

NEW 4.0: blueprint for the energy system of the future – north German region to go 100% renewable

Germany's energy transition continues to gain momentum. With the growing number of offshore wind parks in the North and Baltic Seas, Germany's north plays a pivotal role here: as an energy supplier, an industrial location, and as a provider of consolidated expertise. With a new model project, the federal states of Hamburg and Schleswig-Holstein are now striving to advance the energy transition through intelligent networks and innovative storage technologies. The model region, which is home to over 4.5 million residents, is aiming to switch entirely to renewables by 2035.

In the automated Container Terminal Altenwerder (CTA) in Hamburg, battery-powered heavy goods vehicles transport containers between ships and storage yards. An intelligent software control system ensures that the removable batteries of these self-propelled vehicles are charged whenever there are high supplies of wind power available from the north German electricity grid. This guarantees efficient and eco-friendly operations of the container terminal. At the same time, this lighthouse project helps relieve the grid systems, which are strained by fluctuating power input from renewable energy sources.

Only a few kilometres away from the bustling CTA there is further proof of the energy transition's progress: the Energy Bunker Wilhelmsburg, a former WW2 flak bunker, has been transformed into a green energy power plant. As part of the Renewable Wilhelmsburg climate protection scheme, the bunker supplies a local heating network with over 3,000 residential units with renewable thermal energy, while at the same time feeding green electricity for around 1,000 households into the power grid. In the future, the Energy Bunker will also be used to convert excess wind electricity into heat.

Combining the energy transition's strengths through digitisation

What works on a small scale is now being advanced on a large scale. For this purpose, around than 60 players from business, science and politics have joined forces in initiating the "NEW 4.0: the energy transition in the north of Germany" project, whereby the number four represents the steps towards the fourth industrial revolution. The project aims to harness the ongoing process of digitisation in industry by means of linking up intelligent networks to facilitate the successful implementation of the energy transition. Project partners include plant manufacturers, energy providers, network operators, transport and industrial companies as well as educational and research institutions, all of which will be contributing their expertise and their problem-solving skills to the project. As part of this showcase project, Hamburg and the adjacent federal state of Schleswig-Holstein will be merged to form an energy model region. By 2035, both federal states will be supplied with 100% safe, reliable renewable electricity and will apply their skills to advancing the energy transition in Northern Germany. The project partners involved are now joining forces in an effort to ensure the entire region's adaptability to future needs.

In purely arithmetical terms, Schleswig-Holstein, Germany's most northern federal state, already generates more wind power than it consumes and has thus increasingly become an exporter of electricity. Hamburg, with almost 1.8 million inhabitants, however, is not only an international

trading hub, but also an important centre of industry. While Hamburg's installed capacity for renewables has doubled to 140 megawatts in recent years, this covers only 3% of local electricity demands and does not suffice to quench the Hamburg Metropolitan Region's energy thirst. As a regional consumption hub with limited space, Hamburg's energy balance can only be improved through additional measures to increase energy efficiency if renewable energy is tapped from the surrounding area as part of a regional project. In recent years, many businesses in the port, but also stakeholders from industry have considerably increased their energy efficiency. Copper manufacturer Aurubis, for instance, has improved its recycling processes, which has led to savings in CO2 emissions of up to 460 tonnes annually. Aircraft manufacturer Airbus places an emphasis on continuous environmental and resource protection, e.g. by means of energy-saving lighting systems and highly efficient combined heat and power plants.

Even today, the region is meeting the 2025 energy transition targets

With a calculated renewable energy share of 40% of the power mix, Hamburg and Schleswig-Holstein have already reached the threshold value that Germany as a whole has committed itself to reaching by 2025 in accordance with the Federal Government's expansion scheme for renewables.

The energy system of the future is aimed at synchronising the imbalance between power generation and supply to ensure that renewable energy is used to the full. Fully integrating renewables means linking up generation, consumption, distribution – and thus also network expansion – and storage through intelligent, comprehensive systems management. As part of this unprecedented concept, new technological solutions will be tested alongside their market-based integration. What is more, during its four-year runtime the project aims to create social acceptance for the energy transition by presenting the project to the region's residents in particular.

During the first project phase, both federal states are therefore planning to showcase how the model region can be supplied with 70% renewable energy in a safe and efficient way until 2025. From 2035, the economic region, which is home to more than 4.5 million residents, will be supplied solely with renewable energies. After the project runtime, the relevant solutions for leveraging the imbalance between generation and supply can be adopted by other regions across Germany and Europe. The findings of the project thus contribute to the successful transformation of energy systems, while at the same time creating new market opportunities for the businesses involved amidst a growing, sustainable energy market.

The demonstration project NEW 4.0 is funded by the Federal Ministry for Economic Affairs within the context of the "Smart Energy Showcases – Digital Agenda for the Energy Transition" (SINTEG) funding programme. Overall, the Federal Government is providing 230 million euro for several projects in five German model regions.

Industry 4.0 – a future trend

Over the coming years, the fourth industrial revolution will substantially alter manufacturing techniques and logistics by linking up production with the digital world. While industry 4.0 is considered a future trend, it is not associated with any specific technology but rather represents

a vision that facilitates the implementation of existing and yet-to-be developed technologies. The intelligent control of production processes will cover all areas of social life and the economy. The goal is to create the “smart factory”, which is characterised by adaptability, resource efficiency, and ergonomics as well as the integration of customers and business partners into business and value creation processes.

Further information available at www.new4-0.de

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