

Project no.:
218868

Project Acronym:
ECCO

Project title:
European value chain for CO₂

Instrument: Collaborative Project
Small to medium scale integrated project

Start date of project: 2008-09-01
Duration: 3 years

Annual Periodic Report No 1 Summary

Revision: Final

Due date of delivery: 2009-10-30
Actual submission date: 2009-10-30

Organisation name of lead contractor for this deliverable:
SINTEF Energiforskning AS

Project co-funded by the European Commission within the Seventh Framework Programme (2007-2013)		
Dissemination Level		
PU	Public	X
PP	Restricted to other programme participants (including the Commission Services)	
RE	Restricted to a group specified by the consortium (including the Commission Services)	
CO	Confidential, only for members of the consortium (including the Commission Services)	

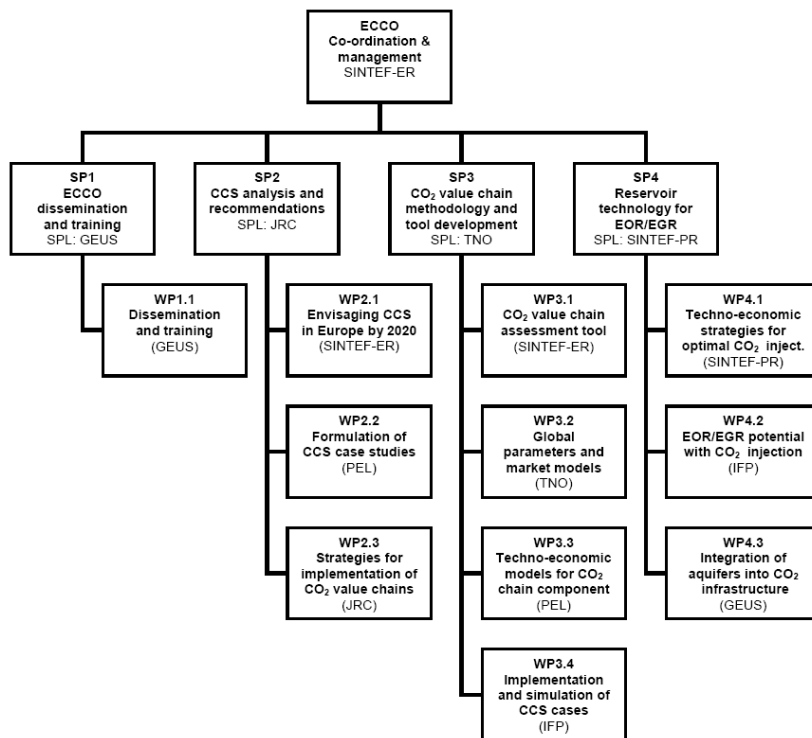
Deliverable number:	D0.1.2_ 1S
Deliverable title:	Annual Periodic Report No 1_Summary
Work package:	WP0.1 Project management and co-ordination
Lead contractor:	SINTEF-ER

Status of deliverable		
Action	By	Date
Submitted (Author(s))	SP leaders	2009-10-10
Verified (WP-leader)	Einar Jordanger, SINTEF-ER	2009-10-30
Approved (SP-leader)	Petter Røkke, SINTEF-ER	2009-10-30

Author(s)		
Name	Organisation	E-mail
Input from SP leaders		
Einar Jordanger	SINTEF-ER	Einar.JORDANGER@sintef.no
Petter Røkke	SINTEF-ER	Petter.E.Rokke@sintef.no

Publishable summary

ECCO has structured its technical work in four sub-projects (SP), with associated work-packages (WP) within each SP, as shown in this figure;



The summary of each of the SPs are given on the following pages.

SP1 Dissemination and training

The first year of the project is focused on facilitating exchange of knowledge among project partners and to create a framework for the external distribution of results. Within the first year of the project, WP1.1 had three tasks: a workshop regarding EOR/EGR projects in Central Eastern Europe and future possibilities in the North Sea, a public website and a “Dissemination and Use Plan”.

The ECCO website became accessible from the web-address: www.fp7-ecco.com (see Figure 1).

