EUROPEAN COMMISSION

Community Research

European Research in Aeronautics

Preparing the Future

AWIATOR Project A340 Flight Test (Nov. 2006)

Dietrich Knoerzer

European Commission

DG Research-H.3 Aeronautics

EASN Workshop Athens, 23rd March 2009

SEVENTH FRAMEWORK PROGRAMME

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Content

- Challenges to Aeronautics
- The ACARE Approach
- The 7th Research Framework Programme
- Lessons learnt from the 1st and 2nd Call for Proposals
- Progress and Status of JTI “Clean Sky”
- Single European Sky ATM Research - SESAR
- Towards Future of Aeronautics Research

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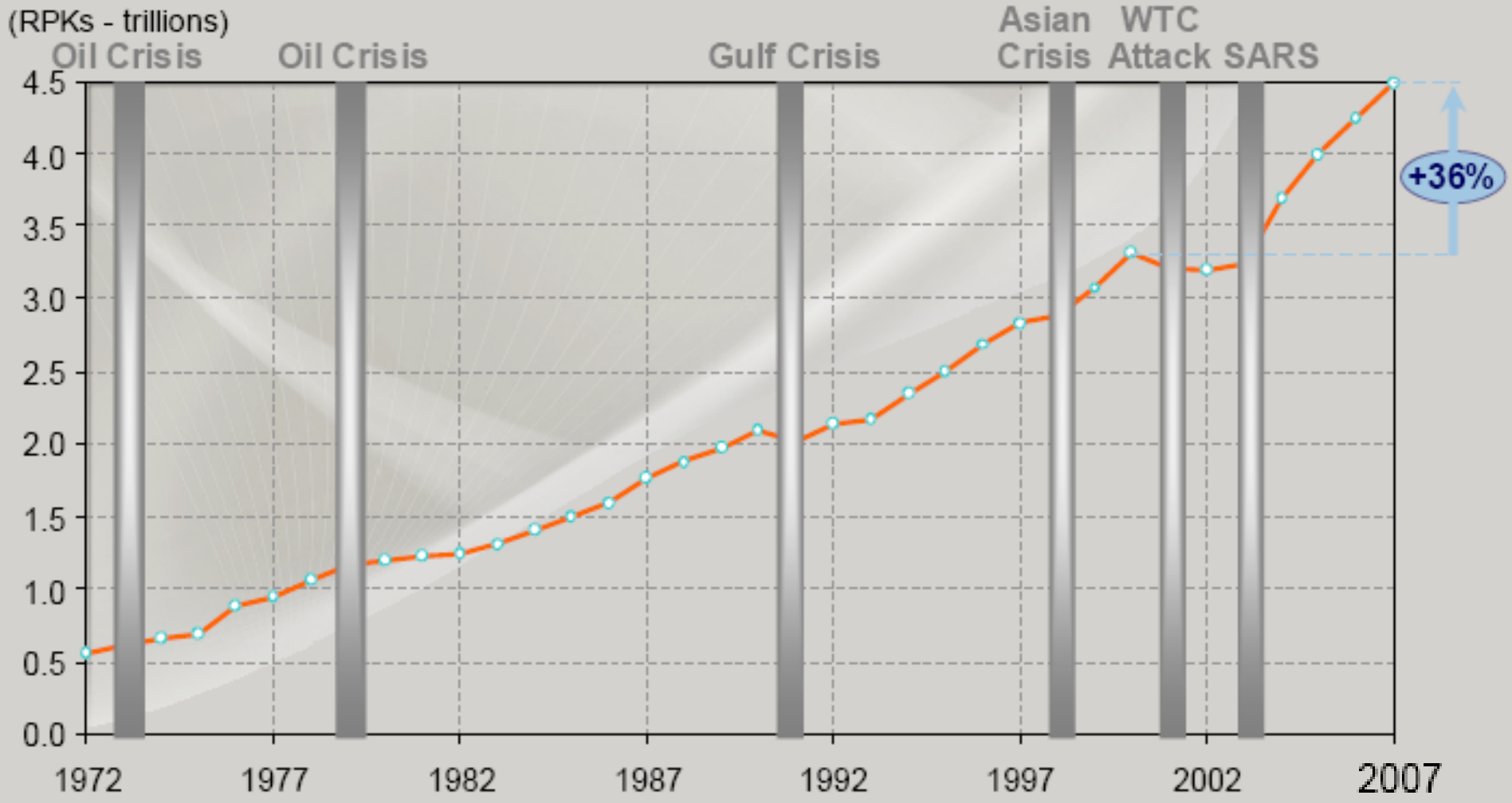
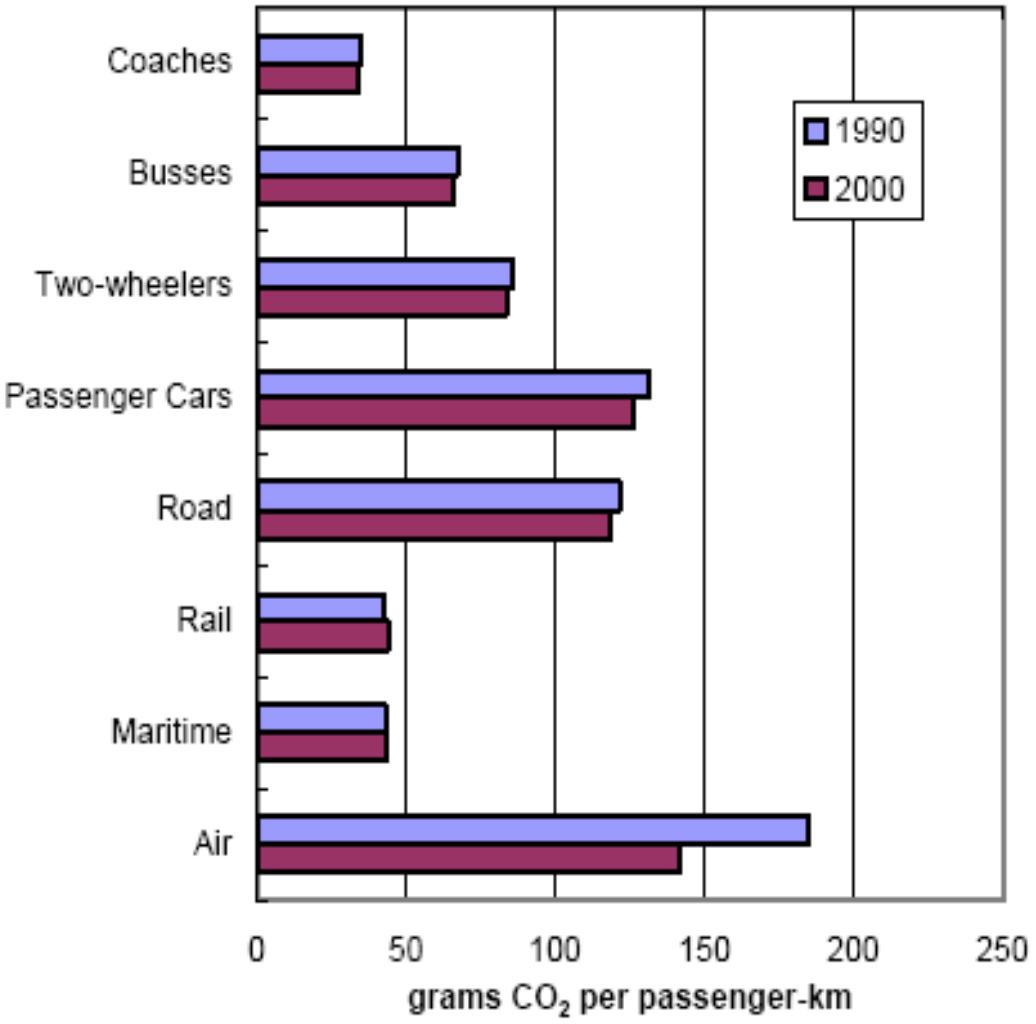
Development of World Air Transport



