Les ambitions, l'organisation de CLEAN SKY

Pau, 6 février 2013

Michel Goulain SAGE PO

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Content

- Clean Sky
  - ACARE
  - Organisation
- Lien avec programmes nationaux
- Clean Sky à mi parcours
- Les partenaires (CfP)
- Clean Sky 2

Unique Public-Private-Partnership in Aeronautics

CLEANSKY

A Joint Technological Initiative

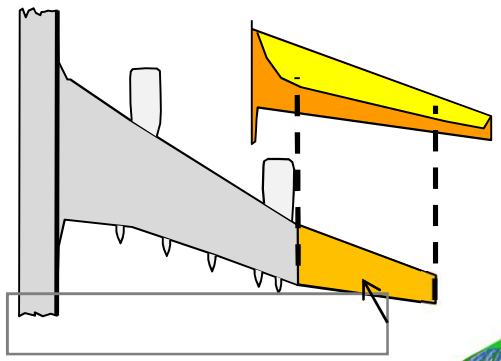
Stemming from ACARE agenda

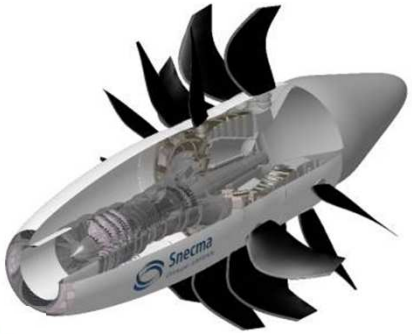
Europe's largest Aeronautics Research Programme ever

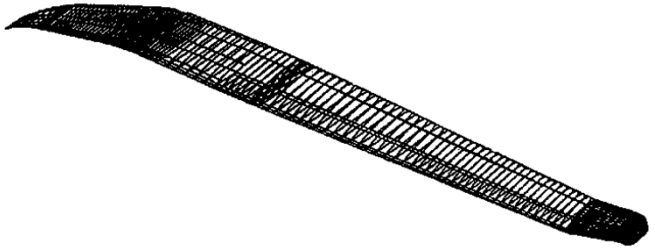
- Environmental objectives stemming from ACARE SRA (2020)
- €1.6B value, split 50/50 between the Commission (cash) and Clean Sky members and partners (in kind)
- Started February 2008; running up to 2017
- Downstream research up to TRL6: integrated demonstrators
- Industry-led

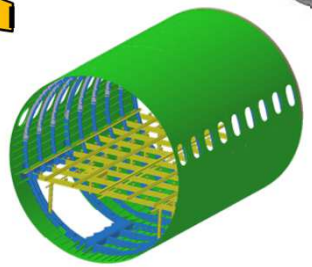
Technology streams

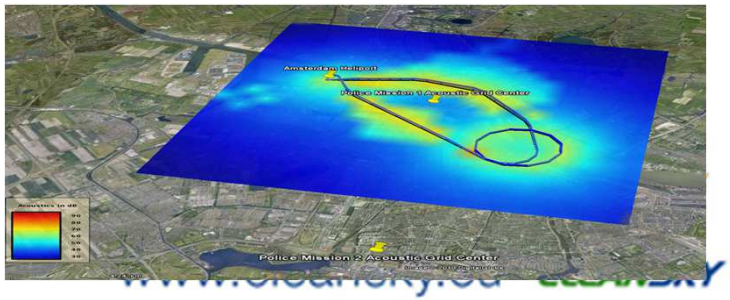
- Aerodynamics
- Advanced Materials and structures
- Propulsion
- On-board energy
- Trajectory











Clean Sky Technologies meeting ACARE goals

ACARE GOALS		Technology Domains
50%CO2 80% NOx	Reduced fuel consumption (CO_2 & NOx reduction)	➢ Power plant ➢ Loads & Flow Control ➢ New Aircraft Configurations ➢ Low weight ➢ Aircraft Energy Management ➢ Mission & Trajectory Management
50% noise	External noise reduction	➢ Power Plant ➢ Mission & Trajectory Management ➢ Configurations ➢ Rotorcraft Noise Reduction
Green design..	"Ecolonomic" life cycle	➢ Aircraft Life Cycle

