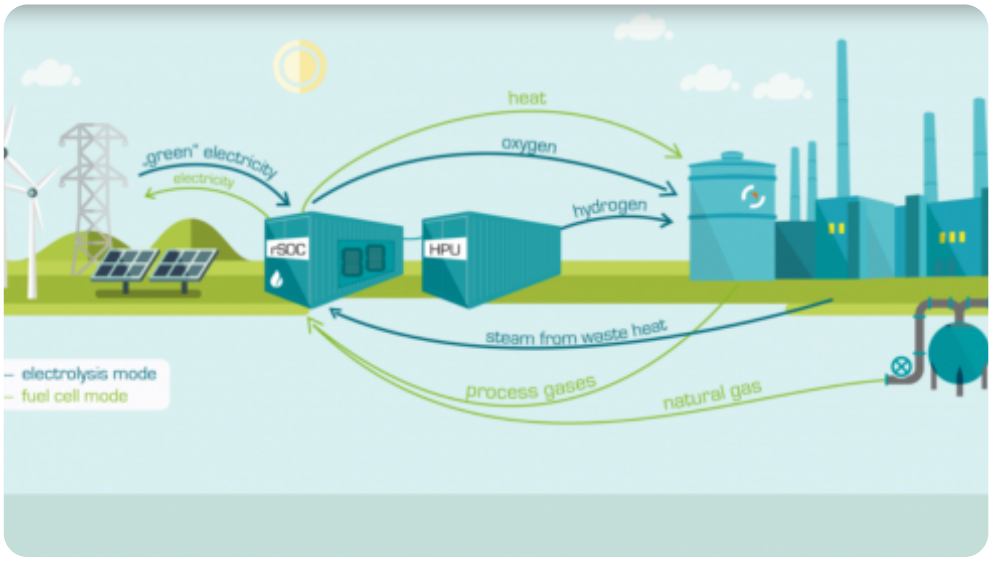
The GrInHy project: Green hydrogen for steelworks



Salzgitter, August, 30th, 2016. Sunfire and seven partners integrate reversible electrolysis into processes at Salzgitter Flachstahl GmbH. SOEC mode facilitates steam electrolysis at 80 percent efficiency / SOFC mode enhances grid stability.

Industrial companies rarely exploit the enormous potential offered by waste heat. The recently initiated GrInHy project – part of the Horizon 2020 programme – aims to kick-start change in this field by integrating reversible electrolysis technology into industrial processes at a steelworks. The concept sees green hydrogen produced efficiently and cost-effectively with the aid of regenerative energy. The recycling of a proportion of the waste heat produced raises the efficiency of steam electrolysis to 80 percent. What is more, the avoidance of CO2 emissions supports the EU Commission's push for a competitive, low-carbon economy.

GrInHy – short for "Green Industrial Hydrogen via reversible high-temperature electrolysis" – involves eight project partners from Germany, Italy, Spain, Finland and the Czech Republic. It is being implemented at Salzgitter Flachstahl GmbH. Sunfire is heading up the development of high-temperature electrolysis – the project's core technology. The aim is for the modular system to operate at a power input of 150 kilowatts and be scalable up to multiple megawatts. The reversible, dual-mode system can be used either as an electrolyzer (for the production of green hydrogen) or as a fuel cell (as a means of grid stabilization).