Source: ICAO, Airbus

Comparison of Transport Modes

CO^2 emission per passenger-km (seat-miles)

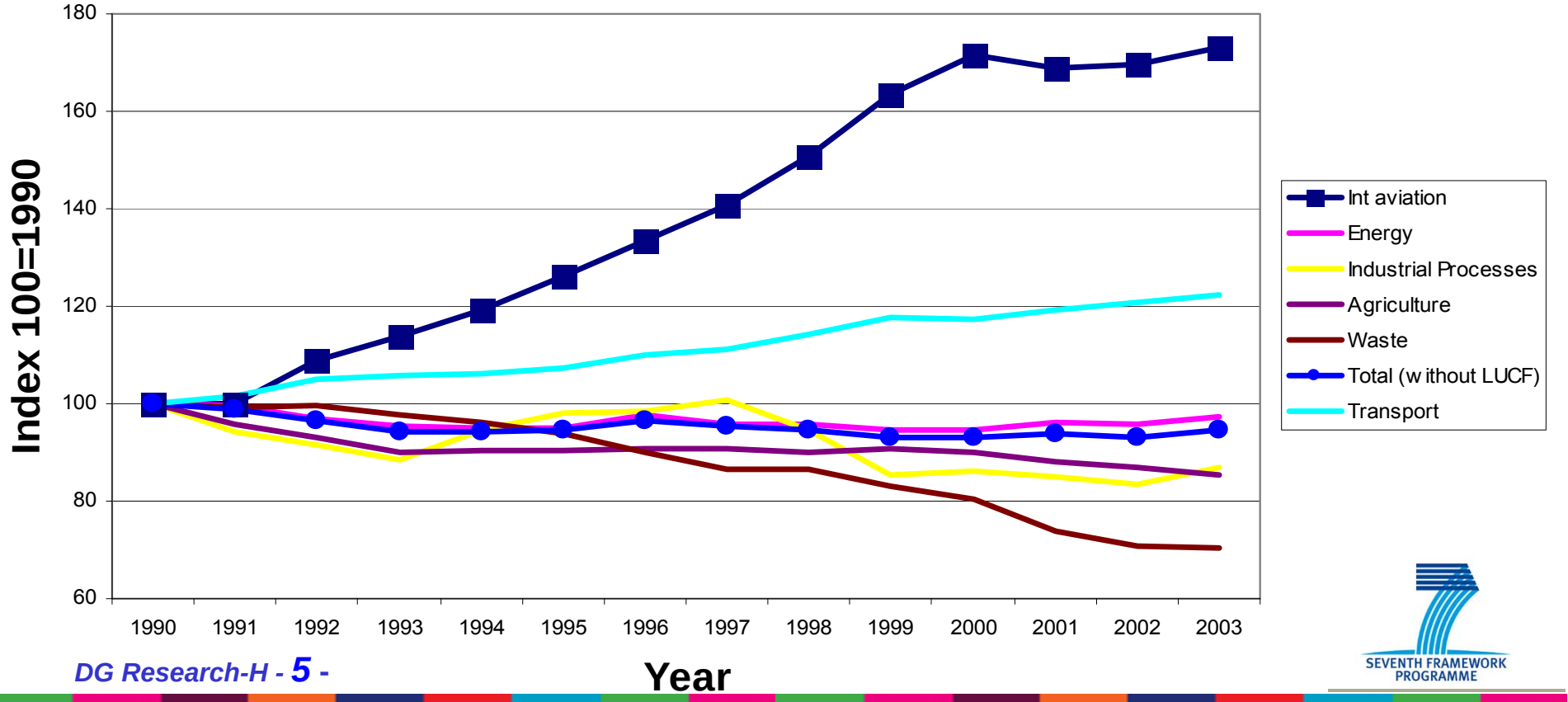


Source: EEA 2006

Aviation GHG emissions have been growing rapidly

The EU decided to include Air Transport in the Emission Trading Scheme (ETS)

EU GHG emissions by sector as an index of 1990 levels



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2000
European Aeronautics:
A Vision for 2020

2002
Strategic Research Agenda
Six Challenges for Aeronautics

2004
2nd Issue of the Strategic Research Agenda
Six High Level Target Concepts

2008 Addendum to Strategic Research Agenda

Society's needs

Global leadership

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European Aeronautics: A Vision for 2020

The Goals for 2020

- 80% cut in NO_x emissions
- Halving perceived aircraft noise
- Five-fold reduction 50% reduction of time to market
- in accidents
- Air traffic system capable of handling 16 million flights a year
- 50% cut in CO_2 emissions per pass-Km
- 99% of all flights within 15 minutes of timetable