Big Technical Challenges

Reduce perceived external noise by

- **50% by 2020**
- **65% by 2050**

Reduce fuel consumption and CO_2 emissions by

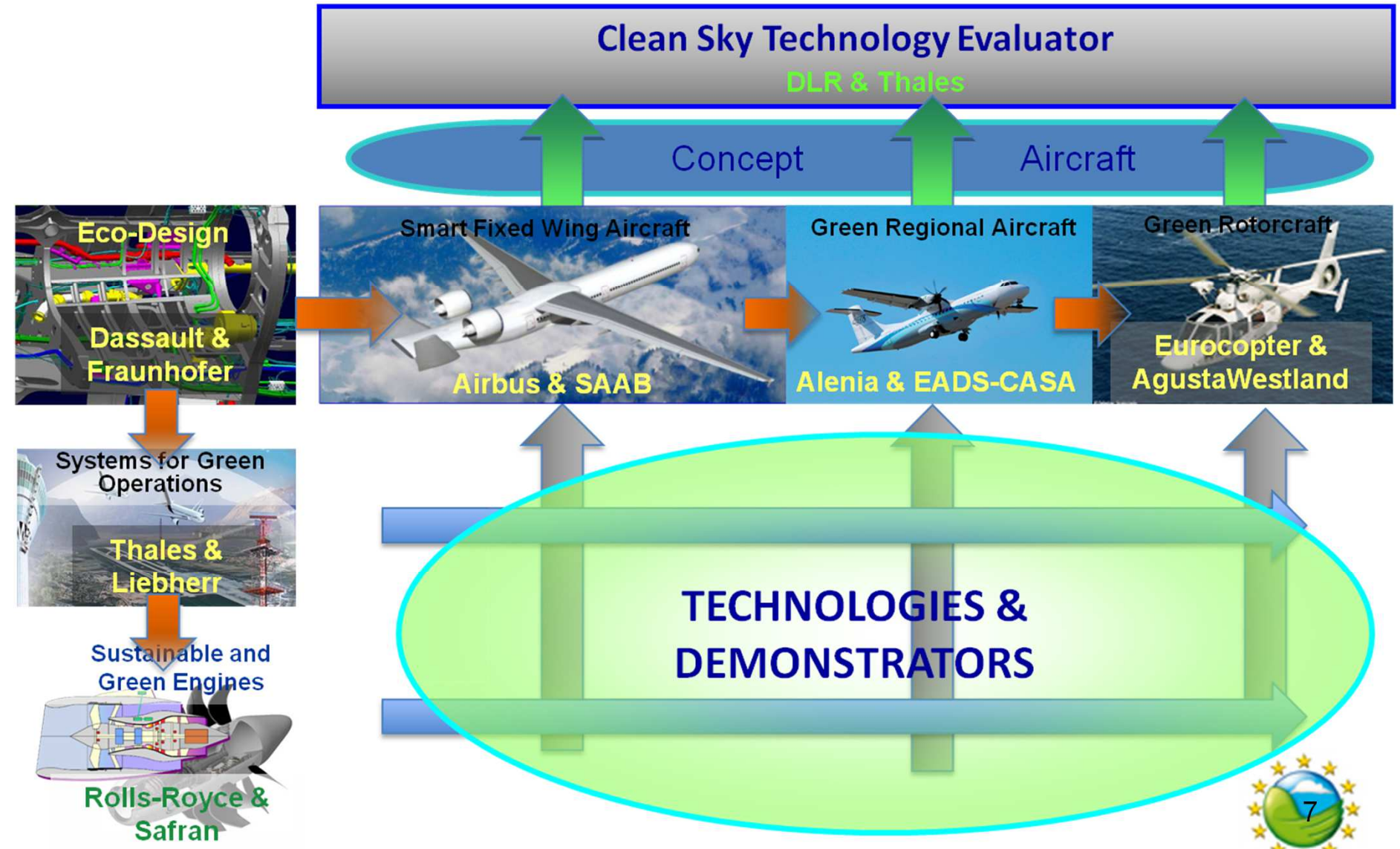
- **50% by 2020**
- **75% by 2050**

Reduce NO_X emissions by

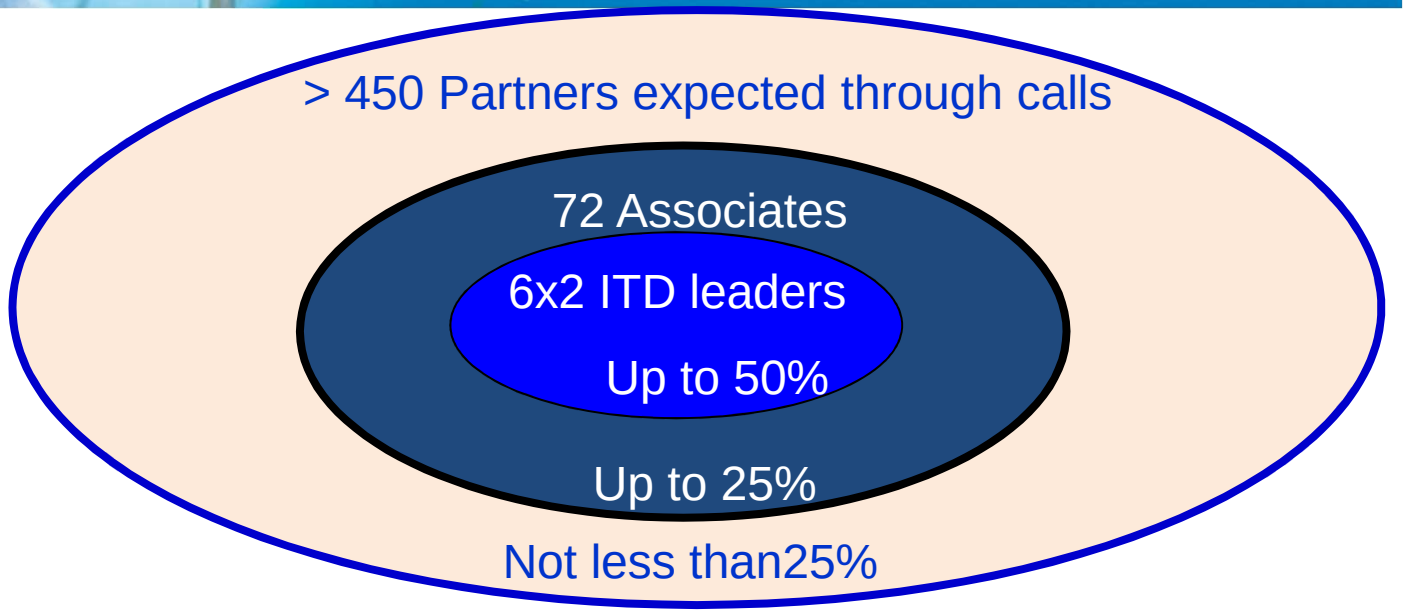
- **80% by 2020**
- **90% by 2050**

Vision 2020 and **Flightpath 2050** targets are for new aircraft and whole industry relative to 2000

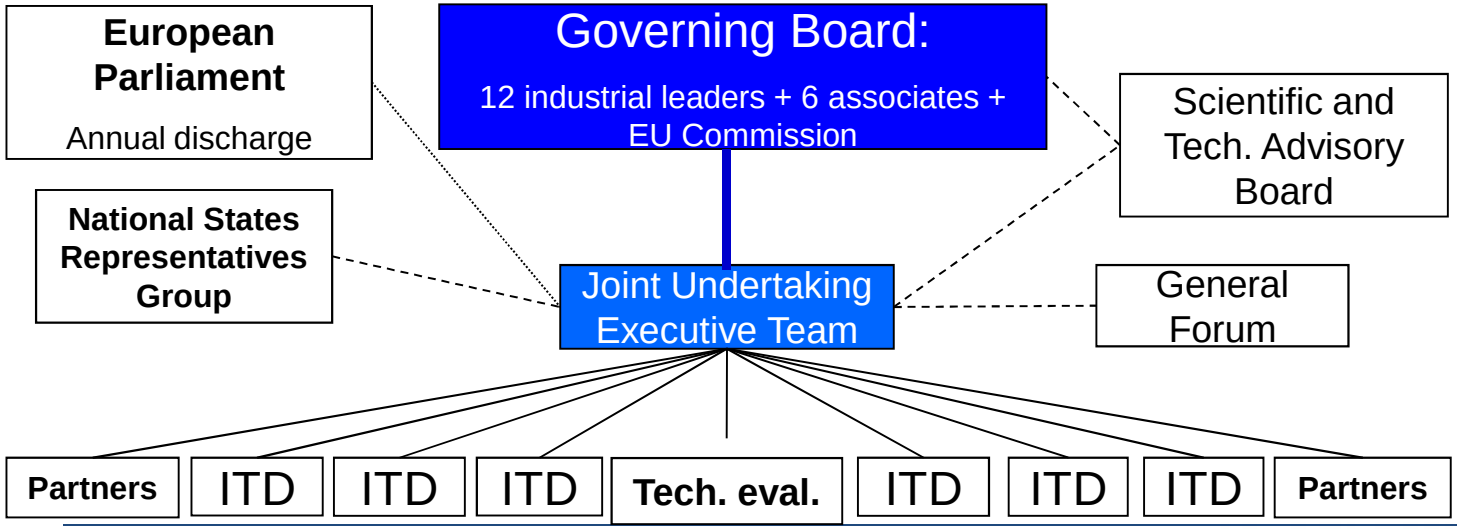
Integrated Program Structure



Clean Sky involves a broad and open participation



~540 participants (members+partners) to date



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Clean Sky pour les nuls

Clean Sky c'est:

- 1600 millions €
- 6 domaines technologiques
- 10 concepts d'aéronefs
- 20 grands demonstrateurs (et beaucoup de petits)
- 100 clé technologies
- 500 participants (compagnies, organisation de recherche, universités)

Et

- 30% réduction moyenne de CO_2 et bruit

National and European activities are consistent and complementary

Like our left and right hands, both are similar but different, yet both are needed, are complementary and follow the same objectives. European and National Aviation RTDI are also both needed. They follow the same Strategic Research Agenda (ACARE) and respond to the same ambitious objectives (FlightPath2050, ACARE SRIA). They are different, consistent and complementary by nature :

- The Aeronautics RTD led at European level in Framework programmes are essential activities which benefit from the mass effect and the added-value of wide European cooperation, potentially tapping some untapped capacities and exploiting win-win situations, contributing to the overall massive effort necessary for the Industry to demonstrate new promising technologies along the ACARE goals.

- Aeronautics RTD activities conducted at Nat'l (or Reg'l) level are complementary to the European ones (FP) : they also are essential, follow the ACARE Goals and consist in projects priority breakthrough technology which help to foster the competitiveness of national stakeholders, which are of confidential nature and can't be shared at the large European level (EU27+Associated Countries…)

Eu-Nat-Reg. Coordination and coherence

@ European Level

Member States

EC — **DG-RTD + DG-MOVE**

ACARE

ACARE include all european Aviation RDTI stakeholders = EC, MS, Industry, Research org, Academia, Airlines, Airports, ANSP, regulatory, etc.

