its monitoring. However, the detailed technical content should allow for appropriate flexibility for the 7 year duration. [S7]
10. It is important that CS2 continues to call for higher TRL topics. These are best suited for the large majority of supply chain SMEs because they are much closer to the market.
11. One of the implementation modes to be continued under Clean Sky 2 is the monobeneficiary calls as this is one of the successes of Clean Sky. One-partner proposals proved to correspond well to the needs of Clean Sky and the mode of operation of SMEs. [I4]
12. Within CS2 low TRL level topics without probable application or use in Clean Sky should be avoided. For increased coherence towards ACARE SRIA goal coverage, CS2 could include some lower TRL topics, when directly related to its objectives and scope. The majority of the lower TRL level topics, including those related to but not part of CS2 should be under the regular H2020 calls [C3], [C4] (e.g. Collaborative Research).
13. The added benefit and targeted technological advances of Clean Sky 2 compared to Clean Sky 1 need to be clear. As in CS1, the CS2 JTI should fulfil all of the following, criteria:
  - o give added value at Union level;
  - o impact industrial competitiveness, sustainable growth and socio-economic issues;
  - o the long-term commitment from all partners based on a shared vision and clearly defined objectives;
  - o have the scale to match the resources involved and the ability to leverage additional investments in research and innovation;
  - o have a clear definition of roles for participants and agreed key performance, indicators over the lifetime of CS2.

These points should be addressed in the proposal as well as in the Impact Assessment.

14. The relationship to other large research programmes should be specified, e.g. the interaction with SESAR and regular Horizon 2020 calls (Collaborative Research). An operational interface between CS2 and SESAR should be ensured when appropriate. [S8]

15. Clean Sky 2 cannot be perceived as additional budget for the same goals that have been committed to in Clean Sky 1. If Clean Sky 2 is a follow-on programme to pull through and de-risk advanced technologies, it should be made clear what the end status of Clean Sky 1 is expected to be and what the starting points of Clean Sky 2 are, and what will be delivered by the new JTI in terms of the ambitions of H2020 and its relationship to policy objectives.

16. A monitoring & evaluation mechanism should be implemented such as a Technology Evaluator that can assess the overall impact of CS2 activities and communicate the results in a clear and effective way. It should evaluate the technical progress against the initial roadmap in order to compare achievements against the plan and make recommendations for the future execution of the programme. [C6]

### **c) INITIATION AND SET-UP OF CLEAN SKY 2**

1. CS2 should be initiated through a Council Regulation. This resolution should build upon the regulation for CS1, adapted to the changed rules of participation under H2020 and the specific focus of CleanSky 2. The lessons learned in Clean Sky 1 should also be included.

2. A multi-year continuity of Clean Sky 2 is needed as this ensures efficiency and coherence to achieve the roadmaps set for Aviation. A long term commitment is essential to achieve the ambitious goals set in Flightpath 2050 and the Strategic Research and Innovation Agenda of ACARE presently under development by all stakeholders. [C5],[I1]

3. Clean Sky 2 should remain a bipartite JTI (i.e. 50% private funding, 50% EC funding). Direct involvement of National States funds should be avoided. This approach should be made clear at all levels in Council, Parliament and National Governments [G1], [P1].

4. For the CS2 JTI, it is absolutely necessary that a clear separation is made between formal establishment and formal start of technical activities. The Commission should ensure that prior to the formal start of technical activities, the resources and administrative tools are available and in place for the start-up, and that an in-depth review of the technical programme (involving National States) is carried out.

5. A clear separation of CS1 and CS2 programmes should be ensured, with a clearly defined connection between the two. Mix-up of activities, different funding rules etc. should be avoided at all cost, to ensure that no future double accounting issues arise.

6. Building on today's CS, the JU programme management approach is recommended. Changes should include strengthening of the CS-JU, building on lessons learned and the successes of CS1. [S1],[G7],[A5]

## Clean Sky 2 consultation outcomes

7. The IP rules should build on and develop those of CS1, taking into account the improvements made for partners during the operation of Clean Sky. Within Clean Sky an improved overall mechanism for information exchange is needed, to accelerate and strengthen the uptake of technologies and the coherence of the entire programme.[G2],[S1].