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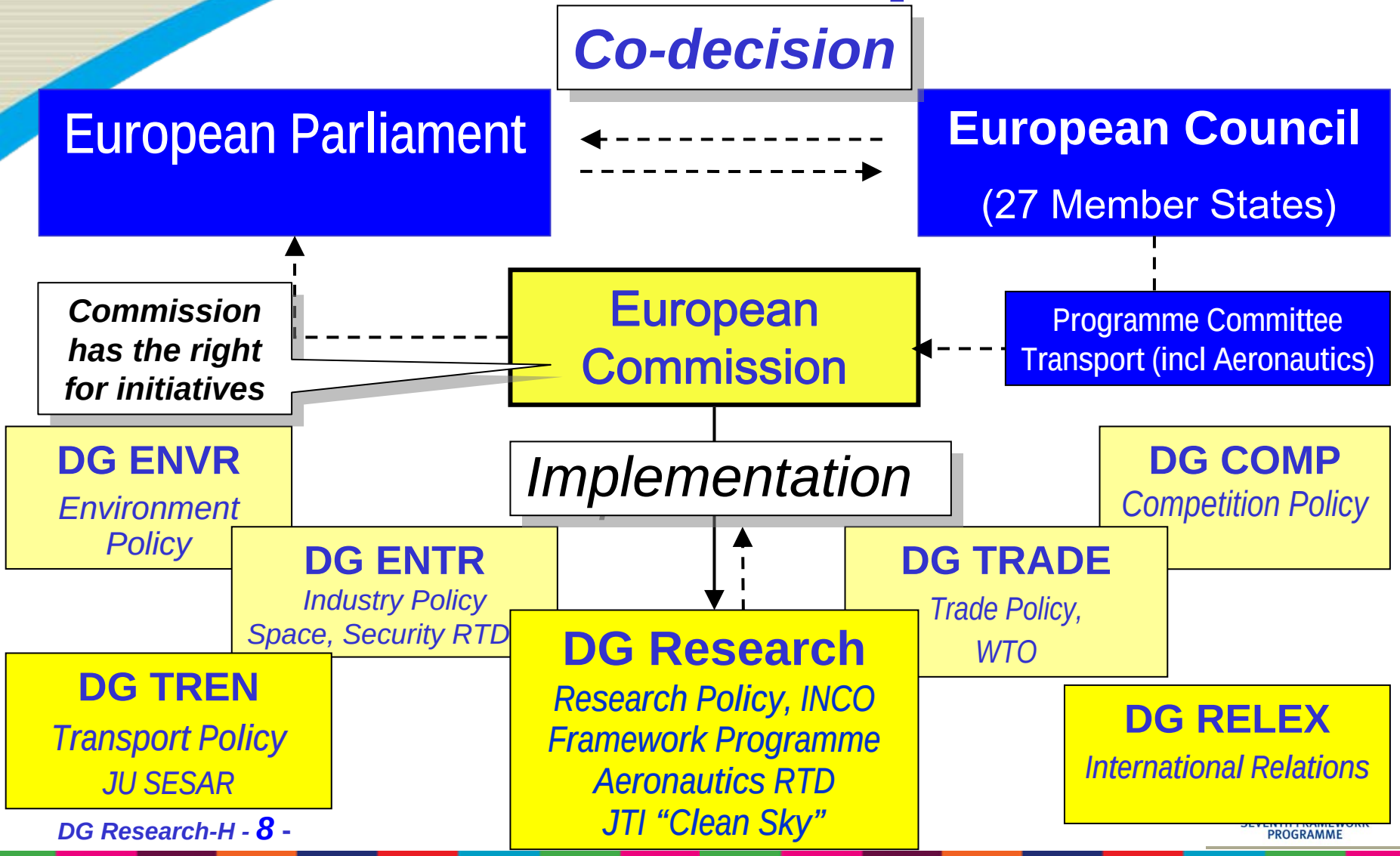
Aeronautics RTD in the European Union



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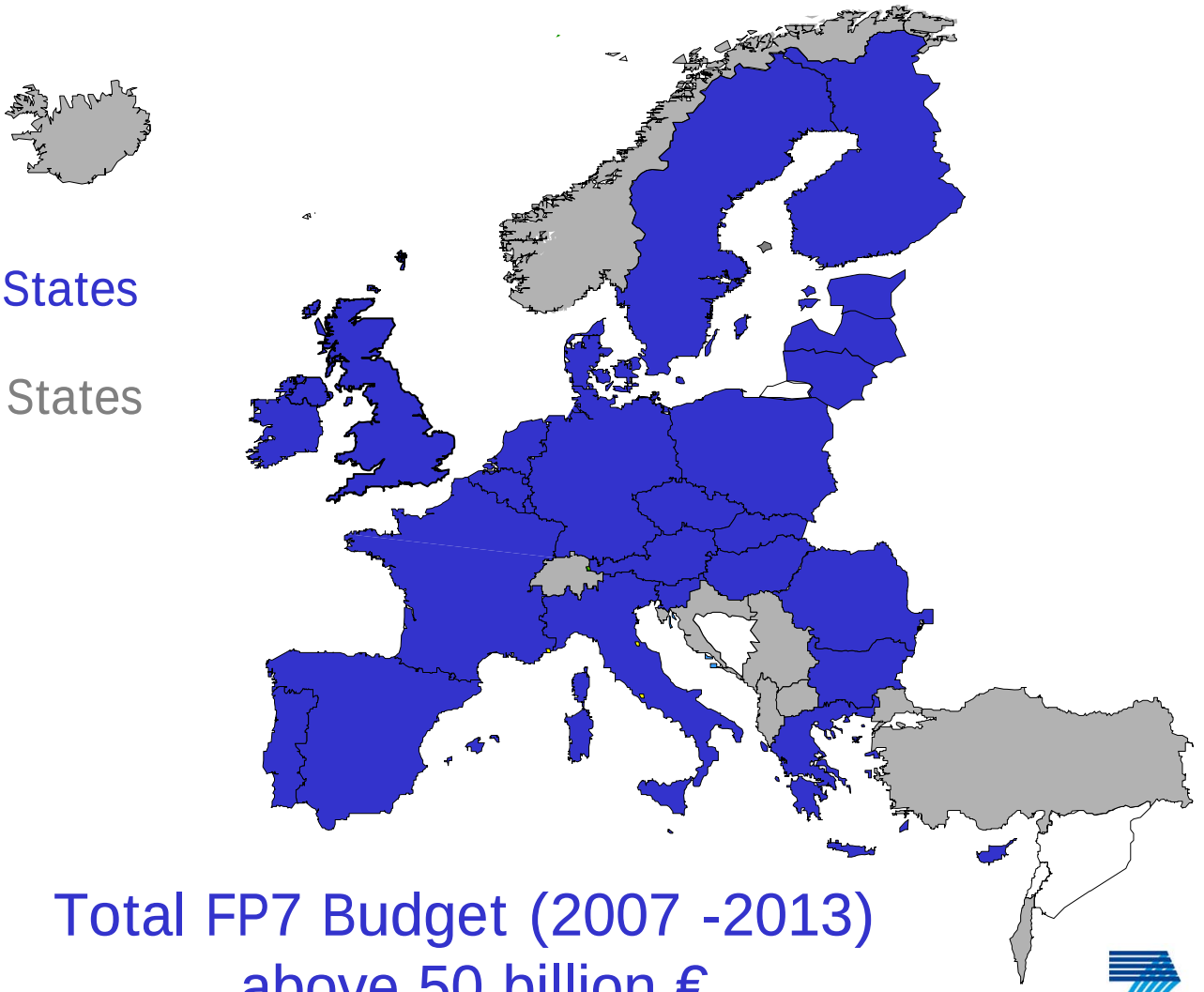
States Contributing to FP7
7th EU Research Framework Programme