Vision 'Flightpath2050' (March 2011) + ACARE SRIA (Sept 2012)

Vision 2020

Flightpath 2050

@ National & Reg. Level

CORAC Aéronautique Environnement Recherche
France
http://www.aerorecherchecorac.com/

LuFo, BDLI
Germany
http://www.dlr.de/pt-lf/

NATS
UK
http://ktn.globalwatchonline.com/
www.innovateuk.org

KIA
Netherlands
http://www.senternovem.nl/mmfiles/KIA_tcm24-312007.pdf
http://www.nivr.nl/aeronautics-air-transport-261.html

PAE
Plataforma Aeroespacial Española
Spain
http://plataforma-aeroespacial.org/pdf/agenda_estrategica.pdf

NRA FLYG
Sweden
http://www.nraflyg.se/documents/nraflyg2010.pdf

ACARE Italia
Italy
http://www.aiad.it/ACARE_IT.asp

Take off
Austria
http://www.bmvit.gv.at/en/service/publications/downloads/takeoff.pdf
http://www.bmvit.gv.at/innovation/downloads/luftfahrtstrategie.pdf

ILO
Finland
www.teknologiateollisuus.fi

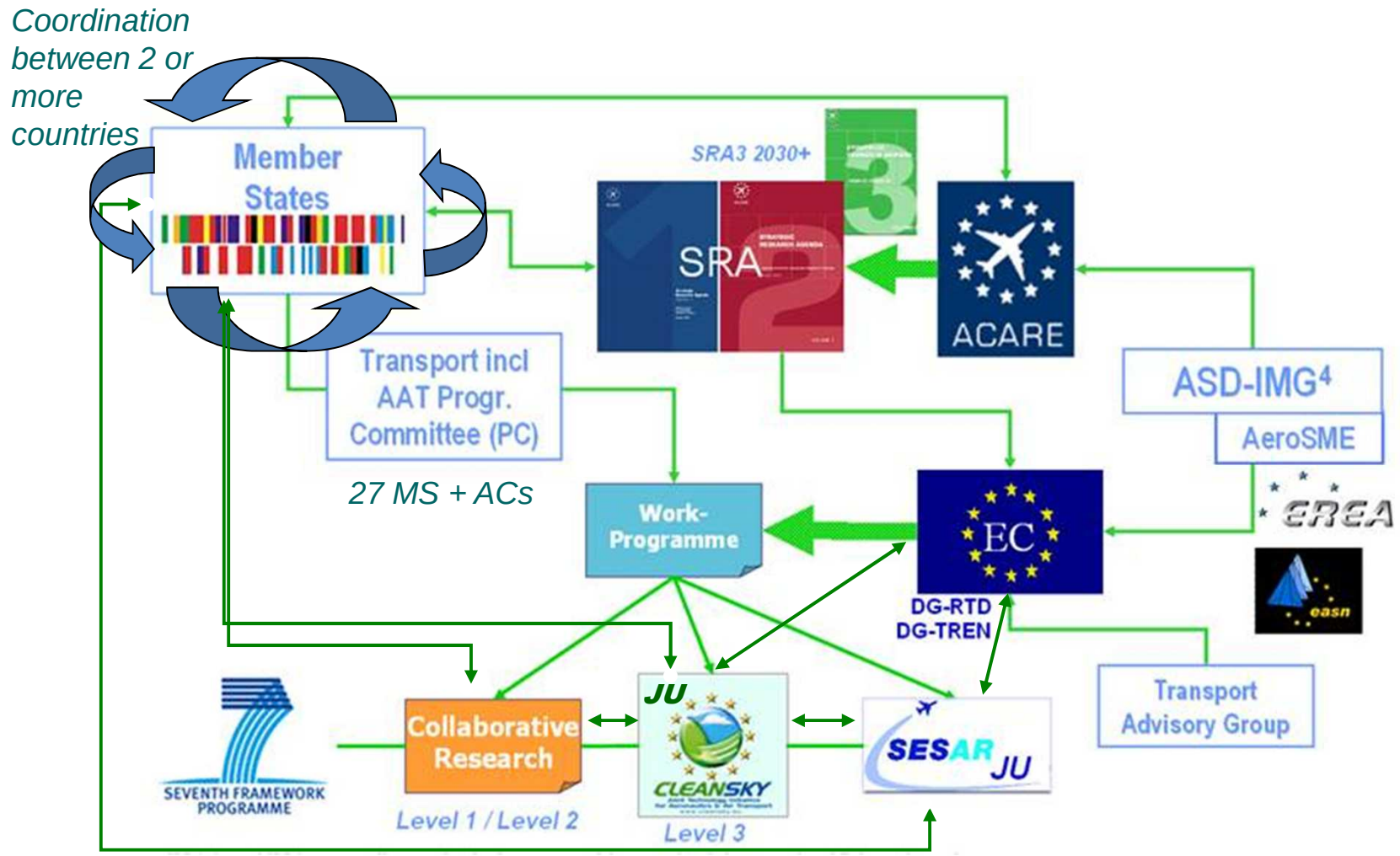
HATP
Hungaria
http://www.haif.org/HATP.html

Aeron program
Poland

...
+ other countries: Belgium, Czech Rep, Romania, etc.

Sce : MSG survey 2009/2010.

Eu-Nat-Reg. Coordination, and coherence.

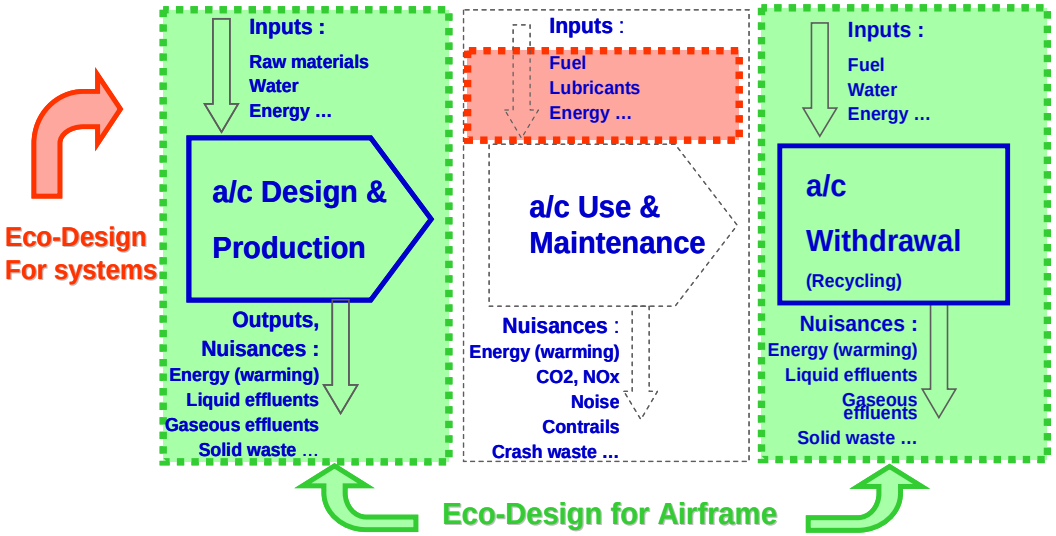


Main coordination links existing in Europe

Eco-Design ITD - Objectives and Contents

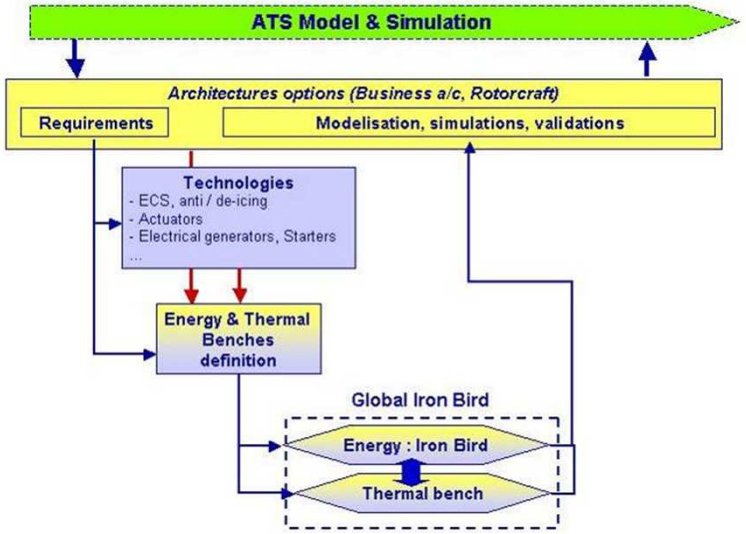
Eco-Design for Airframe (EDA) main objective

To design airframes for decreasing inputs, outputs and nuisances during A/C design & production and withdrawal phases