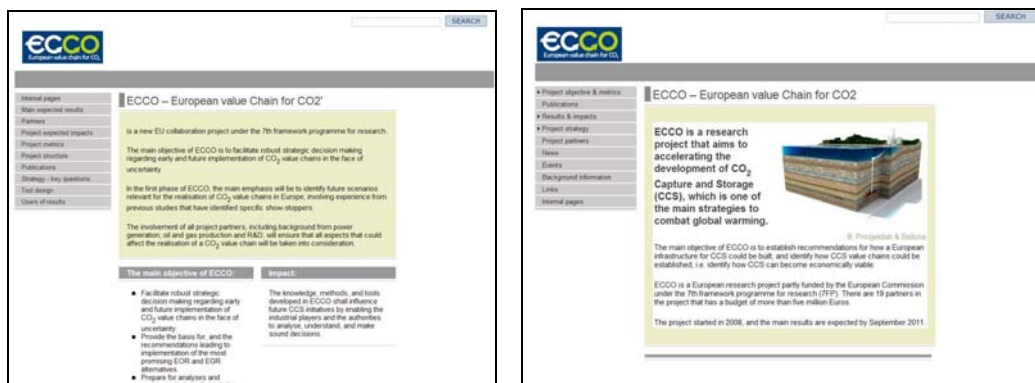


Figure 1 The public ECCO website, left the original version from autumn 2008 and right the improved version from spring 2009.

A workshop entitled “The use of CO₂ for EOR/EGR” was arranged in Zagreb, the primary aim of which was to assess the present level of knowledge within the project group and to promote closer cooperation among partners. The workshop included presentation of knowledge from onshore EOR/EGR CO₂ injection projects in Croatia and Hungary, as well as presentations of the potential for offshore CO₂ injection in oil- and gas fields in the North Sea region. A final discussion contributed to a common understanding of the technological challenges associated with the use of CO₂ for EOR/EGR. The workshop included a field trip to the Ivanić and Žutica CO₂ injection projects in Croatia.

The “Dissemination and Use plan” is the first of two reports that cover the strategy for circulation of information from the ECCO project to related research groups and the general public. The first “Dissemination and Use plan” concerns distribution and data usage during the course of the project. The plan serves as guide for the project partners on the communication of results.

SP2 CCS analysis and recommendations

During the first year of the ECCO project, two work packages have been running within SP2: WP2.1 and WP2.2. WP2.1 is expected to be finalised by month 14 and WP2.2 by month 30. The work performed in the context of these two work packages can be summarised as follows:

WP2.1 – Envisaging CCS in Europe by 2020

Description of the work performed since the beginning of the project

Three workshops has been arranged in the first 12 months of the project to develop scenarios that describe the evolution of the European energy system, including the role of CCS, and the macro-economic environment by 2020 and 2040:

- First workshop, Stockholm 8th-9th October 2008; a brainstorming meeting that aimed at identifying key factors and actors that constitute the drivers in the scenario study;
- Second workshop, Hoofddorp 3rd December 2008; discussions on the main factors, actors and drivers for the development of mini-scenarios;
- Third workshop, Copenhagen 25th-26th March 2009; developed and integrated mini-scenarios into main scenarios describing the future in terms of key indicators.

Description of the main results achieved

The outcome of the workshops was processed and resulted in a nearly complete deliverable, “D2.1.1 Scenarios for CCS evolution including EOR/EGR in Europe by 2020”, which were completed after the 4th workshop, which took place in Helsinki on 21st-22nd September 2009. The discussions held during the workshops contributed to developing a common understanding of and a consensus for the ECCO strategy and enlightened the role of scenarios and case studies for the ECCO project. These scenarios will be revisited in early 2010 to take into consideration the outcome of the UNFCCC meeting in Copenhagen in December 2009. The revisited scenarios will be presented in the second and last Deliverable of this WP.

Expected final results and their potential impact and use (including the socio-economic impact and the wider societal implications of the project so far)

WP2.1 will establish the common base for the definition and evaluation of the case studies by developing a number of scenarios that describe alternative views of the European sectors that influence the development and deployment of CO₂ value chains in Europe, including fuel and carbon prices, the macroeconomic environment, political choices, fuel and technology mix etc.

WP2.2 – Formulation of CCS case studies

Description of the work performed since the beginning of the project

Two work package meetings were organized, the kick-off meeting in London on 27th April 2009, and a SP2/SP3 joint meeting in Petten on 1st-2nd July 2009. The first meeting was focused on the definition of key questions to be addressed by the case studies and the second one dealt with the identification and definition of the KPIs (key performance indicators) that will be used to benchmark/assess the case studies and modelling requirements.

Description of the main results achieved

The initial set of questions to be addressed by the case studies have been discussed and agreed, and discussions for ideas for case studies of CO₂ chains have been initiated. Progress on defining further case study data requirements and North Sea CO₂ opportunities has been achieved and internal case study questions and criteria established to allow suitable case studies to be selected are being developed.

Expected final results and their potential impact and use (including the socio-economic impact and the wider societal implications of the project so far)

WP2.2 will design likely value chains that are compatible with the framework developed in WP2.1, developing initial recommendations for case studies for deeper evaluation using the ECCO tool.

