European Commission

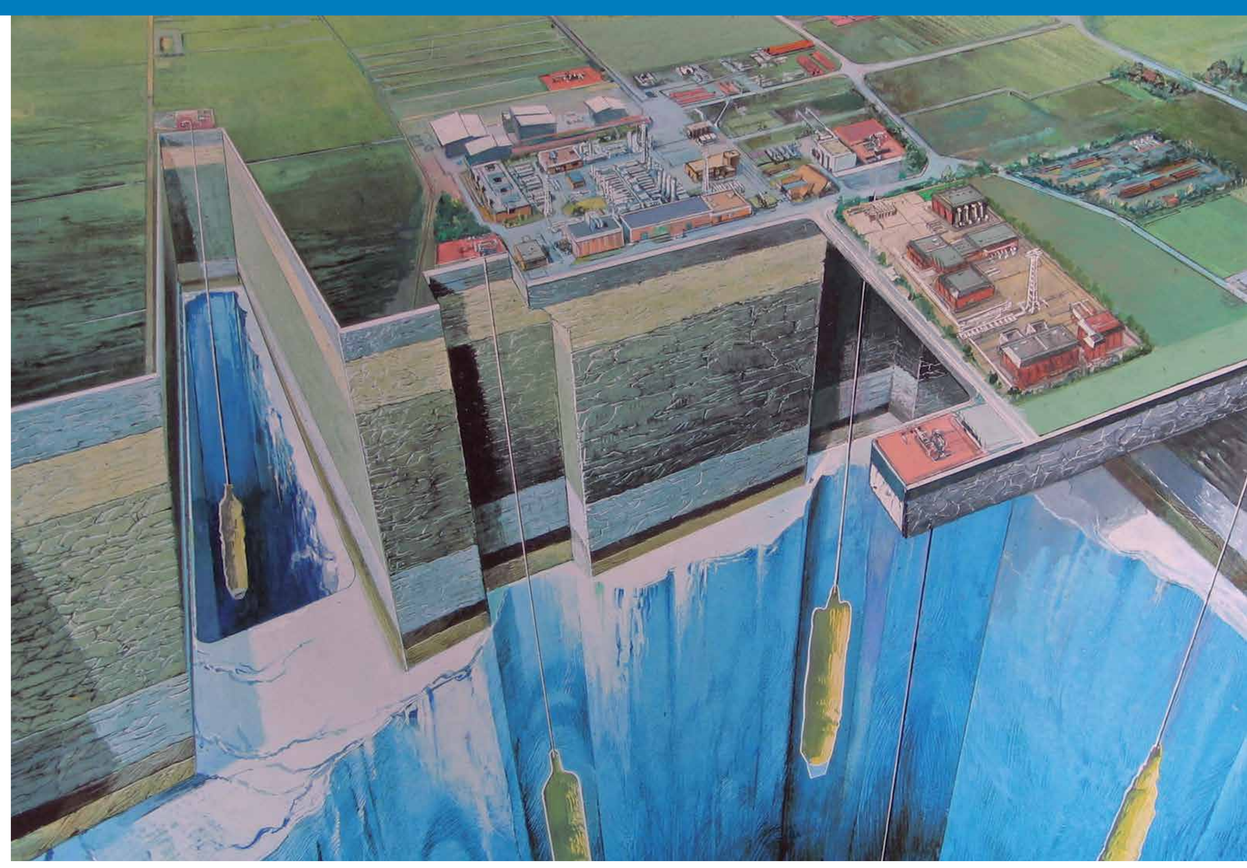
Hydrogen - A Competitive Energy Storage Medium To Enable the Large Scale Integration of Renewable Energies

Seville, 15-16 November 2012

Assessment for large scale storage of RES by H2 underground storage (HyUnder)

Why large scale hydrogen underground storage for intermittent renewable energies ?

Interest in the use of hydrogen as energy carrier and storage medium has been growing in recent years. This is based on the insight that in our energy future, which will require the integration of increasing amounts of renewable electricity generation, chemical storage offers the most promising methods of storing large amounts of energy. Hydrogen offers highly versatile chemical energy storage, and therefore ideally suited to large-scale load balancing of renewable electricity generation: renewable electricity can be used to generate hydrogen by electrolysis, and the hydrogen can be converted back to electricity by combustion or in a fuel cell. The large-scale storage of hydrogen in underground sites also opens up additional uses of hydrogen which present or future economic opportunities – as a transport fuel, industrial consumption, or injection into the natural gas grid.