Eco-Design for Systems (EDS) main objective

To design architectures of a/c systems, towards the more/all electrical a/c, with the objective of reducing use of non-renewable and noxious fluids/materials



Modelling

BLADE – Major Laminar Flow Demonstration

Aernnova, Airbus, Asco, Dassault, DLR, GKN, Incas, NLR, Onera, Saab

AIRBUS

Natural Laminar Flow Wing Flying Testbed

- Advanced passive laminar flow wing aerodynamic design
- Two alternative integrated structural concepts for a laminar wing
- High quality, low tolerance manufacturing and repair techniques
- Anti contamination surface coating
- Shielding Kruger high lift device

Q4/2014

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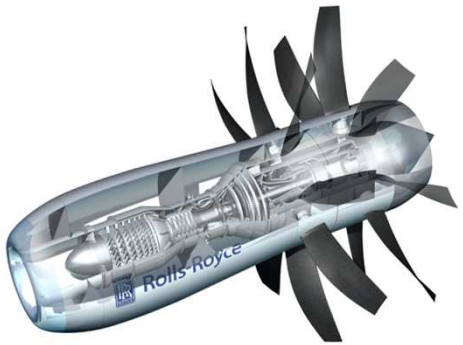
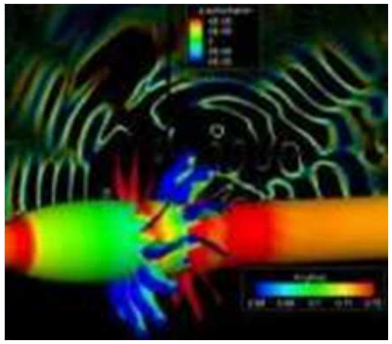
Open rotor blade

- About 1.3 m long
- 3D shape to decrease noise and propellers interaction
- 3D shape to improve load performance
- In composite to have a lighter powerplant system
- Anti icing capabilities

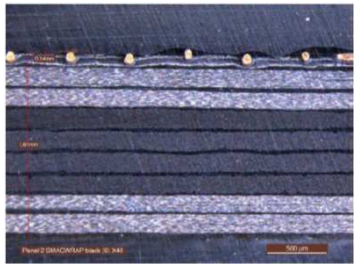




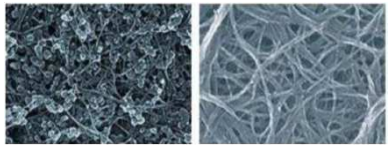
Radiated Noise From unsteady computing calculation

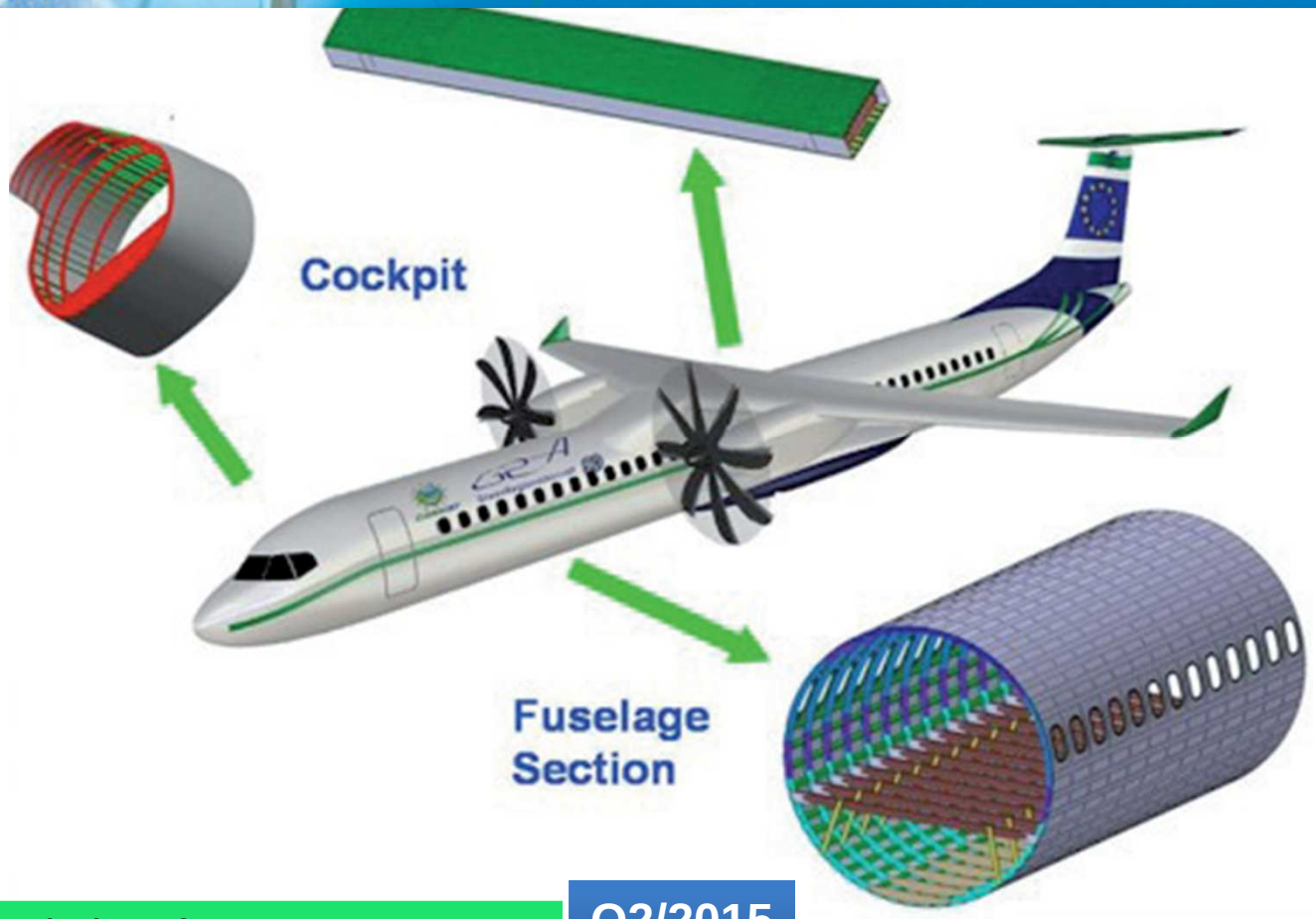
Composite structures for regional aircraft

Multi-layer composite



Carbon nanotubes for conductivity





Next Generation Regional Aircraft:
Full-scale Static and Fatigue Testing

- Advanced Al-Li structures and processes
- Multi-functional composite materials

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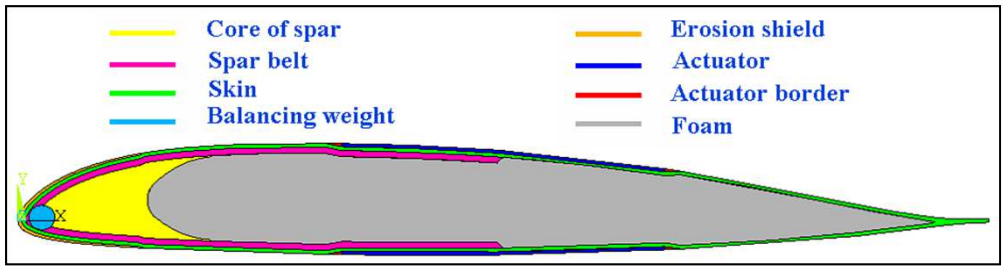
Rotorcraft morphing Blades

Objectives:

