

POTENTIAL FOR DECENTRALISED HYDROGEN PRODUCTION



BACKGROUND

German and Dutch companies cooperate to build the hydrogen value chain

The use of hydrogen (H₂) is considered a key building block in shaping the energy transition. Especially in the north of the Netherlands and Germany, where renewable energy is increasingly being produced, the use of hydrogen as an energy carrier is gaining in importance. H2Watt provided the platform for the realisation of numerous implementation projects. The focus was on processes and systems for the efficient production, storage, transport and use of hydrogen. The innovation projects were mainly implemented on the islands of Borkum and Ameland. The natural characteristics in the Wadden Sea provide optimal conditions for the production of “green” hydrogen, e.g. with the help of wind and solar power plants as well as wave and tidal power plants. Another advantage is that a self-sufficient consideration of the supply system could be made.

OBJECTIVES

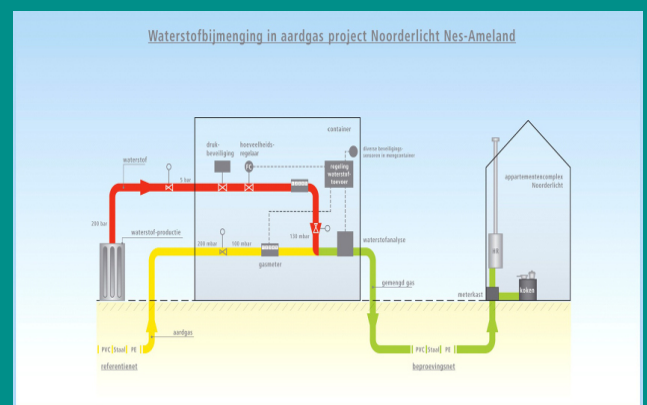
Achieving the climate targets for 2030 through decentralised hydrogen production

The Netherlands is facing an energy challenge to meet the 2030 climate targets. According to the municipality of Ameland, decentralised hydrogen production is therefore an underexposed means to reach the climate targets (at low cost). The municipality wanted to ‘demonstrate’ this on Ameland in order to elaborate and

AMELAND



— HYDROGEN ADMIXTURE TO NATURAL GAS —



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develop it further. The latest developments in the field of technology and economic models were explored in depth. Reversible fuel cells, which can function as both a fuel cell and an electrolyser, were developed and are an innovative addition to this concept. Innovation in the economic models resulted (in addition to volatile markets) from the cost savings of grid operators and coordination with them. By shifting this (peak) solar production from the daytime to the evening hours through decentralised conversion into hydrogen, many infrastructural measures could be saved and the total production capacity could be better utilised.

RESULTS

Decentralised hydrogen production on Ameland: using it as efficiently as possible

In consultation with the grid operators, it was possible to determine where decentralised hydrogen production can be used most efficiently. Sometimes this is at the level of streets and neighbourhoods, but also at the level of medium voltage and/or substations up to high voltage. In most cases, the capacity of this hydrogen production has been between a few hundred kilowatts and 10 megawatts. Grid reinforcements will still be needed on a large scale, but with decentralised hydrogen production this could be spread more effectively over time and the required capacity. It is not easy to quantify the exact savings, but this could be investigated in Ameland. In the village of Ballum, the grid operators investigated what reinforcements were needed in the electrification

of households. Efficiency losses that occurred when converting to hydrogen could be compensated by placing the decentralised production units in places with high heat demand. Examples are swimming pools, local heating networks or large utility buildings. The heat that was released during both the conversion to hydrogen (electrolysis) and the conversion back to electricity (fuel cell) could then be used almost completely.

JOIN IN!

The hydrogen infrastructure is designed as a research and demonstration model. We would also like to offer external institutions, municipalities and companies the opportunity to use the infrastructure.

So if you have research questions or want to use the facility for demonstrations, testing and training purposes, please contact us.

Supported by:



www.deutschland-nederland.eu

Further information at: www.h2watt.eu

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