

***Combustion vs. gasification for a demonstration CCS project in Italy:  
a techno-economic analysis***

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**Abstract**

The need to reduce CO<sub>2</sub> emissions requires a great economical effort to optimize the processes and solve the main technical and economic problems which still limit a large-scale diffusion of this kind of carbon capture and storage (CCS) technologies.

In this paper, the main results of a techno-economic comparison between ultra supercritical pulverized coal combustion (USC) and integrated gasification combined cycle (IGCC) plants are presented. The Sulcis coal basin, considered as a reference location for the plant configurations here analysed, could represent a very important site to test carbon capture and storage technologies, being representative of a lot of potential storage site in the world.

For both USC and IGCC technologies, three different configurations have been compared: a configuration without CCS, a CO<sub>2</sub>-free configuration and an intermediate solution in which a demonstration CCS system is applied to only a portion of produced gas.

The analysis here presented shows that USC technology is slightly more profitable than IGCC if a configuration without CCS is considered, whereas IGCC is more profitable than USC for a CO<sub>2</sub>-free configuration. Due to the high CCS costs and to the specificity of the site, the investment is not profitable if not supported by an adequate incentive.

**Keywords:** Coal gasification; Ultra-supercritical plant; Carbon capture and storage; Sulcis coal

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