SECTOR COUPLING

Renewable energies: more than just electricity

For the energy transition to be a success, renewables must replace fossil fuels not just in the area of electricity generation. The needs of the other sectors must also be met with green energy. There is still a lack of suitable framework conditions.

According to an analysis by the Centre for Solar Energy and Hydrogen Research Baden-Württemberg (ZSW) and the German Association of Energy and Water Industries (BDEW), renewable energies covered 44 percent of Germany's electricity consumption in the first half of 2019 with 128.5 billion kilowatt hours. At 47.3 billion kilowatt hours (+ 18 percent), onshore wind energy accounted for the largest share of this. In all of 2018, the share of renewables in gross electricity consumption was just under 38 percent.

In contrast, the use of renewable energies in the heating and transport sectors is stagnating. According to figures from the Federal Environment Agency, the share of renewables in the heating sector has been around 14 percent for years. In the transport sector, the share is even lower at 5–6 percent. One thing is clear: if climate protection is to be successful, all sectors must be considered as a whole and decarbonised completely. By means of sector coupling, renewable energies can also be used in the areas of heat, industry and transport, an example of which is e-mobility. Moreover, wind power can be used to split water into oxygen and hydrogen in an "electrolyser". In addition to the transport sector, the latter can also be used in energy-intensive industries such as steel production.

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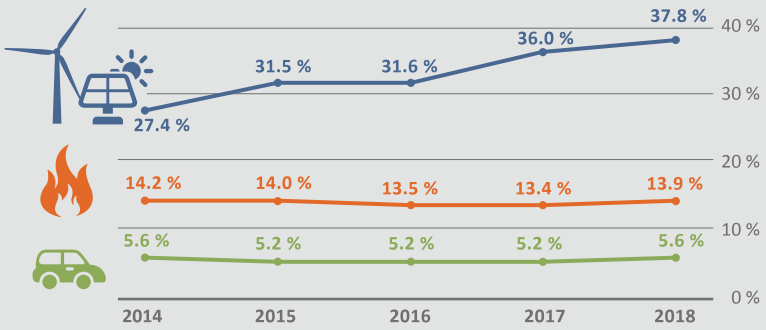
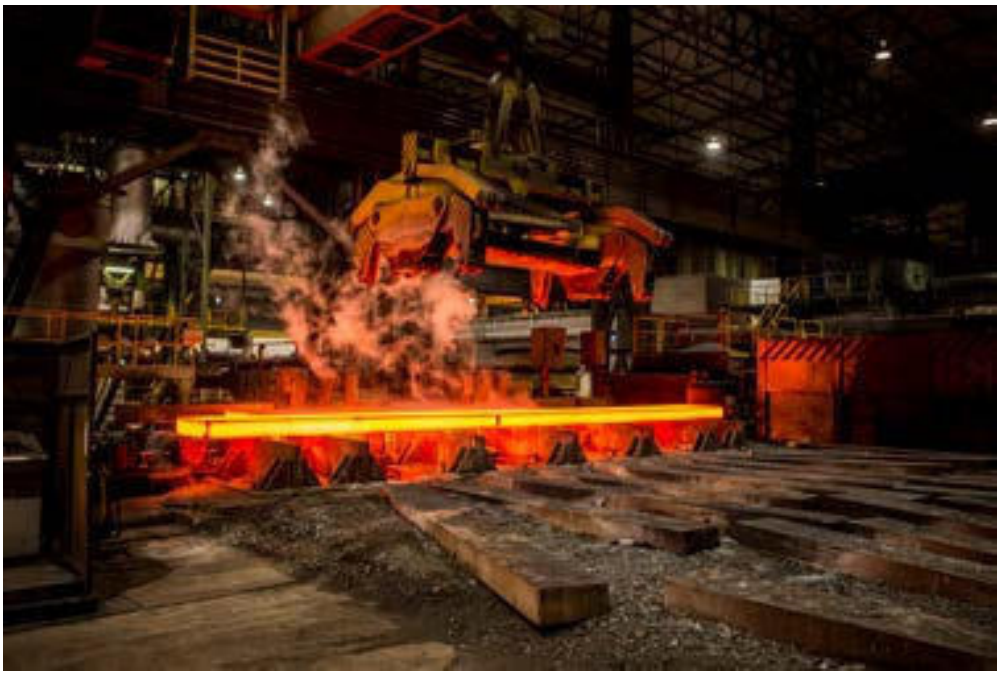
Share of renewables in the electricity, heating and transport sector



