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Press Release

Why hydrogen is already an economical energy source

At peak times, hydrogen can be an economically viable addition to electricity supply - provided that the hydrogen is converted on so-called reversible power-to-gas storage systems. This is the result of a new study by Mannheim economists Professor Stefan Reichelstein, Ph.D., and Professor Dr. Gunther Glenk.

In their study, which was published in *Nature Communications*, the two authors examine the economics of reversible power-to-gas systems in the context of the German market and Texan electricity markets. A key advantage of such systems is that they can operate in two directions: In times of sufficient and affordable supply of wind and solar energy, they can convert electricity into hydrogen. In times of electricity shortages, however, the systems can reverse this procedure and convert hydrogen back into electricity.

“Green hydrogen is often still believed to be expensive and thus unprofitable. But reversible power-to-gas systems have the potential to play a key role in securing clean energy supply in Germany,” says co-author Glenk.

As of now, hydrogen used for power generation would come at a high cost, because the corresponding generation facilities can only run in one way. Gas turbines that generate electricity from hydrogen, for example, would achieve a relatively low utilization rate. They would only connect to the grid when wind and solar energy sources produce too little electricity, for example on windless, gray winter days. The rest of the time, they would remain idle.

In contrast, reversible power-to-gas systems can produce hydrogen needed for industrial purposes and, furthermore, contribute to the supply of electricity in case the basic supply of wind and solar energy is not enough. As such, they achieve high utilization rates and, in turn, low average costs. Reversible power-to-gas systems also increase the independence from energy imports from abroad.

European companies are currently at the forefront of developing power-to-gas systems that are capable of operating in reverse. The market for such systems is still in its infancy, but the more these systems are installed, the more their production costs will drop. This, in turn, makes it all the more likely for hydrogen to emerge as a crucial energy source in the future.

Link to the original publication: <https://doi.org/10.1038/s41467-022-29520-0>.

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