8. It is important that the aviation JTI continues to be carried out by world leading European manufacturers having access to world markets, investing considerably in RTDI, and able and willing to engage financially to achieve the goals and challenges set in Flightpath 2050. Given the size of these challenges, not all European stakeholders can lead these efforts. Different types of participation should be continued and the three level structure, developed in Clean Sky 1, with Founding Members, Associates and Partners should be further developed and implemented in an even more open way.

The three levels of commitment reflects well the structure of the sector and its' long RTDI cycles and should be continued in Clean Sky 2. [S5]

### **d) CLEAN SKY 2 PROCESSES**

1. Clean Sky 2 work programmes for calls should be developed in such a way that public and private stakeholders can express their views and the topics opened in an interactive way. A comparable information distribution system based on that of the Horizon 2020 calls should be used. This will improve the coordination of topics and increase the visibility of the opportunities to the widest possible public [G4], [P1]

2. The number of associates involved and their role should be increased. They are to be selected in an open and transparent way. As a first step an Expression of Interest should be called for, where potential associates can indicate their capabilities and ideas of work to be fulfilled within the overall scope of Clean Sky 2. The number of partners should be increased during the course of CS2, including integrating new associates.  
[S3]

3. A non-prescriptive approach should be taken, allowing first and second tier suppliers, supported by other key research and innovation actors, to define and drive technology demonstration activities of clear European value and in line with CS2 objectives. The evaluation of those proposals should be done in a fully transparent way in line with public accountability rules.

4. The share of funding through calls should be increased compared to Clean Sky 1, which includes calls for Associates, calls for Partners and calls for Tenders.

5. The funding rates in CS2 should as far as possible align with those of CS1 and the H2020 structure and be at least 50% of the full costs. The funding rate should be fixed for the entire duration of the JTI activities.

6. Service activities (testing and demonstration for industrial type of activities –no research involved, including the use of major research and test facilities such as wind tunnels when applied as service for the industry) should be funded as subcontracts at a level of 100%. Subcontracts

## Clean Sky 2 consultation outcomes

should be implemented through Calls for Tenders above an agreed threshold and the total value of subcontracts should be limited. [S4]

7. The Call for Proposal process should be enhanced and speeded up in particular with reference to the final phases (negotiation, contract signature and kick-off).

8. Clean Sky 2 should not replace the Level 1 and Level 2 projects as currently exist for collaborative research. Collaborative projects should remain in H2020 as there is significant benefit from these projects for the supply chain as a whole. [C2]

9. Clean Sky 2 should interact with the Commission to provide inputs and information for calls of the Work Programmes of H2020.

10. There should be no internal charging of management cost of Founding Members to other Members / Partners.

## V. CONCLUSION

The set-up of CS1 JTI, a new instrument proposed by the Commission in FP7, has gone through a long learning phase, during which many details and issues had to be resolved and improved. The JU was granted its autonomy in November 2009, two years after the legal establishment of the initiative. During its operation up to now, Clean Sky has evolved into an efficient and effective instrument to de-risk and mature promising technology breakthroughs.

It is important for CS2 not to reinvent the instrument from scratch and to build-up on today's successful CS operations and the lessons learned since the first Clean Sky discussions about 7 years ago.

## ANNEX 1: THE SUCCESSES & LESSONS LEARNED

The successes and lessons learned in Clean Sky 1 regarding the Governance, Start-up, Awareness and Administrative issues from the perspective of the national representatives are:

### *Start & Set-up*

S1. The work involved in the legal set-up of Clean Sky was underestimated even after the Council Regulation was adopted. Major hurdles in this respect were the drafting of model contracts and deviations regarding rules of participation in FP7. This led to different interpretations and, in fact positions are still developing since the set-up of Clean Sky. Commission requirements changed when legal implications surfaced and it was unclear which directorate was in charge (RTD, BUDG...)

