CP04

PSS-CCS

Policy Support System for Carbon Capture and Storage

DURATION OF THE PROJECT
Phase 1: 15/12/2005 – 15/06/2008
Phase 2: 01/01/2009 – 31/01/2011

BUDGET
614.891 €

KEYWORDS
Climate change, Sink-source mode, Policy support system, Climate policy, Post-Kyoto target, Energy systems

CONTEXT

Global warming refers to the rise of temperatures on Earth during the past 150 years. Direct cause are human activities that release greenhouse gases into the atmosphere. Large amounts of CO_2 are emitted, especially in the Western world, due to the extensive use of fossil fuels. Developing regions such as China and India will worldwide lead to an even growing need for energy, while currently already about 1/3rd of the CO_2 in the atmosphere is of anthropogenic origin.
Natural gas, oil and coal are fundamental to our current society, and drastically reducing the emissions of CO_2 therefore requires very significant measures. Carbon Capture and Storage (CCS) is a technique that can be used for industrial sources of CO_2. CCS involves the capturing and subsequent storage of CO_2 in geological reservoirs.

PROJECT DESCRIPTION

Objectives

The mitigation potential of Carbon Capture and Storage (CCS) is very important. The central question of the current project is whether this potential can and will be realised. Indeed, CCS involves important and fundamental infrastructural changes for existing and future energy intensive industry. Factors of different nature will be decisive for the future of CCS.
The central goal of the project PSS-CCS (Policy Support System for Carbon Capture and Storage) is the development of an economic-environmental simulator that will attempt realistic predictions regarding the impact and growth of CCS between 2010 and 2050. The simulator will be developed and its applicability demonstrated.
A number of satellite targets have been defined that need to be realised in order to reach the main goal, which is the development of the PSS-CCS simulator. These secondary targets are: inventorying the geological storage potential in Flanders and the Walloon Region; the setting up of a methodology for risk evaluation of geological sites; inventorying the current and expected sources of CO_2 in Belgium; the development of an ad-hoc routing application for pipeline trajectories and networks of pipelines; and inventorying the technologies that are related to the capture and compression of CO_2.

Methodology

Economic-environmental simulations require expertise from different disciplines. It is indeed important to fully master all aspects of the simulated technology. It is only when the basic data for the simulation is realistic and the influence of all parameters on costs and profits are properly understood, that realistic predictions can be made.
Running simulations therefore strongly depends on the thorough evaluation of the techniques and possibilities to capture and compress CO_2 in order to transport and store it. The results of these studies will be summarized in a relational database that will serve as the scenario input for the simulator.
The simulator is being built from scratch. During this process the principles of economy have been confronted with technological insights. This confrontation has lead to a calculation and decision scheme that pays specific attention to these points in which CCS distinguishes itself from other mitigation techniques.
Spatial aspects are for example important. On one hand, the location of a coal fired power plant, a major source of CO_2, will depend on the supply routes of coal. On the other hand, the location of the geological reservoir cannot be chosen freely as this depends on the configuration of the geological subsurface. Any mismatch between the location of source and reservoir requires the transport of CO_2 by pipeline. The larger the distance, the larger this additional cost. Also and with time a network of pipelines can emerge that connects several sources and reservoirs, at least when CCS will become a major activity. Also the growth of such a network of pipelines will get specific attention within the current project. Introducing these aspects in the simulator requires a GIS environment (Geographic Information System), which forms an important part of the simulator.
A second aspect typical of CCS is the exploration risk of the geologic reservoir. Briefly state this risk means that as long as the reservoir has not been fully explored and tested, the possibility remains that the reservoir will not be suited for

PSS-CCS

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storing CO_2. Therefore, although the most important cost factor in the CCS chain is the capturing of CO_2 at the source, the success of the complete project will depend on the results of the exploration of the geological reservoir. How to cope with this risk in a practical situation, and how to integrate it in economic simulations, is also a point of focus within the project PSS-CCS.

INTERACTION BETWEEN DIFFERENT PARTNERS

This project has brought together all expertise on CCS in Belgium. The expertise within the research groups spans the complete CCS chain, starting with the capture and compression of CO_2, to its transportation and geological storage.

Link to international programmes

The project is closely followed by two international organisations (see follow-up committee), and the results will be presented to the international community. The project has the potential to continue at a European level.

PARTNERS - ACTIVITIES

The expertise for inventorying the geological storage options for CO_2 comes from **VITO** and the **university of Mons (FPMs**). VITO also supplies the economic expertise and is responsible for the setting up of the the risk evaluation procedure. Evaluation of the technology for the capture and compression techniques, and the influence of these components on the performance of industrial installations, is made by **the team of the ULg.** The **GSB-RBINS** coordinates the different activities and is the main developer of the PSS-CCS simulator. Subcontractor Ecofys makes an inventory of the CO_2 sources and provides an overview of the international boundary conditions required by the simulations.

CONTACT INFORMATION

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www.naturalsciences.be/PSS-CCS

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Follow-up Committee

For the complete and most up-to-date composition of the Follow-up Committee, please consult our Federal Research Actions Database (FEDRA) by visiting http://www.belspo.be/fedra or http://www.belspo.be/ssd

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