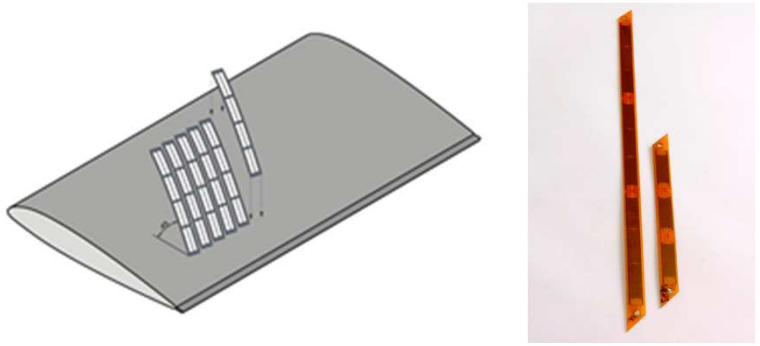
a. **reducing power consumption (i.e power requirement) by increasing lift during certain flight conditions**
b. **decreasing perceived noise level mainly during take-off and landing**

Technologies and solutions envisaged:

- **Active Twist** rotor system for power and noise reduction

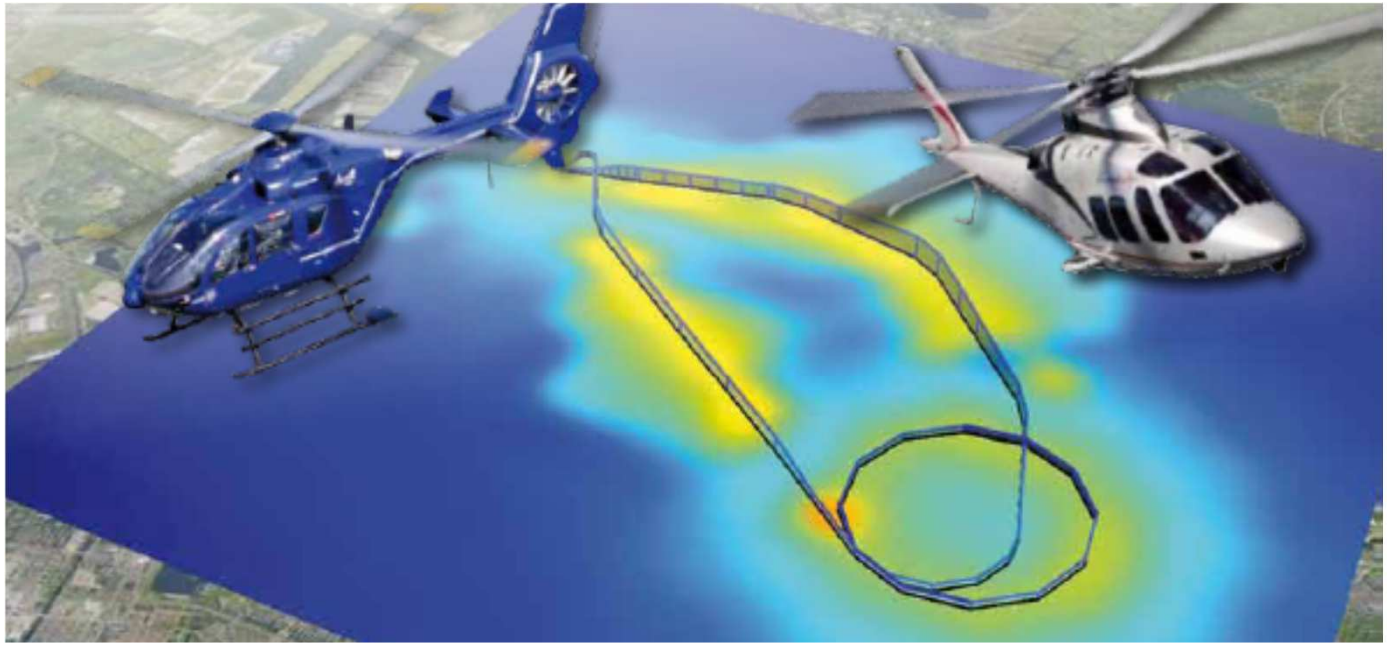


Active blade deformation e.g. active twist



multilayer piezo-composites arrays into an active rotor blade

Mission and Trajectory Management



Systems for flight path optimisation

- Rotorcraft
- Aircraft

- Underpinning and complementing SESAR

Q1/2015

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Technology Evaluator

•Technology Evaluator : integrator of the outcomes of the different ITDs in order to provide an assessment of the actual environmental benefits

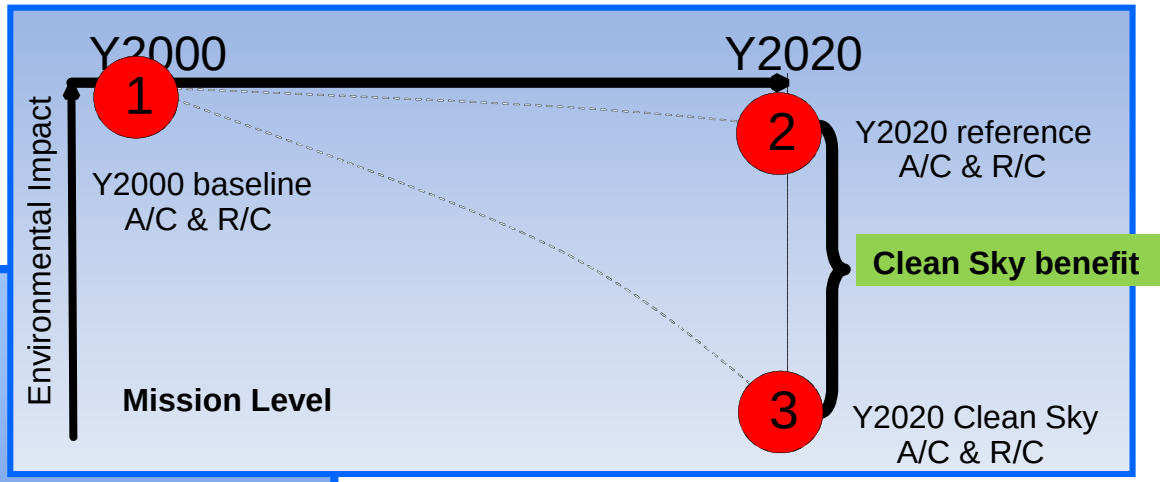
•TE is tasked to coordinate the revision of the targets set at the beginning of the program

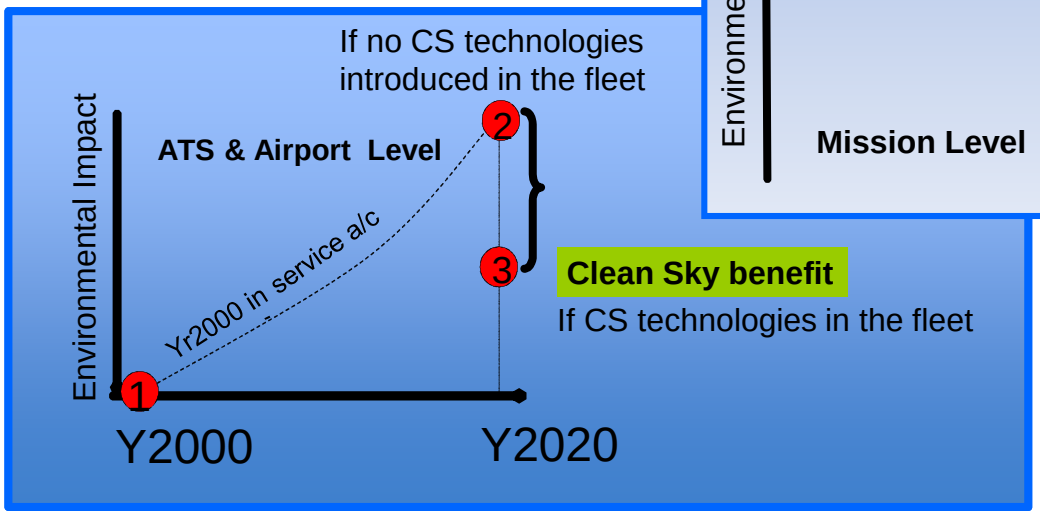
•TE is also the focal point for the links with other programs or bodies like SESAR, EASA and Eurocontrol

Concept Aircraft – enabling the TE to assess the Programme's environmental benefits