S2. During the start-up several deviations from the rules for the FP7 collaborative research projects were implemented. Examples are the overhead percentage of 20% instead of 60% for some participants, and the liability of participants up to two times the value of the grant.

## Clean Sky 2 consultation outcomes

The rationale for these deviations is unclear. In other cases deviations were helpful to the JU for running the programme, e.g. the changed CfP system.

S3. The transparency of the process to develop an initiative such as Clean Sky, and the wide communication within Europe of its content is vital to promote its general acceptance, and to contribute to its smooth operation.

S4. During the proposal and initial stages of Clean Sky 1, which took more than 3 years, several meetings and events were organised, including a large information and consultation event which contributed to the selection of associates, followed by a Call for Associates. However a limited number of channels were used to select founding members and associates and the overall selection process could have been more open and transparent. This resulted in some disappointment across Europe. Also there is no apparent provision for new Associates in CS1.

S5. The three different levels of engagement and commitment through Founding Members, Associates and Partners has had its merit. Some issues and lessons are:

S5.1. Improvement and widening of the cluster participation. Clusters did facilitate the participation of smaller entities and the operational benefit of this way of participation is widely acknowledged. However the legal acceptance of clusters was not resolved.

S5.2. The involvement of partners through the CfP process was successful, in particular with respect to attracting SMEs (close to 40%).

S5.3. A rather high number of topics failed in the CfP process. This needs careful consideration on which topics to call, how information should be distributed, how budgets are assigned, etc. The topics in the CfP were often low TRL-level and very constrained without a clear distinction between research and sub-contract (tenders). Some of the topics were not well described.

S6. The allocated role of National States was quite weak in the start-up and implementation phase.

S7. In CS1, the work was defined and specified by the primes at a high level and there was not always a clear distinction between activities performed by the different types of members and the corresponding detailed budget to be allocated to CfP. This refinement came later and turned out to be fundamental for the flexibility needed for the 7-year period of Clean Sky.

S8. In the start-up of CS and SESAR, coordination between the two JUs was mentioned.

While a dedicated interface has been created between the JUs, the efficiency of the coordination is not very evident.

### ***Content***

C1. The 'Clean Sky' JTI proved to be an efficient and essential instrument to demonstrate, mature, 'de-risk' and validate promising technology breakthroughs. 'Clean Sky' brings high added-value to Europe and efficiently delivers technology demonstrators for step changes in improving Aviation environmental performance.

## Clean Sky 2 consultation outcomes

C2. The technical content has proven to be a good balance of the public and private interests. Benefits for society, as well as industrial competitiveness, have been addressed appropriately.

C3. Clean Sky succeeded in attracting a high level of interest from companies, well above the average participation of industrial entities in the collaborative part of FP7.

C4. Visibility of the technical programme to the National States has been weak.

C5. Clean Sky is a good vehicle to bring technologies to a higher level of maturity. However several call topics focus on low TRL level activities or high level test work/services. The level of funding proposed for services & test work sometimes resulted in failure of call topics.

C6. A specific issue is the effectiveness of some CfPs and the related project results with respect to the overall programme. In fact, some CfPs were so late that it was difficult to fully exploit the project results.

C7. The fact that the JTI instrument allows for multi-year continuity and visibility is one of the successes of “Clean Sky” in FP7. This avoids fragmentation over many smaller projects, and is essential towards the ambitious goals set in Vision 2020. It also contributes to achieving the roadmaps that have been jointly agreed between all stakeholders.

C8. The implementation of a Technology Evaluator has been well appreciated and is seen as an essential tool both for industrial and public accountability. However the full potential of the Technology Evaluator has yet to be reached and the initiation of the Technology Evaluator itself was difficult. The use of the Technology Evaluator to communicate results and achievements can be strengthened and its output used to shape the future programme.