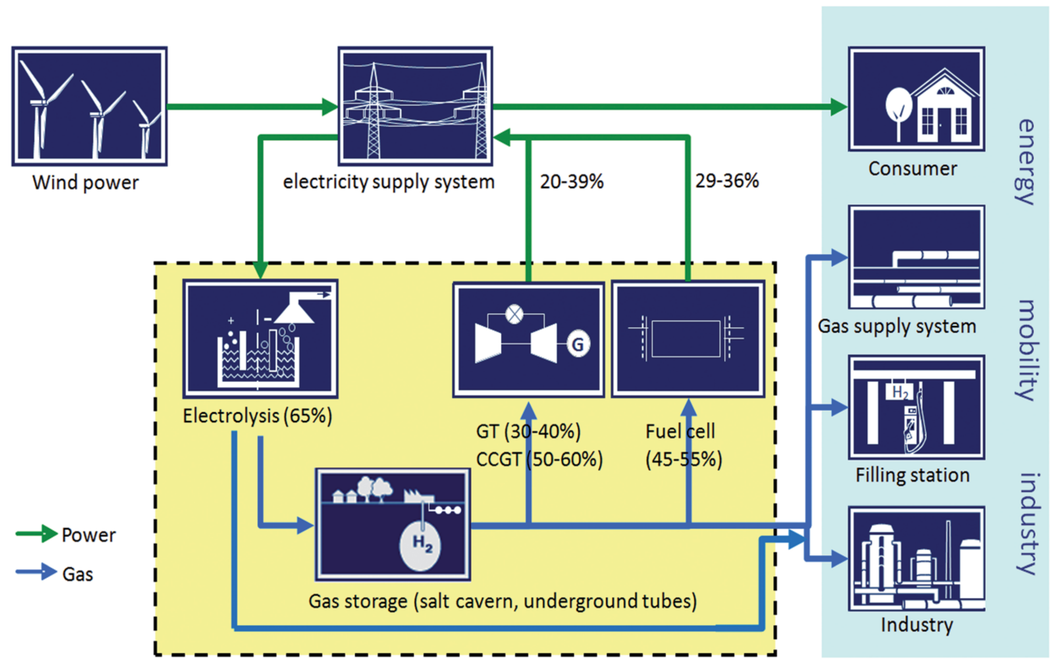


Simulation of hydrogen underground storage systems. Source: KBB Underground Technologies

The potential for large scale storage of RES by hydrogen underground storage by Europe will be analysed

Project overview

The ambition of HyUnder is to develop a European Implementation Plan, based on a detailed assessment by six individual Case Studies of the hydrogen utilization options and salt cavern storage potential all across Europe.



Electricity-to-gas for re-electrification, as transport fuel and for material use: E-hydrogen

Case Studies

The central topics of HyUnder are the representative case studies with a focus on salt cavern storage: the project foresees the development of individual case studies on hydrogen underground storage for Germany, Spain, the UK, Romania, France and the Netherlands. The case study approach comprises:

- Development of a common methodology for all individual case studies: electricity cost will be variable in function of the case study; equipment cost will be fixed for all case studies.
- The main actions to be developed in each case study: regional storage prototype location analysis, economic scenario type assessment, introduction of hydrogen underground storage into different markets.
- Sensitivity analysis based on scenarios assumptions.
- A comparison of the individual case studies. The Implementation Plan will be a concrete action plan to develop and move hydrogen storage from the current development phase through the demonstration, and finally the deployment phase. It will also make policy recommendations.

Project Overview

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- Ludwig-Bölkow-Systemtechnik GmbH (LBST); Foundation for the Development of New Hydrogen Technologies in Aragon (FHa); Hinicio s.p.r.l.; KBB Underground Technologies GmbH (KBB); National Research and Development Institute for Cryogenics and Isotopic Technologies – ICIT Rm. Vâlcea, National Hydrogen and Fuel Cell Centre (NFHCC); DEEP Underground Engineering GmbH (DEEP); E.ON Gas Storage GmbH (EGS); The Energy Research Centre of the Netherlands (ECN); SHELL Global Solutions International B.V. (SHELL); Centre of Excellence for Low Carbon and Fuel Cell technologies (CENEX); SOLVAY Chemicals GmbH (SOLVAY); CEA (Commisariat Energie Atomique)

- From 06/12 to 06/14
- www.hyunder.eu

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