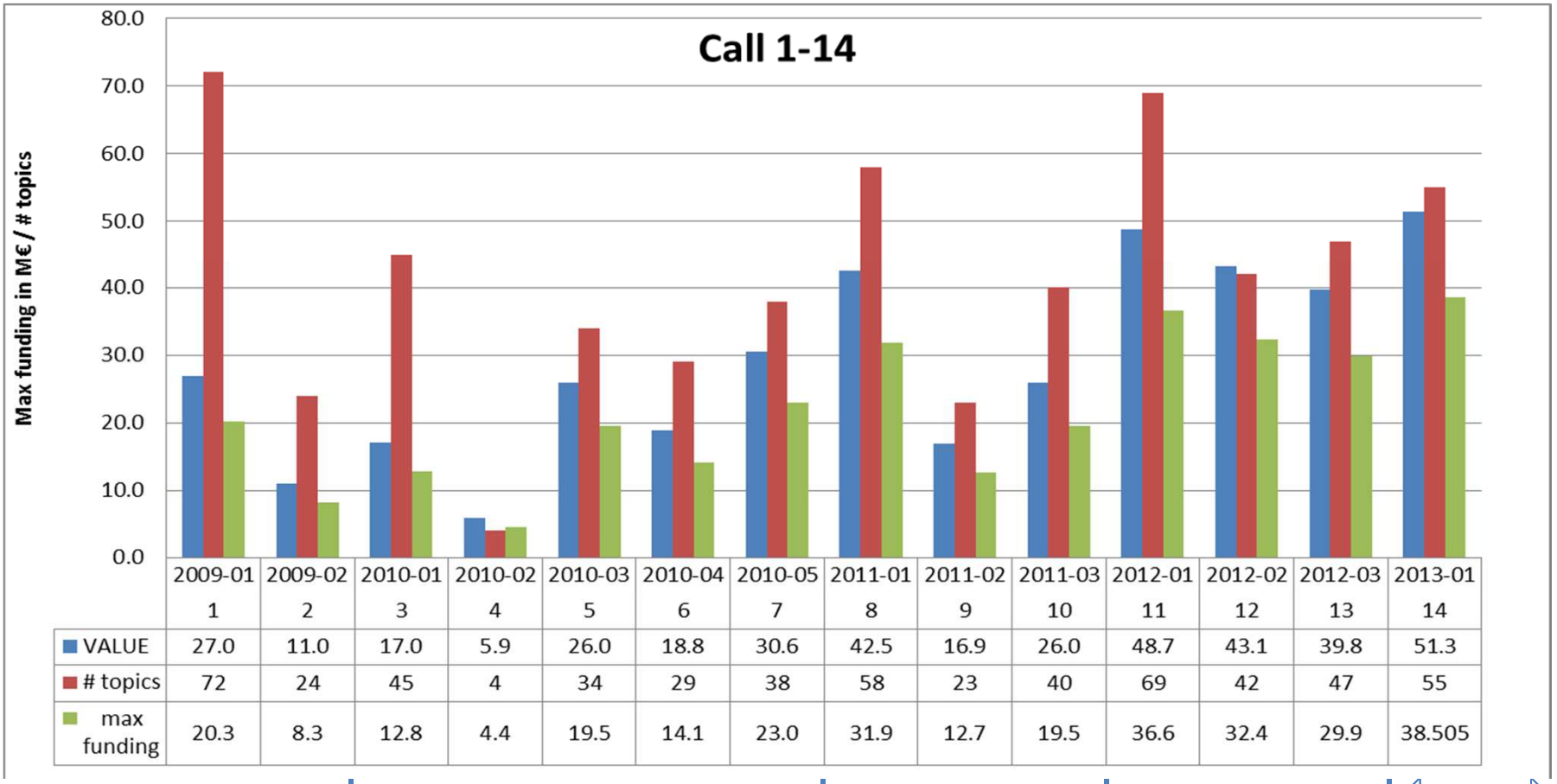
Integrating the technologies and enabling the assessment