Source: AGEE-Stat

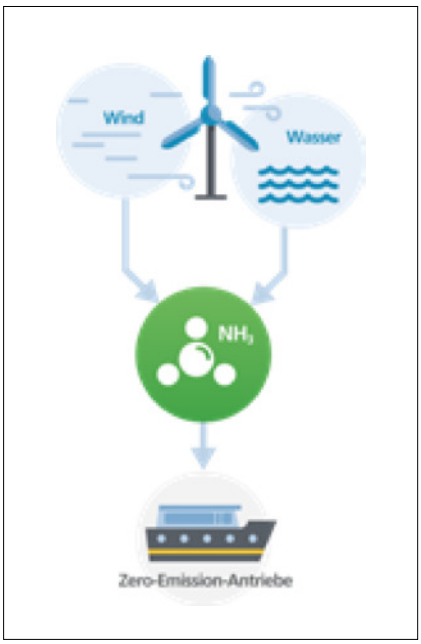


Hot strip mill at
Salzgitter AG.
Photo: Salzgitter AG

Flagship projects for sector coupling

At the end of October 2018, the companies Salzgitter Flachstahl GmbH, Linde AG and Avacon Natur GmbH launched the "Windwasserstoff Salzgitter" project, which aims to generate hydrogen using wind energy. Salzgitter Flachstahl, a steel producer, intends to build and operate the electrolysis plant. The distribution grid operator Avacon, in turn, plans to erect seven wind turbines with a rated capacity of 30 megawatts on the Salzgitter site to supply the electrolyser with electricity. The industrial gas specialist Linde will supply the steel producer with the hydrogen that is generated. The costs of the project amount to around 50 million euros. If everything goes to plan, hydrogen will be generated from wind energy on the site from 2020 onwards in order to "significantly reduce" CO_2 emissions from steel production, as the companies jointly announced.

Wind energy is also expected to make a decisive contribution to the decarbonisation of shipping traffic in the future. For example, with the research project "CAMPFIRE: Fuels from Wind and Water – Energy and Maritime Mobility Transition in the North-East Region", in which researchers are investigating how ammonia generated from wind and water energy can be used as maritime fuel and energy storage. In Schleswig-Holstein, the "West Coast 100 Living Laboratory" was also launched at the end of May.



The cross-sectoral project, which will run for five years, aims to produce green hydrogen from offshore wind energy while also using the waste heat generated in the process. The hydrogen will then be used "both for the production of climate-friendly fuels for aircraft and fed into gas grids", the project partners announced. "In fuel production without fossil fuels, unavoidable CO_2 from regional cement production is used for the production process. What is special and innovative about this living laboratory project is the integration of different material cycles within existing regional infrastructure."

Project Campfire, zero emission ship propulsion.
Grafik: wir-campfire.de
Photo: Aleksey Stemmer – stock.adobe.com

“It is absolutely essential that existing market barriers are finally taken down“

Despite this and a number of other novel approaches, sector coupling is not yet economically viable and therefore not profitable for many players under the current tax and contribution system for the various energy sources. Old wind turbines in particular, which are no longer eligible for subsidies from 2021 (p. 26), could supply cheap electricity for a wide variety of applications. In any case, the governing parties have agreed in their coalition agreement to improve the regulatory framework for sector coupling. However, uncertainty was caused by an amendment to the Grid Expansion Acceleration Act passed at the beginning of April. Among other things, this law is intended to facilitate the construction of Power-to-X systems. Severe criticism was triggered by a change according to which electrolysers were to be charged grid fees, which would have put sector coupling at great risk. The federal government then announced that it would amend the law once again.

The industry has long been calling for the government to speed up: “It is absolutely essential that existing market barriers are finally taken down. We now need a courageous step toward sector coupling, namely for the direct supply of trade and industry and the use of infrastructure in the gas sector, and we definitely need to bridge the gap with regard to mobility”, explains Hermann Albers, President of the German Wind Energy Association.

Power to Gas innovation project: wind hydrogen storage system by Uniper.
Photo: Paul-Langrock.de