SP3 CO₂ value chain methodology and tool development

Description of the work performed since the beginning of the project

SP3 is responsible for defining and constructing a software tool capable of assessing quantitatively the economic performance of case studies as defined by SP2, conditional on the macro-economic scenarios as defined by SP2, and using the generic knowledge on CO₂-EOR and CO₂-EGR as developed by SP4. During year 1, preparatory work has been performed in order to enable construction of the ECCO tool in year 2. In addition, macro-economic and infrastructural databases have been assembled, and an EU-ETS CO₂ pricing model has been developed.

Description of the main results achieved so far

The main results achieved by SP3 in year 1 are:

- Overview of existing tools assessing CCS value chains (D3.1.1). It was concluded that no existing tool is capable of assessing case studies such as to be defined by ECCO.
- Specification of appropriate ECCO tool detail to support the corporate decision gate process. Notably, contractual issues between value chain actors impact on tool design (D3.1.2).
- Specification of “core” of ECCO tool in terms of administering data that is common to more than one module. Specification of main modules to be constructed, though only partly the functional relationships within those modules (D3.1.2).
- Database of macro-economic data pertinent to quantifying SP2 scenarios, including various correlations between macro-economic data (part of D3.2.1)
- Development of CO₂ pricing model, allowing the CO₂ emission rights price to be calculated as a function of EU macro-economic variables and EU-ETS controllable variables (part of D3.2.1)
- Inventory of infrastructure: Chain components data (D3.3.1)
- Inventory of infrastructure: Classification of components for case studies (D3.3.2)
- Furthermore, discussions have been engaged with SP2 and SP4 to obtain end-user feedback on the tool specification, and to ascertain generic results (rather than case-specific results) from CO₂-EOR experiments using detailed simulation of “conceptual” reservoirs.

Expected final results and their potential impact and use

The results expected from SP3 are unchanged: enabling CO₂-EOR/EGR case studies to be assessed economically per actor in the value chain. That includes contractual arrangements between actors and possible government interventions to meet an individual actor's hurdle rates. A better understanding of the potential frictions in the CCS value chain is believed to provide commercial enterprises with new business opportunities. Moreover, governments will obtain a means to better understand their role in promoting CCS in society, thereby reducing CO₂ emissions in the atmosphere, improving the security of oil supply, and creating new jobs.

SP4 Reservoir technology for EOR/EGR

Since the beginning of the project we have performed a review of the many options for handling of produced CO₂ after breakthrough. We have focused both on onshore and offshore installations. With respect to onshore installations we have visited field sites in Hungary and Croatia. MOL in Hungary has released field data and field experience on CO₂ for EOR, EGR and for storage to the ECCO project. INA in Croatia has released field data and field experience on CO₂ for EOR.

We have proposed technical solutions and estimated costs associated with CO₂ based EOR projects for re-injection of produced gas and other options. We have discussed the options of re-circulation of a mixture of produced CO₂ natural gas without prior separation and re-circulation of purified CO₂ after separating CO₂ from natural gas fraction.

We have collected field data as basis for definition of conceptual reservoir models for Central Europe and North Sea oil and gas reservoirs. We have developed conceptual reservoir models for a selection of relevant field types and performed both black-oil and compositional reservoir simulation on the models. We have identified aquifers for a plausible CO₂ chain case study.

We have arranged two SP4 workshops in 2009 to present and discuss the relevant topics in the sub-project in addition to separate workshops within each work package in SP4.

The main results achieved so far are:

- Review of options for handling of produced CO₂ after breakthrough.
- Technical solutions and estimated costs associated with CO₂ based EOR projects for re-injection of produced gas and other options.
- Preliminary conceptual model definition and data collection.
- Conceptual model description and base case simulation.
- Identified aquifers needed for a plausible CO₂ chain case study.
- Database containing relevant aquifers needed for the CO₂ value chain.

The expected final results from the sub-project SP4 are improved ability to predict enhanced oil recovery (EOR) and enhanced gas recovery (EGR) profiles and potentials for CO₂ injection for storage purpose into European oil and gas reservoirs. The final results will be the basis for selection and calculation of feasible aquifers in the CO₂ value chain. Furthermore we will study the potential economic impact on oil and gas field operations of additional petroleum products produced from oil and gas fields in Central Europe and the North Sea as a result of CO₂ EOR and EGR.

The overall strategy of the SP4 work plan includes interaction of the three work-packages of SP4 and with SP3 and SP2 work-packages. In addition independent activities that will be completed by technical reports, SP4 subproject will also provide basis for formulation of modules to be used in the ECCO core tool development and specific input data to be used in modelling of the value chain. This interaction will be continuous during the project period.