- at aircraft (mission) level
- at airport level
- at air transport system level

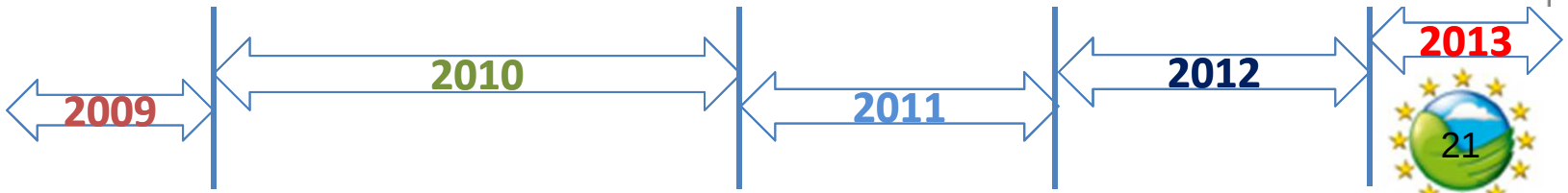




Clean Sky Calls statistics

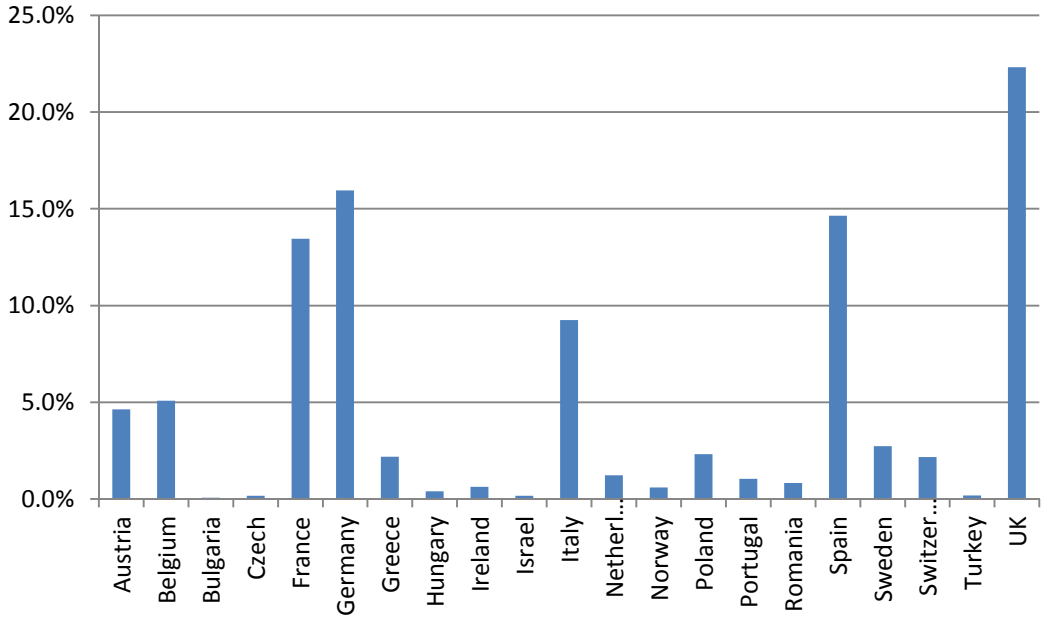


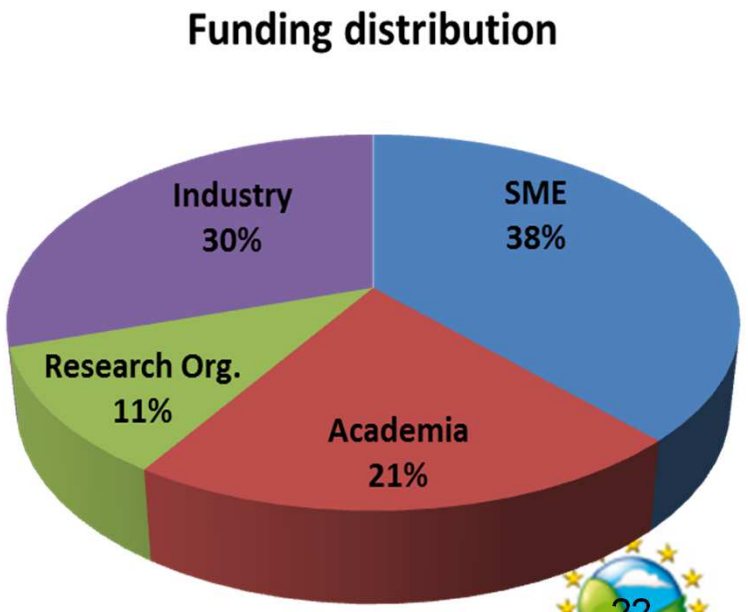
	2009-01 1	2009-02 2	2010-01 3	2010-02 4	2010-03 5	2010-04 6	2010-05 7	2011-01 8	2011-02 9	2011-03 10	2012-01 11	2012-02 12	2012-03 13	2013-01 14
VALUE	27.0	11.0	17.0	5.9	26.0	18.8	30.6	42.5	16.9	26.0	48.7	43.1	39.8	51.3
# topics	72	24	45	4	34	29	38	58	23	40	69	42	47	55
max funding	20.3	8.3	12.8	4.4	19.5	14.1	23.0	31.9	12.7	19.5	36.6	32.4	29.9	38.505



Clean Sky Calls for Proposals are successfully attracting SMEs and academia

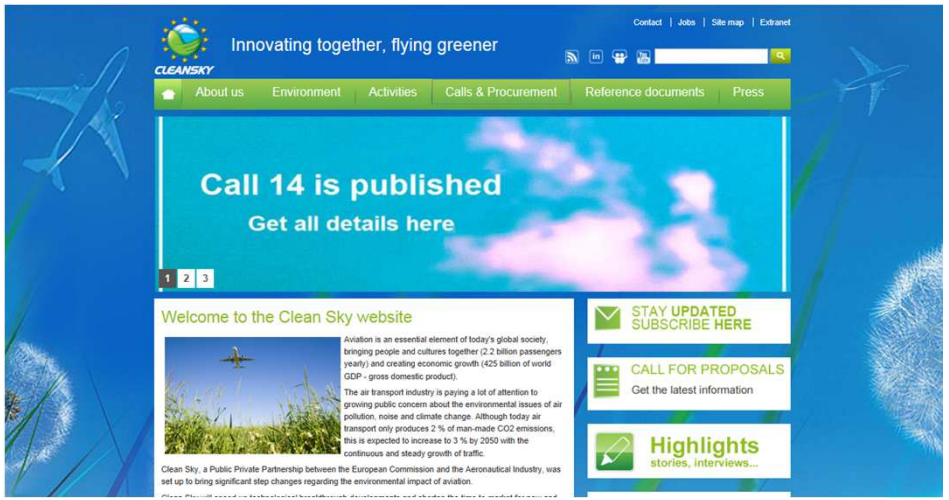
- ✓ More than 400 topics
- ✓ > 30% success rate for applicants
- ✓ Average topic cost 500 K€
- ✓ > Towards 400 partners involved (i.e. towards 500 participants incl. Members)
- ✓ > 50% of newcomers, not involved in previous European programmes





Calls update

- **Call 14: publication 15 January 2013**
  - **deadline: 18 April 2013**
  - **Evaluation: week 20 (13-17 May 2013)**
  - **Negotiation Kick-off: 14 June 2013**

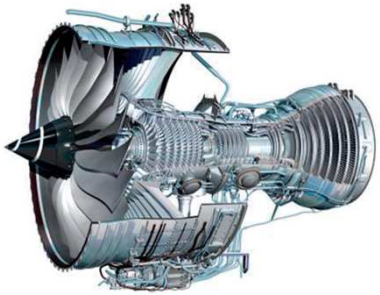


- **Call 15: publication 9 July 2013**
  - **deadline: 22 October 2013**
  - **Evaluation: week 48 (25-29 November 2013)**
  - **Negotiation Kick-off: December 2013 (TBC)**

2012: Clean Sky reaches half way, progressing well towards its objectives

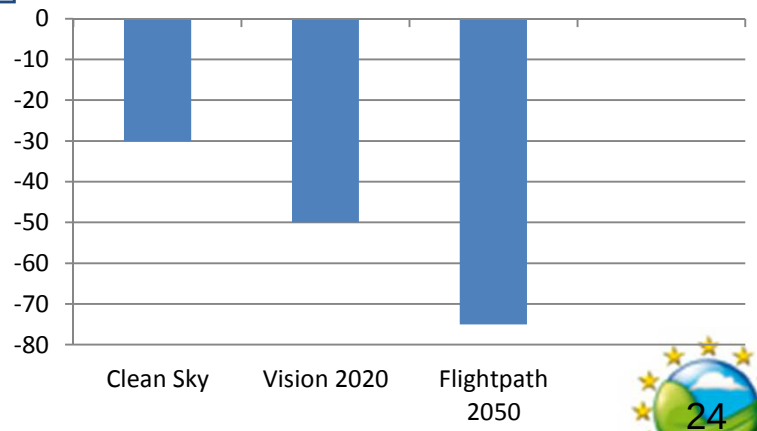
50% of the activities to completion have been executed in average, and 50% of the budget spent

First engine demonstration have started (Large engine)
Turboshaft engine demonstration to start in February 2013



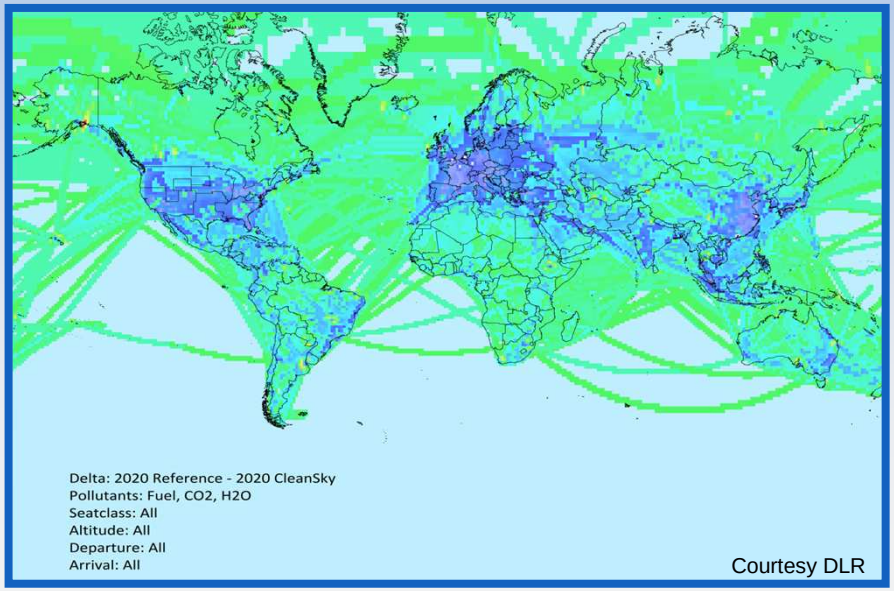
Roughly 80% of the Calls for Proposals budget already committed - last calls planned in 2013

First Technology Evaluator assessment completed: initial objectives confirmed
Clean Sky average targets are in the range of 30% of CO2 reduction / noise reduction

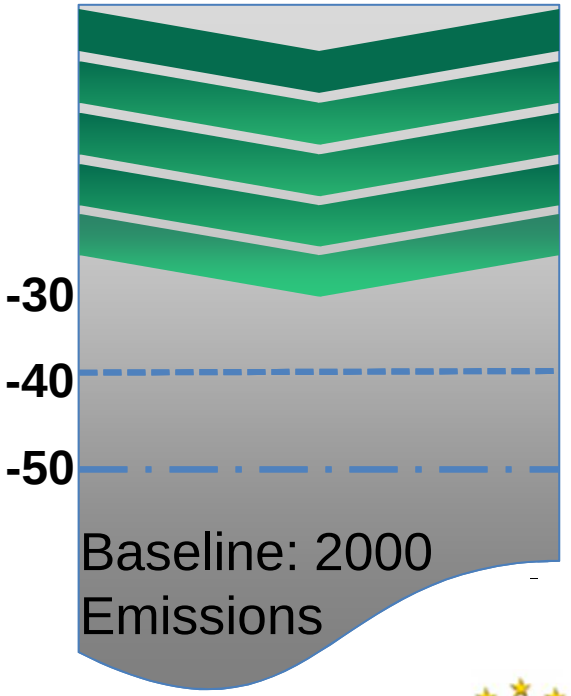


Overview of progress – the 1st TE evaluation

- Monitoring and reporting progress towards Environmental Goals
- 1st Assessment completed Feb 2012
- TE System in place and validated
- Clean Sky is 'on track'