27 EU Member States

FP7 Associated States
- Iceland
- Norway
- Switzerland
- Croatia
- Turkey
- Albania
- Israel
- Macedonia
- Montenegro
- Serbia
- Others to join

Total FP7 Budget (2007 -2013)
above 50 billion €

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7th Framework Programme

Four Specific Programmes

Corresponding to four major objectives of European research policy

- **Cooperation** *(32.4 billion Euro)*

  Support will be given to the whole range of research activities carried out in trans-national cooperation

- **Ideas** *(7.4 billion Euro)*

  An autonomous *European Research Council* will be created to support investigator-driven "frontier research".

- **People** *(4.7 billion Euro)*

  The activities support training and career development of researchers, referred to as "Marie Curie" actions,

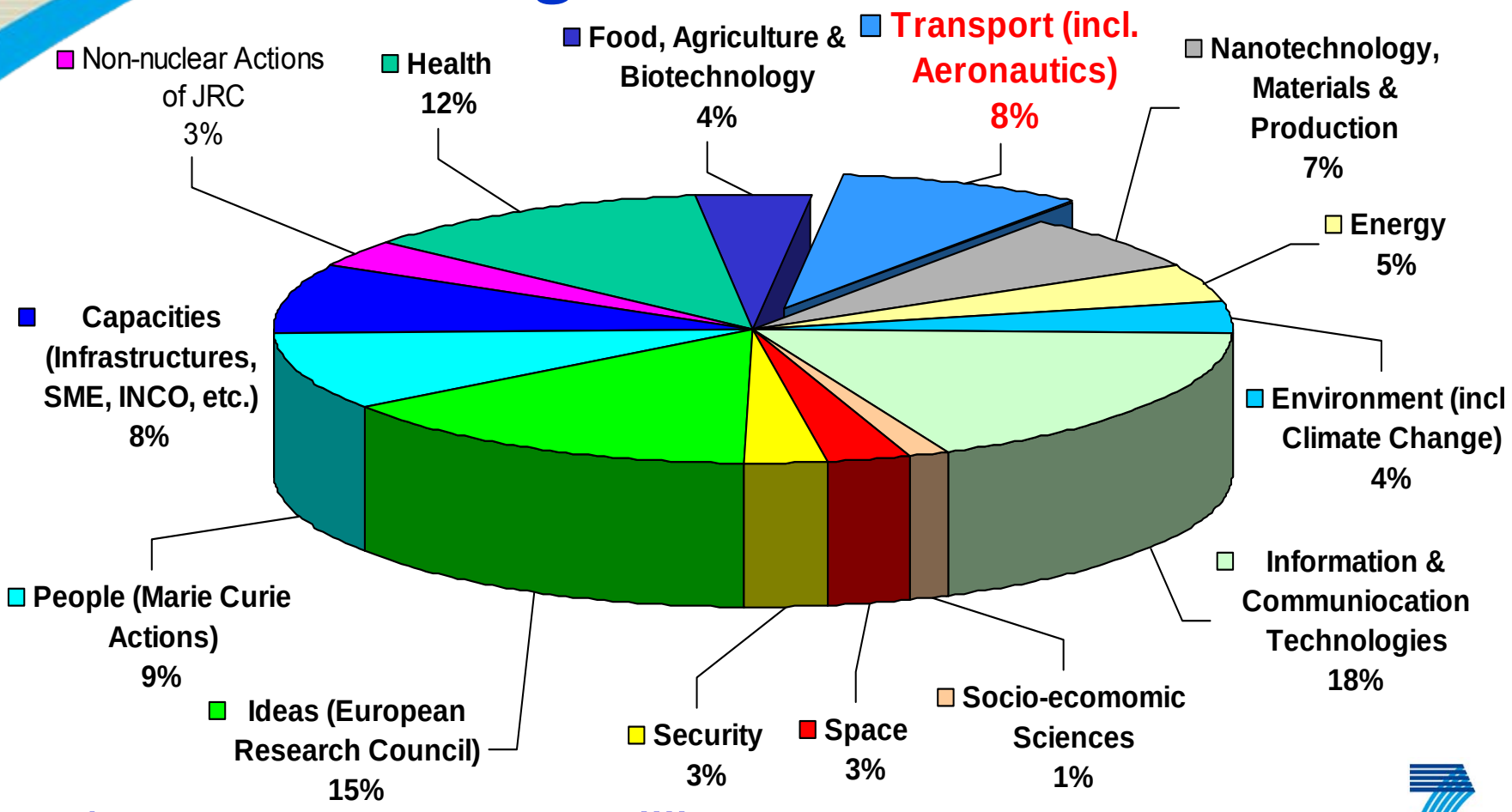
- **Capacities** *(4.2 billion Euro)*

  Key aspects of European research and innovation capacities will be supported: research infrastructures; research for the benefit of SME; regional research driven clusters.

