



## The potential of geological storage of CO<sub>2</sub> in Austria: a techno-economic assessment

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An impressive two-third or about 40GWh/y of electricity in Austria is produced from renewable energy sources, in particular hydro energy. For the remaining part the country depends on fossil fuels, which together with iron & steel production form the most CO<sub>2</sub> intensive industries in Austria with a combined emission of just over 20Mt/y. According to the IEA, CO<sub>2</sub> capture and geological storage (CCS) can reduce the global CO<sub>2</sub> emission until 2050 by 17%. A correct assessment of CCS needs to start with the storage potential. Prior to this study, only general estimates of the theoretical capacity of Austrian reservoirs were available, thus, up until now, the realistic potential for CCS technology has not been assessed.

Both for policy and industry, an assessment of the matched capacity is required, which is the capacity that actually will be used in CCS projects. This hurdle can be taken by applying a recently developed methodology (Welkenhuysen et al., 2013). This policy support system (PSS) consists of two parts, PSS Explorer and PSS III simulator. In brief, the methodology is based on expert judgements of potential reservoirs. These assessments can provide the best available data, including the expert's experience and possibly confidential data, without disclosing specific data. The geo-techno-economic calculation scheme PSS Explorer uses the expert input to calculate for each individual reservoir an assessment of the practical capacity (as probability density functions), in function of an acceptable price for storage. This practical capacity can then be used by the techno-economic PSS III simulator to perform advanced source-sink matching until 2050 and thus provide the matched reservoir capacity. The analysed reservoirs are 7 active or abandoned oil and gas reservoirs in Austria.

The simulation of the electricity and iron & steel sector of Austria resulted in the estimation of the geological storage potential, taking into account geological, technological and economic uncertainties. Results indicate a significant potential for CCS in Austria and a very high probability for any CO<sub>2</sub> storage activity. The assessment of the average practical capacity of the whole country is 120Mt at 15€/tCO<sub>2</sub> of storage budget, while the average matched national capacity is 40Mt. Concerning the individual reservoirs, reservoir development probabilities generally lie between 20 and 30%. These numbers served as basis for a reservoir exploration ranking. Compared to current emissions, total storage capacity is at the low end, which is likely the main technical limiting factor for CCS deployment in Austria. Also, current policy seems not in favour of CCS. Storage capacity is however high enough to provide a significant contribution to the reduction of CO<sub>2</sub> emissions in the country, in the order of a few million tonnes per year. Opportunities to combine CO<sub>2</sub> geological storage and geothermal energy seem promising, but require additional evaluation.

Welkenhuysen, K., Ramirez, A., Swennen, R. & Piessens, K., 2013. Ranking potential CO<sub>2</sub> storage reservoirs: an exploration priority list for Belgium. *International Journal of Greenhouse Gas Control*, 17, p. 431-449