### ***Governance***

G1. A clear benefit of Clean Sky is the way it is financed: a bilateral funding from FP7 public funds and private funds from aeronautical stakeholders.

G2. The overall cohesion and synergy in the governance between ITDs is exploited only at a limited level. It is not always possible to exchange information between ITDs. The difficulties of the modelling exercise of the Technology Evaluator are one of the examples. Each of the ITDs developed and used its own information-sharing facilities, leading to limited exchange between ITDs.

G3. Regarding budgetary issues, the limited flexibility to shift funds to later years has proved difficult and is not in line with the nature of research. This is true for both members’ activities within the ITD programme, and partners’ activities through CfPs.

G4. The role of the NSRG has been mainly informative.

## Clean Sky 2 consultation outcomes

G4.1. It was informed on developments, annual plans and planned call topics at a late stage and via final drafts only.

G4.2. The advisory role of the NSRG was focused on the Call for Proposal process with Clean Sky. The NSRG was only rarely consulted by industry / the JU on other matters.

G4.3. The role of the NSRG for coordination between public programmes and Clean Sky has proven to be difficult. This includes National Programmes as well as Framework Programme. The individual national states have ensured the coherence with the European Programmes, including Clean Sky.

G4.4. The information exchange between the JU on CS progress and CfPs and National States Representatives has proven to be difficult.

G5. The discussions on Aviation R&I under FP7 are taking place in different committees. This sometimes leads, for some National States, to fragmented and/or unclear views of budget decisions. Also the rules for participation are different for the various committees. The attendance level of some representatives is related to the availability of reimbursement of travel costs and their commitment and willingness to attend all meetings.

G6. The industrial governance structure for CS1 has proven to be reasonable and efficient. However the role of Associates in the governance has been limited and fragmented and could be strengthened.

G7. The private stakeholders in Clean Sky have to contribute financially to the running cost of the JU and the management costs. This creates considerable administrative burden as all Members are invoiced. In addition, associates are expected to contribute to the management costs of the ITD leaders, without being able to charge their own management costs.

G8. The Technology Evaluator (TE) depends on the willingness of industry to supply data. In turn, industry questions the needs and benefit of the work and analysis being done by the TE. The independence of the TE is therefore limited.

### ***Public and Political Awareness***

P1. During the start-up and execution of Clean Sky, an understanding developed that participation in Clean Sky was possible only for a limited number of participants. Today, even when 500 entities participate in Clean Sky, this image has not totally disappeared, despite efforts to correct it and the open access to the Calls for Proposals implemented from the beginning of Clean Sky. At the political level not all parties are aware of the specific approach and set-up of Clean Sky.

### ***Administrative issues***

A1. Legal documents

## Clean Sky 2 consultation outcomes

A1.1. Consortium agreements have been developed for each of the ITDs separately. For each ITD, participants are confronted with different agreements leading to unnecessary complexity. This approach, on the other hand, allows for flexibility.

A1.2. Grant Agreements for members are concluded during the year, and not before. In certain cases top level management of partners has blocked or ended participation because of their exposure to requirements that were not clear at the beginning.

A1.3. Lack of correlation between Grant Agreements and Annual Implementation Plans/Cost Plans, leading to problems in the audits.

A2. As for other FP7 activities, the red tape for Clean Sky has been considerable and should be reduced. SMEs especially, which record very successful participation rates in CS1, are hindered by the amount of overhead needed for timesheets, cost calculations methods etc. The alternative of letting ITD members get a larger share of the funding through Calls in addition to the other sources does not seem desirable either.

A3. The participation of a member of a given ITD in CfPs of another ITD is allowed but the overall budget share between members and partners has to be respected. This has created uncertainty in whether some members could take part in specific CfPs.

A4. The budgetary constraints of yearly commitments lead to difficulties when delays occurred. No simple mechanism is available to shift unfinished tasks from one year to a next year. Furthermore, the annual contracts create difficulties for the definition and management of calls.