FRAMEWORK GRAMME

7th Research Framework Programme

Budget Breakdown



Budget 2007 - 2013: 50.521 million Euro (+ nuclear JRC and EURATOM)

SEVENTH FRAMEWORK PROGRAMME

7th Framework Programme
Aeronautics & Air Transport
(2007 – 2013)

Activities

1. The **greening** of air transport
2. Increasing **time** efficiency
3. Ensuring **customer** satisfaction and safety
4. Improving **cost** efficiency
5. **Protection** of the aircraft and passengers
6. **Pioneering** the air transport of the future

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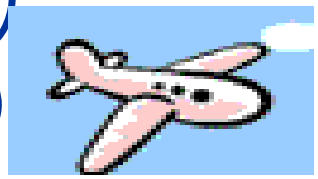
The "Transport" Theme
(Tentative Budget Breakdown)

- Aeronautics & Air Transport *(2.100 mio €)*
  - Collaborative Research (L1 & L2)
  - JTI "Clean Sky"(800 mio €)
  - Support to SESAR (350 mio €)



- Surface Transport *(1.108 mio €)*
  - Road (including urban)
  - Rail (including urban)
  - Waterborne (maritime & inland)

- Support to the European Navigation Satellite System (Galileo) *(518 mio €)*

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Success Rate by Instrument of the Call 2007 and the Call 2008

- **Level1:** Call 2007: 26 out of 167 proposals
  Call 2008: 28 out of 223 proposals
- **Level 2:** Call 2007: 4 out of 5 proposals
  Call 2008: 4 out of 6 proposals
- **CSA:** Call 2007: 6 out of 20 proposals
  Call 2008: 11 out of 24 proposals

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1st Call FP7 – 2007 AAT
Summary of Proposal Failure

1. *Scientific and/or technological excellence*
   - *Failure to position the work in relation to present state-of-the-art*
   - *Level of innovation is too low*
   - *Not convincing that technical challenges can be met*
   - *Lack of focus in the technical objectives, too many items without synergy*
2. *Quality and efficiency of implementation and management*
   - *Management structure is very weak.*
   - *Very little real cooperation between key partners.*
   - *Risk assessment and management is not convincingly addressed*
   - *Partners have not sufficient critical mass to address all diverse areas*
   - *Funding requested is considered too large for the expected results*
3. *Potential impact through development, dissemination and use of results*
   - *Dissemination is weak*
   - *Impact/funding ratio appears low.*

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2nd Call FP7 – 2008 AAT Ranked Priority List (Level 1)

Activity	Acronym	Rank	Recommended Grant
Level 1	AdMap-GAS	1	2.883.670
Level 1	ODICIS	2	3.595.087
Level 1	BEMOSA	3	3.399.934
Level 1	DAPHNE	4	3.956.791
Level 1	ERICKA	5	4.702.671
Level 1	ATAAC	6	3.791.019
Level 1	ATOM	7	3.478.545
Level 1	CREAM	8	4.200.000
Level 1	COSMA	9	4.155.435
Level 1	PLASMAERO	10	3.815.784
Level 1	SUPRA	11	3.714.113
Level 1	GreenAir	12	5.057.700
Level 1	VALIANT	13	2.700.000
Level 1	DESIREH	14	4.992.336

Activity	Acronym	Rank	Recommended Grant
Level 1	KIAI	15	5.399.004
Level 1	ON-WINGS	16	2.503.056
Level 1	TITAN	17	2.594.337
Level 1	ADDSAFE	18	2.608.669
Level 1	DELICAT	19	3.811.460
Level 1	glFEM	20	2.839.910
Level 1	FAST20XX	21	5.122.149
Level 1	iSPACE	22	2.100.000
Level 1	IAPETUS	23	2.339.663
Level 1	INFUCOMP	24	3.301.820
Level 1	PICASSO	25	5.000.000
Level 1	ADVITAC	26	4.000.000
Level 1	COALESCE2	27	2.828.397
Level 1	ELUBSYS	28	4.500.000

Total: 103.391.550€

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Call 2008 - AAT Ranked Priority List (CSA-SA)

Activity	Acronym	Rank	Recommended Grant
CSA-SA	MONITOR	1	529.014
CSA-SA	EUROTURBO 8	2	15.000
CSA-SA	AeroAfrica	3	363.165
CSA-SA	Green horizons	4	75.000
CSA-SA	FUSETRA	5	397.772
CSA-SA	REStARTS	6	253.501
CSA-SA	AERO-UKRAINE	7	201.954
CSA-SA	ICOA.10.09	8	56.000
CSA-SA	ARPE	9	61.600
CSA-SA	CoopAIR-LA	10	333.074
CSA-SA	E-CAERO	11	713.548

Total: 2.999.628 €

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Level 2 Proposals
– Overview Main List

Proposal Acronym	Proposal Title	Related Workprogramme Topic
CRESCENDO	Collaborative and Robust Engineering Using Simulation Capability Enabling Next Design Optimisation	*AAT.2008.4.4.1.* Integrated approach to full virtuality in design and product development within the extended enterprise
SANDRA	Seamless Aeronautical Networking through Integration of Data Links, Radios and Antennas	*AAT.2008.4.4.2* (Integrated approach to network centric aircraft communications for global aircraft operations)
OPENAIR	Optimisation for Low Environmentally Noise Impact Aircraft	*AAT.2008.1.4.1.* Integrated approach to lowering aircraft external noise
ALICIA	ALL Conditions Operations and Innovative Cockpit Infrastructure	*AAT.2008.2.3.2* Integrated approach to advanced avionics systems for new cockpit architectures and aircraft all-conditions operation

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JTI "Clean Sky"

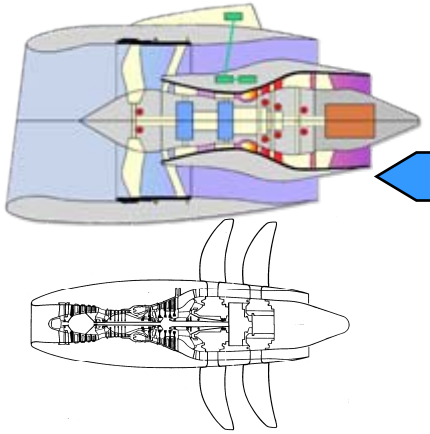
Integrated Technology Demonstrators (ITD)

