

## RESEARCH CONTEXT

On March 4, 2005, the Belgian Council of Ministers approved the research programme "Science for a Sustainable Development" (2005-2009). This research programme is the continuation of the first and second Scientific Support Plan for a Sustainable Development Policy (SPSD I (1996-2001) and SPSP II (2000-2005)). This Programme covers many research areas, including climate change.

## PRESENTATION

Emissions from international air and maritime transport are currently not covered by the Kyoto Protocol commitments, nor by the EU-ETS, though they have been growing considerably for more than 10 years. However, the inclusion of these sectors into emission reduction policies is increasingly considered, both within the European Union (the aviation sector should be included in the EU-ETS by 2013 at the latest) and in the UN Framework Convention on Climate Change. It is thus a major issue in defining post-2012 climate policy at both the European and international levels. Different options for including international air and maritime transport are thus to be considered, as their impacts for Belgium.

At the international level, several studies are currently being performed concerning the environmental, and particularly the climate-related impacts of aviation and other international transport. At the Belgian level, current emphasis seems to be put on maritime transport. However, international studies show, among other things, that the climate-related impacts of aviation, as compared to other international transport, are much more complex and extensive, especially if we take into account the rapid growth of this sector and the non-CO<sub>2</sub> related climatic effects (e.g.: the effects of condensation trails, ozone impacts, etc.). Another conclusion, taken more specifically from

the IPCC special report on aviation, indicates that the radiative forcing caused by condensation trails is particularly important over the Belgian territory and around it.

## STRUCTURE

This research project serves two main objectives:

1) to inform policy makers about the environmental, political and socio-economic implications for Belgium of integrating (or not) the international aviation and maritime transport sectors into climate policy;

2) to provide a tool for the preparation and assessment of Belgian climate policy, on the eve of the negotiations concerning the expansion of the European Emission Trading Scheme (EU-ETS) and the post-2012 phase of the Kyoto Protocol.

A multi-criteria analysis will allow our findings on aviation and Belgian climate policy to integrate other issues of concern – such as the other environmental impacts related to air and maritime transport (cf. NO<sub>x</sub>, SO<sub>x</sub> and PM emissions, etc.), the socio-economic impact of different policies (climate-related or not) on the given sector, etc. It will also allow us to consider the viewpoint of different groups of stakeholders (policy makers, airlines, transportation users, etc.).

More specifically, the project's first phase (2006-2007) includes the following work packages:

- A state-of-the-art that will summarise available data and knowledge concerning maritime and other transport mode sectors, climate policies and emission inventory methodologies ;
- The design of scenarios describing the probable evolution of the aviation sector by means of a market analysis and traffic projections ;
- The identification and assessment of available technologies (current and future) for aircraft propulsion as well as different air routes and possible flight options ;

- An evaluation of the emissions from international air transport transiting through Belgium (and the European Union) as well as a comparison with the emissions from other modes of transportation ;
- A comparison of the climate-related impacts of emissions from the aviation sector and the impacts of the greenhouse gases concerned by the Kyoto Protocol as well as an assessment of various methods for the spatial and temporal aggregation of climate-related impacts using existing climate models like JCM ;
- An identification and assessment of the options for integrating the aviation and maritime sectors into international climate policy, including environmental and efficiency aspects, the additional charge for Belgium and the effort required from the aviation and maritime sectors as compared to other sectors ;
- A multi-criteria analysis aimed at comparing various political options with respect to the priorities of civil society.

In the second phase of the project (2008-2009), the process will be reiterated on the basis of new scenarios that will integrate:

- A regional climate model, with the aim of analysing mainly the effects of cirrus cloud formation over Belgian territory: after an exploration of new methodologies and datasets and likely sensitivity to different forcings, the CCLM (COSMO model in Climate MOde) model has been chosen for this task. The physics of the RCM have been extended to allow the formation of additional cirrus clouds in upper troposphere related to air traffic and geographical patterns of such forcing using datasets from other European projects, as well as from WP4. After running several scenarios with differing aviation forcing and/or nested in different Global Climate Model (GCM) datasets, results will be analysed in terms of different climate indicators and will be

considered in terms of regional impacts (with input from other project partners as well as from literature).

- The analysis of other potential political measures aimed at reducing environmental damage (including non-climate related ones) of air and maritime transport ;
- The updating of major parameters (for instance: fuel prices and the demand for international transport), the development of potential evolution scenarios for aviation and maritime transport and an assessment of major implications for Belgium, the aviation and maritime transport sectors based on the policy options and scenario chosen.

Towards the end of its second phase, the project will deliver a synthesis report that will compare, from a political, technical, socio-economic and environmental viewpoint, the options for integrating air and maritime transport into climate policy. Finally, it will provide a series of recommendations for Belgian decision-makers, based on the multi-criteria analysis.

## RESEARCH TEAMS

The participants in the projects are:



The Centre for Economic and Social Studies on the Environment (CEESE - Université libre de Bruxelles)

is a research centre which uses the development and the application of decision-making instruments in trying to answer environmental challenges deriving from economic and social development.

The CESE is the coordinator of this project.



The Vakgroep Electrotechniek en Energietechnik (ETEC

- Vrije Universiteit Brussel) has been active for more than 30 years in the field of innovative and environmentally friendly vehicle technologies. This

expertise is now used to develop a methodology useful for other transport modes like, aviation, rail and maritime transport and this with the aim to assess climate policies.



Vrije Universiteit Brussel  
Department of MOSI - Transport and Logistics

The Vakgroep Transports and

Logistics of the department Mathematics, Operational Research, Statistics and Information (MOSI - Vrije Universiteit Brussel) main research topics are multi-criteria analysis, system dynamics, location analysis, transport and logistics. The PROMETHEE method, which is widely used and recognised as one of the most important multi criteria analysis approaches, has been developed by MOSI.



The Institut d'Astronomie et de Géophysique Georges Lemaître (ASTR - Université

catholique de Louvain) is widely known for its contributions to the astronomical theory of paleoclimates. More specifically, it has computed the long-term insolation variations resulting from changes in the Earth's orbital parameters.

## RELEVANCE AND SUPERVISION

A follow-up committee has been set up to give an external view on the subject and at the same time supervise the study. This committee is composed of international, national and regional actors and experts in the field of aviation / climate policy.

## FOR MORE INFORMATION / CONTACT

Visit the ABC Impacts project website for more information and also for the final report of phase I:

<http://www.climate.be/abci>

ABC IMPACTS project

## AVIATION AND THE BELGIAN CLIMATE POLICY : INTEGRATION OPTIONS AND IMPACTS



<http://www.climate.be/abci>



A RESEARCH PROJECT FINANCED BY THE BELGIAN SCIENCE POLICY OFFICE