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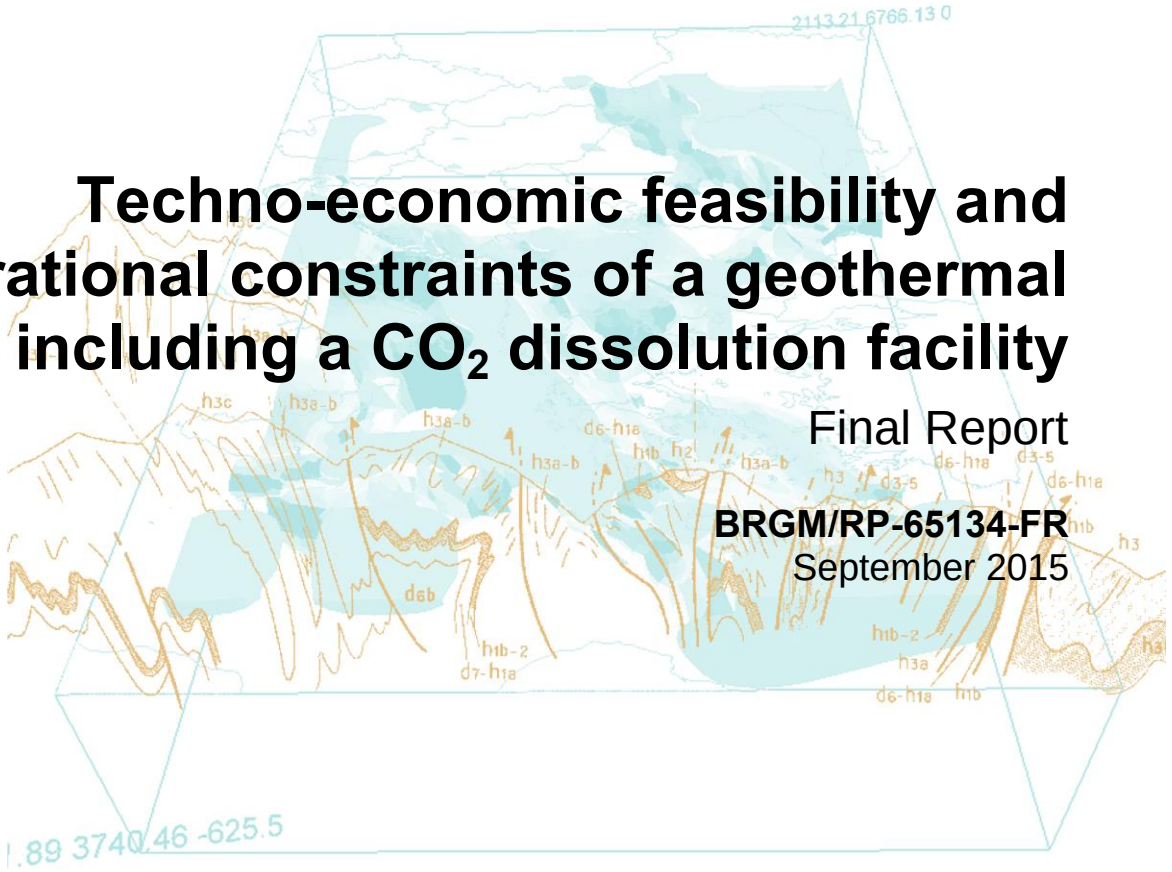
Techno-economic feasibility and operational constraints of a geothermal loop including a CO_2 dissolution facility

Final Report

BRGM/RP-65134-FR
September 2015



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Study carried out as part of the CO_2-DISSOLVED project,

funded by the ANR (agreement ANR-12-SEED-0009-01)

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With the collaboration of
G. Blount and K. O'Neil

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Warning

This report is the result (deliverable D1.3) of part of the research work carried out in the framework of the CO_2-DISSOLVED project, funded by the ANR (agreement ANR-12-SEED-0009-01).

This report remains **confidential** and its distribution is restricted to the project partners and to the ANR **until the end of the project (04/30/2016)**.

By the end of the project (from 05/01/2016), the status of this **report will become public**.

Keywords: CO_2-DISSOLVED project, geothermal reservoirs, Dogger, Trias, CO_2 dissolution, dissolved CO_2 storage

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Synopsis

This report is the deliverable D1.3 of the CO_2-DISSOLVED project. This project is funded by the ANR (French National Research Agency) in the framework of the 2012 call for proposals of the SEED program (acronym – in French – for Energy Efficient and Decarbonized Systems). The CO_2-DISSOLVED project proposes to assess the feasibility of a novel CO_2 injection strategy in deep saline aquifers, combining injection of dissolved CO_2 (instead of supercritical CO_2) and recovery of geothermal heat from the extracted brine.

The combined CO_2 injection and geothermal heat exchange approach relies on:

- low tonnage industrial CO_2 emitters (ca. 10-130 kt/yr) which would be compatible with a single geothermal doublet installation, accounting for solubility limits of CO_2 in brine.

- a new low-cost patented CO_2 capture and dissolution technology provided by Partnering in innovation, our American partner.

- a “typical” geothermal doublet system, used for both CO_2 injection and recovery of heat from the extracted brine.

This study focuses on:

- a technical and economic description of the geothermal doublet technology which is commonly used in the Paris Basin to extract heat from the Dogger geothermal aquifer. As such, the Dogger aquifer is the most used low enthalpy geothermal aquifer for district heating around the world.

- a description of the dissolved CO_2 injection system.

- combining dissolved CO_2 injection with a typical geothermal loop, which implies adaptation of both technologies. Among the adaptations, work has been done more particularly on the dissolved CO_2 injection facility itself, on corrosion-resistant materials and cements, and on the well design.

- the technical feasibility study is completed with indicative investment and operating costs, and also with the potential constraints that are specific to the project.