CLEANSKY
Joint Technology Initiative for Aeronautics & Air Transport

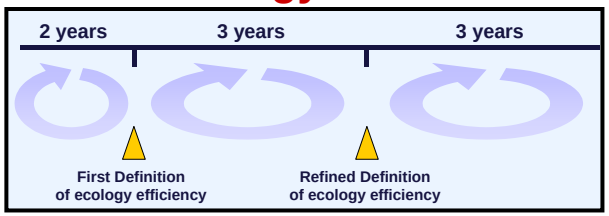
SMART Wing Aircraft

Regional Air Transport

Green Engines



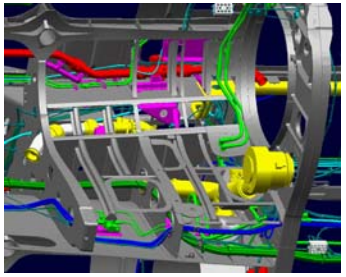
Technology Evaluator



Simulator Platform AC, ATM, AP (flight segment)

ATS Model

Green Rotorcraft



Eco-Design

Systems for Green Operation

Linked to "SESAR" Joint Undertaking

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JTI "Clean Sky" – *Targets*

Technology Evaluator

ITD	Smart Fixed Wing Aircraft	Green Regional	Green Rotorcraft	Sustainable & Green Engines	Systems for Green Operations	Eco Design
Activities	Active Wing New Aircraft Configurations	Advanced Aerodynamics (Low Drag & Noise) Low Weight Structures	New Powerplants Innovative Blades & Rotors New Aircraft Configurations	Advanced LP & HP System Technology New Engine Concepts (i.e. Open Rotor)	Mission & Trajectory Management Aircraft Energy Management	Whole Life Cycle Environmental Impact Analysis
Targets	CO_2 ~12 to 20% Noise ~10dB	CO_2 ~10 to 20% Noise ~10dB	CO_2 ~26 to 40% NO_x ~53 to 65% Noise ~10dB	CO_2 ~15 to 20% NO_x ~15 to 40% Noise ~15dB	CO_2 ~10 to 15% Noise ~17dB	CO_2 ~10% Noise ~10dB
Products	**Widebody 2020**  CO_2 -30% NOx -30% Noise -20dB	**Narrowbody 2015**  CO_2 -20% NOx -20% Noise -15dB	**Regional 2020**  CO_2 -40% NOx -40% Noise -20dB	**Corporate 2020**  CO_2 -30% NOx -30% Noise -10dB	**Rotorcraft 2020**  CO_2 -30% NOx -60% Noise -10dB	

Note: Targets shown represent the **incremental impact** of JTI

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JTI "Clean Sky"
Call for Proposals (CfP)
Proposed steps of selection process

Call for Proposal Process and Competitive Selection

- **Proposals will be selected according to open and transparent competitive procedures**
- **Open criteria agreed by the Governing Board**
- **The selection will be done with the assistance of independent experts**
- **Call for Proposals will contain clear details of the assessment criteria that will be defined to select the best proposals having regard to all relevant factors.**
- **Calls published under: www.cleansky.eu**

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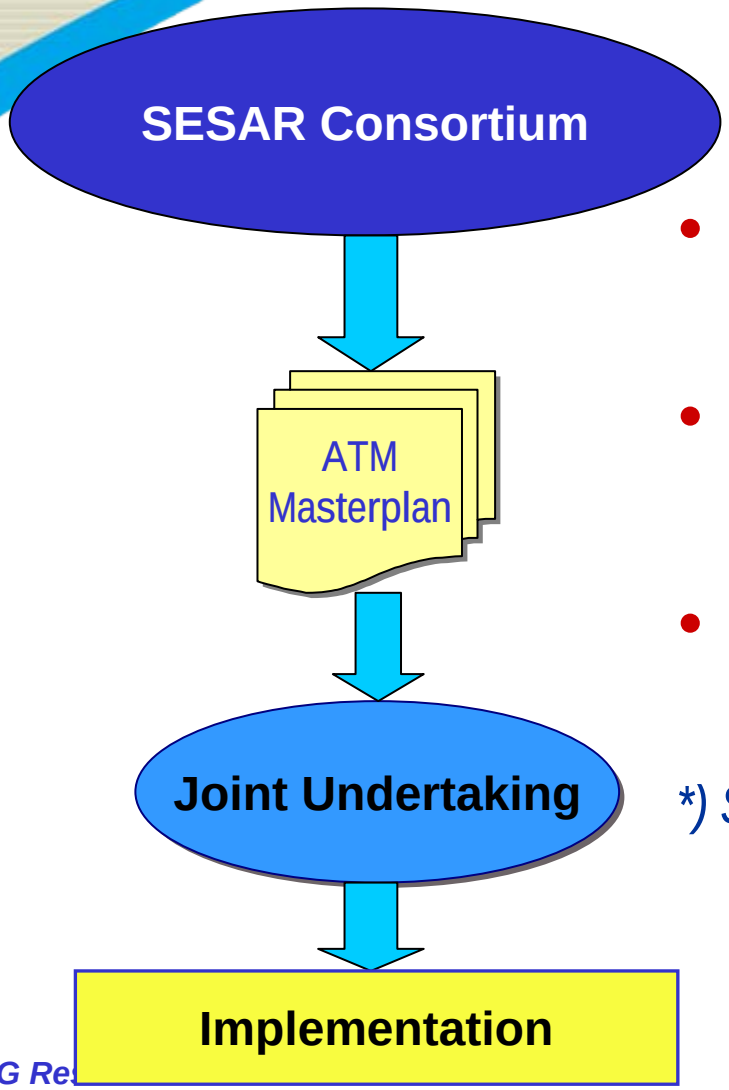
SESAR* Organisation



The three phases of SESAR:

- ***Definition Phase (2005 - 2007),*** delivering the European ATM Master Plan
- ***Development Phase (2007 - 2013)*** to develop the new systems
- ***Implementation Phase (2014 -)*** deploy the new technologies

**) SESAR = Single European Sky ATM Research*

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Single European Sky ATM Research SESAR

The Goals of SESAR

- Enabling EU skies to handle 3 times more traffic
- Improving safety by a factor of 10
- Reducing the environmental impact per flight by 10%
- Cutting ATM costs by 50%

Joint Undertaking

European Commission	EUROCONTROL	Industry = Public – Private Partnership
700M€	700M€	700M€
2 Funding members		3rd funding member

