Economic CO2 network optimization model – COCATE Project

Simon Roussanaly[1], Paula Coussy[1], ...[2], Ton Wildenborg[3], ...[4]

1: IFPEN, 2 : SINTEF, 3: TNO, 4: GEOGREEN

simon.roussanaly@ifpenergiesnouvelles.fr, paula.coussy@ifpenergiesnouvelles.fr, ton.Wildenborg@tno.nl,

Keywords (Transport, storage, storage site screening, techno-economic assessment, value chain assessment)

Text (500-1000 words - maximum 2 pages, font 12)

Industrial CO2 emissions are rarely located near suitable geological storages and these reservoirs many often are widely dispersed. In order to transport industrial CO_2 emissions from sources to suitable reservoirs an optimized transport network must be developed with the main objective of minimizing the total costs of CO2 transport and storage.

During the European project COCATE, an optimization model is developed in order to find a global optimized trade-off between the whole chain of costs of CO2 transport and storage, taking into account different time periods. COCATE model uses different possible type of routes: onshore and offshore pipelines or shipping and include different technical constraints such as total storage capacity, CO2 emissions profiles, forbidden routes...etc.

COCATE model is a macroeconomic optimization model which minimizes the whole costs of the transport and storage chain considering :

- capital expenditures, operating and maintenance costs, ..., of the different possible transport modes (pipeline onshore, pipeline offshore and shipping) and specific storages;
- several emitters and storage sites
- a GIS network grid permitting different options of trade-off.

The aim is to be able to determine the more economical CO_2 network deployment of a system.

According on the characteristic of the case studied (distance, profile of emission and storage, the network grid proposed, emission and storage profile...), the tool defines the CO_2 transport network that minimize the total discounted cost over the lifetime of the project.

The optimization COCATE model is developed using Gams® (Version 23.3). Inputs and outputs of case studies are developed in an useful interface Microsoft-Office Excel.