

***The Sotacarbo coal gasification experimental plant
for a CO₂-free hydrogen production***

Alberto Pettinau^(*), Alessandro Orsini, Gabriele Calì, Francesca Ferrara

Sotacarbo S.p.A. – Grande Miniera di Serbariu, 09013 Carbonia, ITALY

Abstract

Being hydrogen the most promising energy carrier for distributed power generation and being the coal-to-hydrogen technologies far from their large-scale application, mainly due to their high costs, Sotacarbo has recently built up a pilot platform for the combined production of hydrogen and electrical energy from coal. The platform includes two different units: a 5 MW_{th} demonstrative plant and a 200 kW_{th} pilot plant (feed with a maximum of 35 kg/h of coal).

This paper, together with a detailed description of the pilot plant (which includes a fixed-bed up-draft gasifier and the whole syngas treatment line for power generation and hydrogen production), reports a critical analysis of the main results obtained in the first experimental campaigns, carried out by using a low sulphur South African coal and a high sulphur Sardinian coal (for both kinds of coal, a hot gas desulphurization system allows to reduce at about 10 ppm the H₂S concentration in the clean syngas).

In particular, a hydrogen production of about 1.4–1.6 kg/h (depending on the primary fuel composition and the operating conditions) has been obtained from a portion of syngas corresponding to the gasification of 7 kg/h of coal.

Keywords: Coal-to-hydrogen; Zero emissions; Carbon capture and storage; Distributed power generation

Paper available online on www.sciencedirect.com

* Corresponding author:

email: apettinau@sotacarbo.it
phone: +39 0781 670444
fax: +39 8781 670552