Created by the European Union Council Reg No 219/2007

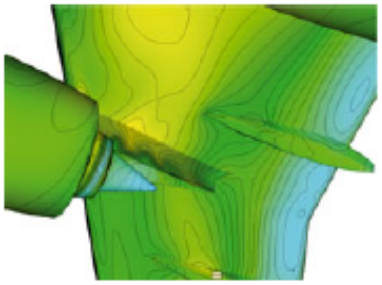
SEVENTH FRAMEWORK PROGRAMME

Technology Needs for Ambitious Goals

ACARE's ambitious goals:

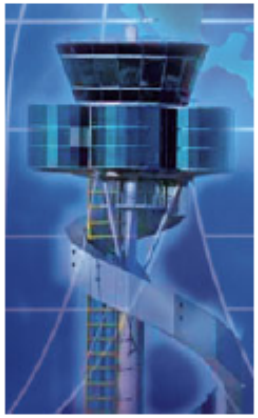
50% cut in CO_2 emissions > Vision 2020

Aircraft manufacturers 20-25%



Engine manufacturers 15-20%

Operations 5-10%
Air Traffic Management



A Clean Sky

Source: Airbus Global Market Forecast 2007 - 2026

SEVENTH FRAMEWORK PROGRAMME

WakeNet 3 – Europe

Coordination Action for Wake Vortex Research in Europe

Co-ordination of EU research activities

- **ATC-Wake, FAR-Wake, CREDOS, national research**

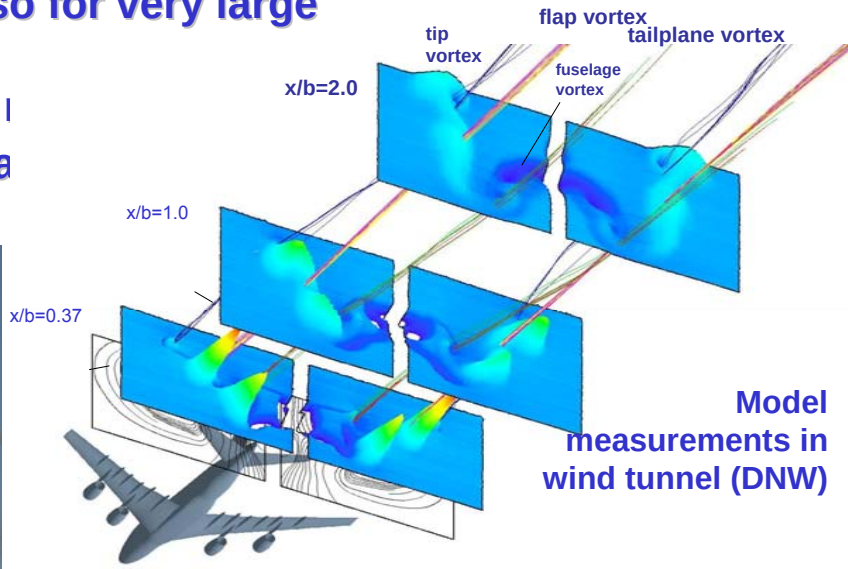
International co-operation with

- **Wakenet USA, Russia**

Co-ordination objectives:

- **Assure present ICAO safe separation distances to remain valid also for very large transport aircraft**
- **Increase airport capacity by**
- **Explore means to minimise a**

AWIATOR Project A340 Flight Test



Model measurements in wind tunnel (DNW)

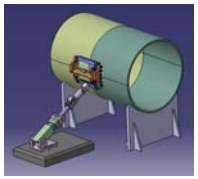
Source: Klaus Huenecke, Airbus D

Synergy from EU Projects

3rd Generation
High-fidelity simulation for fast production of integrated composite airframes

2nd Generation
"Composite-oriented design"

1st Generation
"Black metal CRFP parts design"



FP7: MAAXIMUS
'As-built'
Component Level
Simulation-based design

FP6: ALCAS
Sub-Component Level
Design Manufacturing Testing
(CWB / LG, Keel-beam, Large cut-out, PAX door surround)
Composite sizing criteria

FP5: TANGO
Design, manufacturing, test and mechanical evaluation of composite technologies at **component level**
No Virtual Development

2000 2004 2008 2012

Source: Airbus-F

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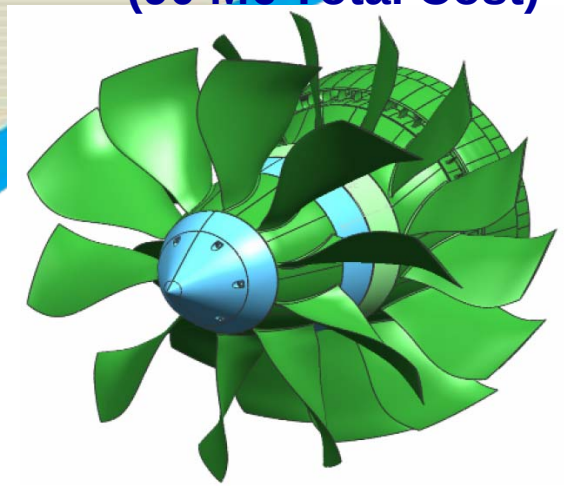
Aero-Engines

VITAL

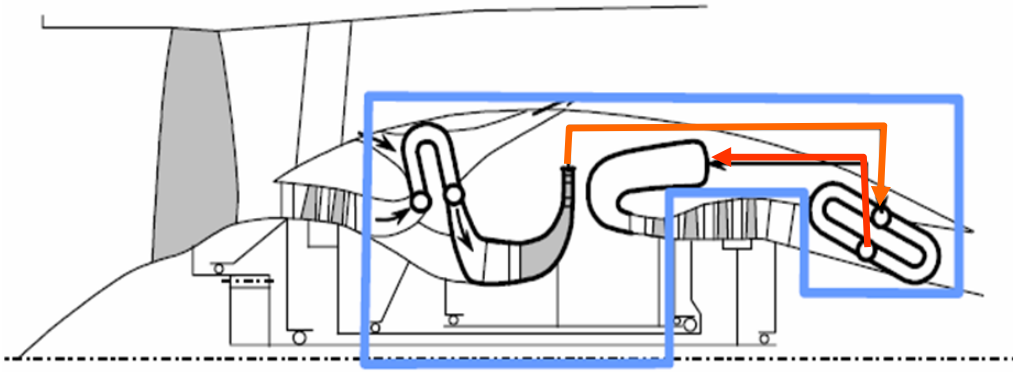
(90 M€ Total Cost)



SNECMA property

NEWAC

(75 M€ Total Cost)