A5. Several operational and administrative issues had to be resolved during the initial phase of Clean Sky. These included essential resources and administrative tools which were not adequate as the JTI developed.

A6. The Stakeholders agreement (SHA) is inconsistent with regard to IPR and information exchange between ITDs (art.6). This relates to Specific Exchange Agreements and the different conditions for information exchange within an ITD and between ITDs.

### ***Impact***

I1. The CS programme has shown a significant leverage effect on private funding and it relates well to the Strategic Research Agenda of ACARE.

I2. During the implementation of the work, the communication of the results achieved and the overall information was limited and below the level of expectations of some National States and the level required to effectively coordinate with national programmes.

I3. A clear impact of Clean Sky is the closer relationship between universities and industry. In fact, the Clean Sky approach results in industry giving guidance to universities for the direction of their research. The focus of Clean Sky towards higher TRL level research provided good opportunities for supply chain SMEs participation

Clean Sky 2 consultation outcomes

Appendix 3 Association of European Research Establishments in Aeronautics (EREA) Position on Clean Sky 2 (as presented at ILA Berlin Air Show)

### **EREA Position on Clean Sky 2**

ILA Berlin Air Show

12 September 2012

**A Aviation JTI in Horizon 2020** EREA recommendation:

- ensure in **HORIZON 2020** the coverage of entire aviation research and innovation cycle ranging from **basic research up to demonstration**.
- Specifically, a successor of Clean Sky should be foreseen reinforcing the **demonstration activities for innovative technologies** and **radically new configurations** reducing the risks of new product development.

#### **Content of JTI**

Goal: to bring the technologies up to the highest level of maturity

- Validation and demonstration at **technology level**;
- Validation and demonstration of **integrated technology**;
- X-demonstrators - Demonstrators with breakthrough technologies **integrated in radically new configurations**

EREA and its members are ready to support validation and demonstration in the different phases

#### **Continue market approach**

Continuation with **five main** topics within next JTI

- Fixed Wing a/c
- Rotary Wing a/c
- Engines
- Systems
- Technology/Impact Evaluation

#### **EREA proposal on continuation of current JTI set-up**

Use **same funding rules** as Horizon 2020 (simplification).

- Continue with current **level of participation**: Members, Associated Members, and partners;
- Continued or even reinforced **partnership between EREA and industry** under the successor of Clean Sky e.g. **institutionalized EREA seats in the Governing Board**;

Appendix 3 (continued)

- **100% funding** (full-cost) for the use of **research and test facilities** (infrastructures), as well as the associated hardware (such as wind tunnel models) as a service for industry

**Optional: CS2 as project management organisation**

- An **open and transparent** process similar to the current process of the Commission has to be ensured for L0, L1, L2.

- Use REA principles and procedures (Space & Security) But: **EC to take final decision** on funding, involving the programme committee (Member States).

- Members and partners of the L3-project should be able to apply for **open calls** for proposals for L0, L1 and L2.

- The **demonstration activities** (L3) will be funded via the project management organization in the same way as today Clean Sky by EC.

Appendix 4 European Aeronautics Science Network (EASN) Position on a successor to Clean Sky in Horizon 2020

***EASN Position ...on a successor to Clean Sky in Horizon 2020*** European Aeronautics Science Network

The position paper was formulated after a questionnaire campaign within the EASN members, followed by an open consultation process. Based on the responses received, the following main points may be considered as common within the European Academia:

- The European Academia is well aware of the research activities of CS
- Several Universities have participated in CS calls and were actively involved through a number of won proposals
- The overall experience from the participation of Academic institutions in CS is positive and a successor to CS is supported.

**Advantages**

- The success rates of Clean Sky calls are significantly higher compared to the AAT FP7 calls
- Focused and specific topics with clear objectives – easier proposal preparation process
- The active participation of project officers and topic managers

**Drawbacks**

- The budget is sometimes low for the proposed tasks
- Not enough innovation exists in the results
- Limited cases of unclear topics
- Universities from classical aeronautics countries are favoured

***...with respect to the role of the Academia in CS***

Although the development of demonstration hardware to high TRL levels is not one of the Academia activities, certain Universities can support such activities through dedicated technology centres.

