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**SEVENTH FRAMEWORK PROGRAMME
THEME 5 - Energy
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Collaborative Project- GA No. 213569**



CESAR
CO₂ Enhanced Separation and Recovery

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Public Summary for Deliverable D2.3.5 – Techno-economics of CESAR 1 Integration Studies:

Within the project CESAR under the Seventh Framework Programme of the European Commission, Work Package 2 aims at process integration between all the elements of the power plant equipped with CO₂ capture (boiler, turbine, CO₂ capture, CO₂ compression), using as a starting point the achievements of the CASTOR project. The ultimate aim of this work is to provide the technical and economic analysis of benchmark and advanced CO₂ capture processes.

The six selected baseline cases for investigation are:

- Natural gas-fired 430 MW_e Combined Cycle Gas Turbine plant
- Advanced Supercritical Bituminous coal-fired 800 MW_e PF plant New Build
- Advanced Supercritical Bituminous coal-fired 800 MW_e PF plant Retrofit
- Bituminous coal-fired 600 MW_e CHP plant
- Lignite-fired 1000 MW_e PF plant
- Lignite-fired 380 MW_e PF plant

This paper presents the technical and economic analysis of the CESAR 1 process with advanced integration between the power plant and the capture and compression plant. The purpose of this study is to technically and economically evaluate the potential of the CESAR 1 process and compare this process to the benchmark MEA process defined in CESAR deliverable D2.3.4.

The implementation of the CESAR 1 solvent with advanced integration techniques has resulted in a significant reduction in the efficiency penalty. The CESAR project has reduced the efficiency penalty from the range 9.1-15.3 % points with a benchmark MEA process with limited integration, to a range 5.8-11.3 % points with the CESAR 1 process and advanced integration.

Ultimately, the deployment of CCS technology will depend upon the relative cost of CCS versus the price of emitted carbon. In this respect the CESAR project has made significant advances reducing the cost of CO₂ avoided (power plant, capture and compression) from 42-68 €/t CO₂ with a benchmark MEA capture process to 35-55 €/t with an advanced CESAR 1 process. It should be noted that these costs do not include the transportation and storage of CO₂ which was beyond the scope of this project.

A sensitivity analysis showed that solvent costs and degradation rates have significant impact on the cost of CO₂ avoided. This demonstrates that there is potential for further savings that can be made in managing operating costs, primarily in the area of solvent replacement costs. Furthermore this highlights the importance of understanding the implications of degradation and solvent management on the overall economics of CO₂ capture.



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Further information on the CESAR project and on the Work Package 2 is available on the project website: <http://www.co2cesar.eu/index.php>