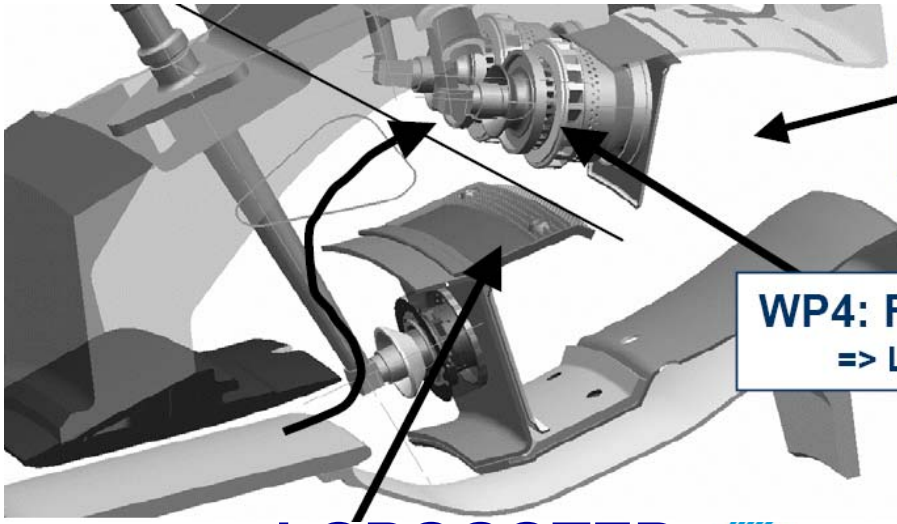


New engine architectures for

- **Higher Propulsive Efficiency (less C02)**
- **Less Noise**
- **Better Thermodynamic Cycle Efficiency (less C02)**

Clean (Lean) Combustors for

- **Less NOx Emissions**
- **Less particles, soot, etc.**



LOPOCOTEP

(7.1 M€ Total Cost)

SEVENTH FRAMEWORK PROGRAMME

FP7 - Aeronautics and Air Transport (2007 – 2013)

Proposed Way Forward

- ***Future Annual Calls***
  - *2010 Call - 114 M€ (estimated)*
  - *2011 Call - 132 M€ (estimated)*
  - *2012 Call - 163 M€ (estimated)*
  - *2013 Call - 144 M€ (estimated)*

To be decided when which instruments will be used

- ***Max. funding to Level 1 projects proposed limit of 5.0 M€***
- ***WP for Level 1 in 2010 Call:***
  - *Open to all topic areas in **Greening, Cost Efficiency** and **Pioneering***
  - *Focusing **Time Efficiency** and **Customer Satisfaction and Safety** to only topic areas not covered in the first two Calls*
- ***Max. funding to Level2 projects proposed limit of 40 M€***

FP7 - Aeronautics and Air Transport
(2007 – 2013)

Future Calls

WP2010 & WP2011 are complementary

- **WP2010 will address Level 1 topics**
- **WP2011 will address mainly Level 2 topics**
- **Total 50/50 split of budget for L1/L2**
- **Maximum funding per project:**
  - **5 million € for Level 1**
  - **40 million € for Level 2**

FP7 - Aeronautics and Air Transport
(2007 – 2013)

Future Calls

WP2010 will focus on the Specific Programme activities of greater strategic importance

- ***The Greening of Air Transport***
- ***Improving Cost efficiency***
- ***Pioneering the Air Transport of the Future***

Some topics also be on **Safety, Time Efficiency** and **Security**

Complementarity and synergy with the Joint Technology Initiatives:
Clean Sky, SESAR and Fuel Cell & Hydrogen JTI
particularly in the selection of topics for "The Greening of Air Transportation"

FP7 - Aeronautics and Air Transport
(2007 – 2013)

Implementation of the Call 2010
Tentative Planning

- Inputs of the Stakeholders — until Oct. 2008
- Commission internal consultation — from Nov. 2008
- Consultation with Advisory Group, PC Transport — Spring 2009
- Adaption of the Call — July 2009
- Publication of the Call — 30th July 2009
- Closing of the 3rd Call — end 2009/ early 2010

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Joint Programming

A new initiative for European research collaboration

- **Elaboration and implementation by Member States (voluntary basis) of strategic research agendas for major societal challenges.**
- **Strategic cooperation between national programmes or new common programmes.**
- **Pool resources, and together define adequate instruments, implement and evaluate progress.**
- **Increase efficiency of R&D and impact of public funding.**
- **Variable geometry, but critical mass.**
- **Proceed step by step.**
- **No Community funding.**

SEVENTH FRAMEWORK PROGRAMME

EASN

European Aeronautics Science Network

- **Role of EASN**
  - Network of European universities performing aeronautics related research
  - Voice of universities in *Advisory Council for Aeronautics Research in Europe - ACARE*
- **Instruments**
  - Web-site
  - Workshops and annual assembly
  - Interest Groups
- **Actions**
  - Update and maintenance of Web-site
  - Collaboration with ACARE Human Resource Group
  - Activities with Aeronautics ERA-Net AirTN – FP7
  - Link to other networks (ECCOMAS, ERCOFTAC, IUTAM, ...)

Strength and Weaknesses of EASN Interest Groups

- **Strength**
  - Wide range of expertise
  - Good knowledge on upstream technologies
  - Link to next generation researchers and engineers
  - Open to participation from all over Europe

- **Weaknesses**
  - Too much focussed on FP proposals
  - Little activities on technology trends and needs
  - Systematic activity structure not yet established

EASN
European Aeronautics Science Network

Proposed Actions for EASN Interest Groups

- **Structural Measures**
  - Develop an active IG infrastructure (organisation, Web-site, workshops, annual meetings, …)
  - Establish links to key industry experts
  - Identify appropriate funding scheme for collaboration activities
  - Play an active role in the ACARE process
  - Link with other specialists networks (SAMPE, ISABE, ERCOFTAC, …)
  - Organise special actions (e.g. workshop for EU12, SME short course, …)

- **Science &Technology Measures**
  - Identify technology trends and developments (e.g. nano-technologies, plasma flow control, …)
  - Identify future industry needs (e.g. new materials for turbo-machinery, surface quality requirements for laminar flow,)
  - Contribute to a EASN newsletter and to publications
  - Work on specific collaboration actions (bi-lateral, with industry, scientific exchange, FP calls)

Thank you for your attention and good luck for the future of EASN!