- Universities could provide validated tools in order to be used by the industry in the design of demonstrators or validate tools that are currently being used
- Specialised researchers and infrastructure provided from European Universities can be better exploited

***EASN's role***

- Support in broadening academia representation by suggesting Universities and labs
- Participate in the dissemination activities of Clean Sky 2
- The active participation in the CS governing board would provide the academia view on issues relevant to academia and also contribute on implementing the lessons learnt in the frame of Clean Sky.

## Clean Sky 2 consultation outcomes

### Appendix 4 (continued)

#### *...with respect to the submission, evaluation and negotiations of proposals*

- The submission and evaluation process for Clean Sky proposals shall remain the same as the rules are clear and transparent.
- The need for the current deviations from the FP7 processes should be re-examined
- Titles and abstracts of winning proposals should be published
- A simplification of the negotiation process is required, as the effort and costs associated with the process are often a drawback to the projects

#### *...with respect to Clean Sky funding*

- The narrow budget limits of the CS calls do not allow much space for innovation.
- Budget range rather than strict budget limits should be considered in order to allow more room for proposals which will take the required technology a step forward
- The most promising (economically and technically) proposal should receive the requested funding
- Funding rules should coincide with the usual FP7 rules. A 60% overhead rate is requested from Universities
- L1 and L2 projects should be handled independently by the EC but a better interaction should be sought through a proper dissemination mechanism.



**Have you received funding from Clean Sky?**

Yes  No

**... if yes, could you please mention your level of involvement ?**

ITD leader  Associate  Partner

**Do you have any suggestions on improving the proposal on the continuation of Clean Sky when compared to the current Clean Sky programme?**

**What should the new Clean Sky priorities be as regards Horizon 2020 and flight path 2050 objectives?** (sort by order of importance: from **1** - very important to **7** - not important)

**Industrial Competitiveness**

- Job creation
- SME involvement
- Innovation and research
- Competitiveness of the supply chain
- Other (please specify) \_\_\_\_\_

**Societal challenges**

- Mobility
- Fuel consumption
- Congestion

**Please add appropriate details / comments below**

**What should be the main drivers to achieve successfully the continuation of Clean Sky in relation to programme objectives?**

(sort by order of importance: from **1** - very important to **6** - not important)

- Implementing an objective-driven approach
- Improving the maturity of promising technologies in a real environment

## Clean Sky 2 consultation outcomes

- Fostering innovation and the study of long-term perspective technologies
- Improving maturity of promising technologies at aircraft level
- Contributing to the reduction of the environmental footprint of new Aircraft
- Working on the integration of the Aircraft in the ATS environment

Other, (please specify) \_\_\_\_\_

**... Please add appropriate comments below**

**If you have any general suggestions or comments on how to improve the current proposal for continuation of the Clean Sky programme, please specify:**

**We thank you for your participation.**

Clean Sky 2 consultation outcomes

Appendix 6            Useful links

**Horizon 2020 Official documents**

[http://ec.europa.eu/research/horizon2020/index\\_en.cfm?pg=h2020-documents](http://ec.europa.eu/research/horizon2020/index_en.cfm?pg=h2020-documents)

**Clean Sky**

<http://www.cleansky.eu/>

**Public consultation on continuation of the Public Private Partnership in Aeronautics**

[http://ec.europa.eu/research/consultations/clean\\_sky\\_h2020/consultation\\_en.htm](http://ec.europa.eu/research/consultations/clean_sky_h2020/consultation_en.htm)

**ACARE Strategic Research and Innovation Agenda**

<http://www.acare4europe.org/sria>

**Flightpath 2050: Europe's Vision for Aviation**

[http://80.33.141.76/origami/docs/Flightpath2050\\_Final.pdf](http://80.33.141.76/origami/docs/Flightpath2050_Final.pdf)