CO_2 Reduction Potential 2020 Clean Sky regional and short/medium range aircraft. (Improvement v. 2000 aircraft)

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Towards Clean Sky 2
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Beyond 2020: Renewed ACARE SRIA towards 2050 launched at ILA Berlin 12th September 2012

Providing a seamless & resilient air transport system

Maintaining & extending industrial leadership

Protecting the environment & the energy supply

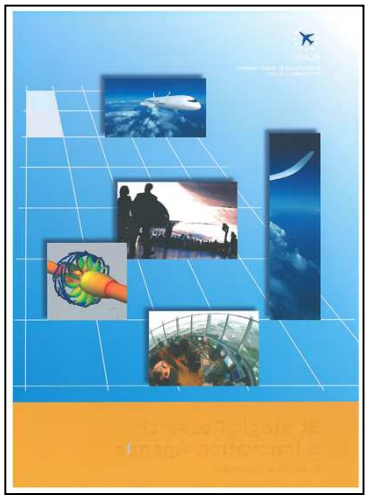
Ensuring safety & security

Prioritising research, testing capabilities & education

Flightpath 2050

ACARE new *Strategic and Innovation Research Agenda*

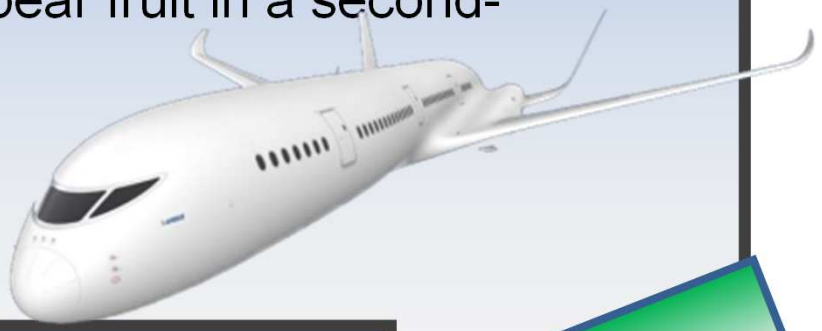
ACARE



The JTI concept is ready to address the European Union's Horizon 2020 challenges

Clean Sky: a demonstrator… and an investment:

- Robust, stable, flexible funding
- Bringing the public and the private sides together in a common understanding of objectives and issues
- Assessing its results through a dedicated, objective Technology Evaluator: a strong asset which should bear fruit in a second-generation JTI
- Complying with the public funding rules
- … and many lessons learnt!



For the first time, almost all of the European Aeronautical industry is working together, addressing societal challenges and competitiveness

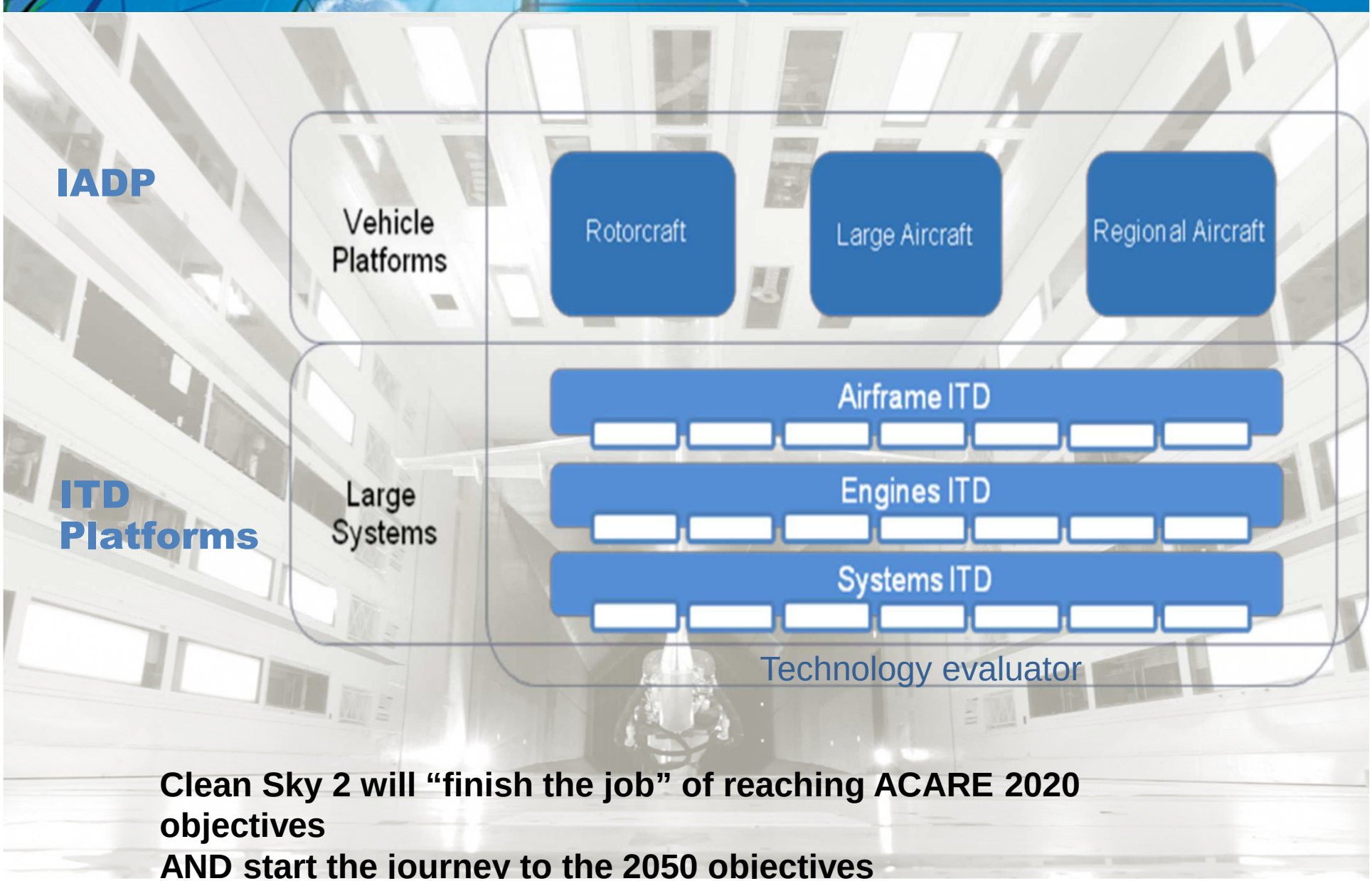
… and so: Clean Sky 2

Clean Sky 2:
Getting higher in the technological integration

- Addressing the integration of breakthrough technologies for the a new generation of aircraft configuration

- **Overall aircraft integration**
- **Overall physical integration**
- **Overall systems integration**

Integrated Aircraft Demonstration Platforms, Integrated Technology Demonstrators



Clean Sky 2 will "finish the job" of reaching ACARE 2020 objectives
AND start the journey to the 2050 objectives

High-speed rotorcraft demonstrations

For increased mobility within global ATS, search & rescue, emergency transport...

Tilt-rotor

Compound

The ITDs will include technologies related to non-conventional aircraft architectures

The next Flightpath 2050 challenges will not be achievable through conventional architectures

Opportunities for subscale, in-flight demonstrations will be addressed

Merci de votre attention