Newsletter March 2022

hereby you receive the newsletter of Global Energy Solutions for the month of March 2022.

Our topics:

- **The future of the German energy transition - Interview with Thomas Unnerstall**
- **GES-Study on the production of low-CO2 hydrogen**
- **Facts and Figures: Low CO_2 hydrogen**

Green electricity and hydrogen – the German energy system 2050

Thomas Unnerstall is an energy consultant, author and member of Global Energy Solutions. In this interview, he outlines the future of the German power and energy system until 2050. After the phasing out of German nuclear power plants this year and the planned shutdown of coal-fired power plants, gas-fired power plants would become increasingly important. According to Thomas Unnerstall, they will be the only conventional power plants left on the grid in 2050. He reckons that 80,000 megawatts will be available, about as much as the entire conventional power plant fleet today. The majority of the electricity will

come from renewable energy, about 300,000 to 400,000 megawatts. According to Unnerstall, Germany's gas-fired power plants will be completely converted to (green and blue) hydrogen around 2050. He sees fewer problems in technology and financing, but rather in slow bureaucracy and the lack of skilled workers.

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War in Ukraine

Russia's attack on Ukraine in violation of international law is a historic turning point. After many years of peace, war is once again raging in Europe. The Ukrainian civilian population is suffering, hundreds of thousands are fleeing. The consequences of all this are not foreseeable, neither militarily, nor politically. Energy policy is already reacting, not only German, but also European and global. Ukraine, a country with a population of just over 40 million, has not only significant energy resources, but also substantial agricultural and mineral resources. You can find the most important figures here (in german):

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GES-Study on the production of low-CO2 hydrogen

Global electrolysis capacities are increasing rapidly from very few capacities available today. Europe leads the way in terms of planned projects, followed by Asia and North America. However, there are still considerable hurdles to a broad market ramp-up: high costs for investments and electricity, possible raw material bottlenecks and a lack of standardisation in production. Based on the available figures, there is a global expansion corridor of 93 gigawatts of installed electrolysis capacity by 2030. Due to weather conditions, African countries basically have great potential for the production of hydrogen by means of electrolysis and renewable electricity. However, problems with infrastructure and investment security prevent investors from the private sector from realising projects in countries like Libya, Algeria, Mauritania or Egypt. And the countries themselves often lack the money for their own investments. Read the paper here (in german):

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Facts and Figures: Low CO_2 hydrogen

According to the common hydrogen colour theory, green hydrogen is produced by water electrolysis. Only electricity from renewable sources is used in this process. Grey hydrogen is usually produced from natural gas. It is broken down into hydrogen and CO_2 by heat (steam reforming). In the process, CO_2 is released into the atmosphere. Blue hydrogen is grey hydrogen. However, the CO_2 produced is captured and stored in the process (CCS). Turquoise hydrogen is produced during the thermal

splitting of methane (methane pyrolysis). Instead of CO_2, solid carbon is produced.

GES considers the prevailing colour theory to be problematic. Especially because the protagonists of electrolysis hydrogen want to monopolise the term green. What is important, however, is the largely climate-neutral nature of hydrogen, not its colour. Much of what can be achieved today with expensive green hydrogen will probably be possible and cheaper via blue hydrogen produced from natural gas in combination with CCS.

News in brief

We have updated our website and made it more informative with a clearer design. If you like, take a look!

At this point, some news of the last few weeks will be addressed which, from GES' point of view, are reason for hope because they contain building blocks of a possible global solution and / or could help to develop a realistic view of the challenges ahead of us.

China is now the new offshore wind giant. This is according to the annual report of the World Forum Offshore Wind. Last year, offshore wind turbines with a total capacity of 15.7 gigawatts were installed worldwide, 12.7 GW of which in China alone. In 2021, the German increase was zero.

H2opZee is the name of a project by RWE and the British gas producer Neptune Energy in the North Sea off the Netherlands. A hydrogen production plant with an electrolysis capacity of 300 to 500 megawatts is to be built there by 2030. The electricity will be supplied by offshore wind turbines. The hydrogen will also be produced offshore and brought onshore via an existing gas pipeline.

Negative emissions and CCS is the new big acceptance topic in Germany, said Economics State Secretary Patrick Graichen at the presentation of the first annual report of the Climate Protection Science Platform. Federal Research Minister Bettina Stark-Watzinger took the opportunity to say that technology openness is the most important principle for achieving climate neutrality.

CO_2-Syn is the name of a joint project between science and business that addresses the material utilisation of carbon dioxide (CCU) from cement production. CO_2 is to be used, for example, to develop basic chemicals such as olefins and higher alcohols. The Heidelbergcement Group is also building a large CO_2 capture plant in Norway, with a capacity of 400,000 tonnes of CO_2. See also the GES interview with SCHWENK Zement.

According to research by the International Energy Agency (IEA) global methane emissions are significantly higher than stated by the states - namely around 70 percent. See the GES paper on the background and countermeasures.

Spread the word

Global Energy Solutions develops global solutions and business models on energy, climate and development issues. Our goal is a climate-neutral energy system - with the following elements: green

electricity, green hydrogen, biological as well as technical CO2 recycling, climate-neutral energy sources and fuels - including methanol.
You find our monthly newsletter interesting? Then please recommend it to others or send it to colleagues, friends or acquaintances. Thank you for your support.

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