



The gas industry already stores natural gas on a large scale in suitable geological strata. The new process wants to capitalise on this existing infrastructure.

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Converting surplus electricity into natural gas

In Germany, the electricity supplied by renewable energy systems already outstrips the current demand at times. This has led to negative electricity prices on the European Energy Exchange in Leipzig. Efficient technologies for storing large electricity volumes will therefore provide key components in a future grid. A German-Austrian cooperation project has developed a process for this purpose that utilises surplus green electricity to produce methane synthetically. This fuel is nothing other than natural gas, for which a proven infrastructure already exists in Germany with large-scale storage facilities and an extensive distribution network.

In order to produce synthetic natural gas, hydrogen is first of all created by means of electrolysis. Combined with carbon dioxide, this then undergoes several intermediate chemical stages to produce methane. This process enables around 60% of the energy originally contained in the electricity to be transferred to the methane. The project principally utilised the surplus electricity produced by north German wind farms, which to date has not been used owing to the lack of demand. Northern Germany is producing increasingly more environmentally friendly electricity, particularly with the ongoing expansion of offshore wind energy. The start signal was provided by the Alpha Ventus Wind Farm, which was officially connected to the grid just a few days ago.

With pumped storage power plants – to date the standard technology for storing surplus electricity on a large scale. The impact of pumped storage power plants on the landscape and the lack of suitable sites in Germany mean, however, that there is unlikely to be any large-scale expansion in this technology. An alternative process for storing electricity on a large scale, which uses compressed air energy storage power plants, was profiled in [BINE-Projektinfo 05/07](#). However, both technologies are principally used as peak-load power plants.

The German gas industry constantly stocks around one fifth of Germany's annual natural gas requirements (approximately 20 billion cubic metres) in its storage facilities. These are the largest capacities in Europe. Synthetic natural gas produced from green electricity, which considerably fluctuates both daily and seasonally, can therefore also be stored, distributed and deployed in these already functioning systems.

The process for generating synthetic methane was developed by the Zentrum für Solarenergie und Wasserstoff-Forschung Baden-Württemberg (ZSW) in cooperation with the Fraunhofer Institute for Wind Energy and Energy System Technology (IWES). The third party is the Austrian company Solar Fuel Technology, which is currently preparing its implementation on an industrial scale. It is planned to construct a larger system with an approximately 10-megawatt output by 2012. Further information is available on the website of the