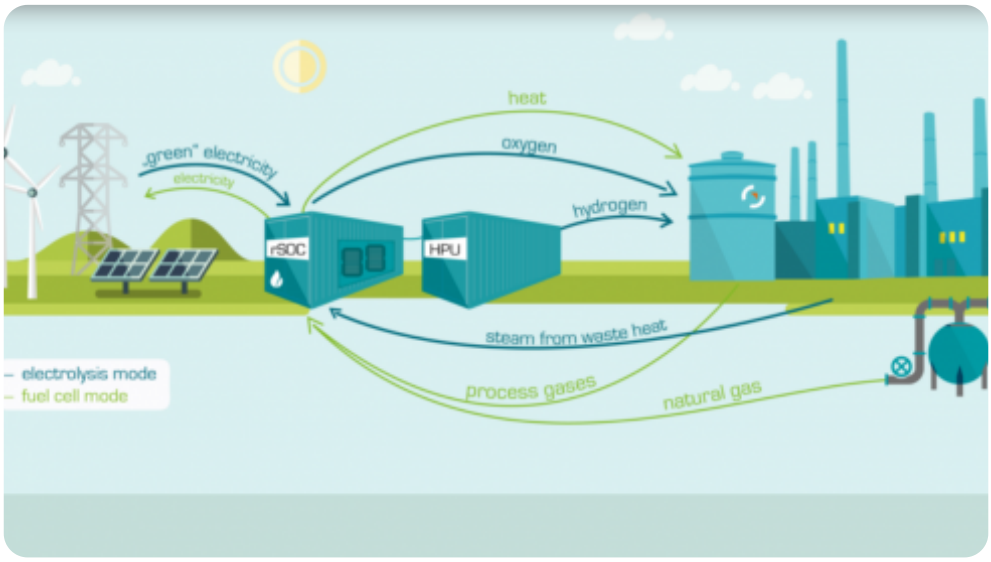
Electrolysis mode sees electricity converted into green hydrogen for steel manufacturing. Steam – and not liquid water – is separated into hydrogen and oxygen. This makes it possible to use waste heat in the form of steam taken straight from the steel manufacturing process, which in turn facilitates high-temperature electrolysis at 80 percent electrical efficiency. When operated in fuel cell mode, the system creates both heat which can be fed back into the steelworks and electricity which can be used for grid stabilization. Hydrogen and natural gas both represent highly flexible fuel options.

One application for which the steelworks in Salzgitter requires hydrogen is the creation of an inert atmosphere (i.e. one in which there is no oxygen). This prevents the oxidation of the steel during the annealing process and, if green hydrogen is used, improves the product's carbon footprint. Project partner Boeing Research & Technology

Europe S.L.U. Spain is developing a hydrogen processing unit which ensures that the green hydrogen meets the specified quality criteria.

42.7 million tons of crude steel were produced in Germany last year. The steel sector may be an important factor in the country's economy, but it is also responsible for a sizeable proportion of domestic CO2 emissions. The 51.4 million tons generated in 2014 represented 6.4 percent of total emissions. Steel producers have used enhanced efficiency in terms of energy, resources and processes to decrease their CO2 emissions by 19 percent since 1990. With tighter regulations on CO2 trading due in 2020, any further reduction in emissions represents a worthwhile contribution to not only the medium-term survival of the German steel industry, but also the fulfilment of the EU's sector-specific climate protection goals by 2050.

Steelworks are not the only consumers who stand to benefit from reversible electrolysis technology. In the solar industry, for example, hydrogen is required as a reaction gas in combination with trichlorosilane during silicon production. In the chemicals sector, on the other hand, hydrogen is the decisive molecule in a range of processes including the production of ammonia, methanol and petroleum-based products. In the case of float glass production, hydrogen is used to create a safe working atmosphere. Hydrogen is also required for the cooling of large generators in the electricity sector.



This project has received funding from the Fuel Cells and Hydrogen 2 Joint Undertaking under grant agreement No 700300. This Joint Undertaking receives support from the European Union's Horizon 2020 research and innovation programme and Hydrogen Europe and N.ERGHY.

In addition to Salzgitter Flachstahl, BR&T-E and Sunfire, the following partners are also involved in the project: Salzgitter Mannesmann Forschung GmbH, VTT Technical Research Centre of Finland, EIFER – European Institute for Energy Research, Institute of Physics of Materials, Academy of Sciences of the Czech Republic and Politecnico di Torino.

More about GrInHy

About Sunfire

Sunfire is a global leader in the production of industrial electrolyzers based on pressurized alkaline and solid oxide (SOEC) technologies. With its electrolysis solutions, Sunfire is addressing a key challenge of today's energy system: Providing renewable hydrogen and syngas as climate-neutral substitutes for fossil energy. Sunfire's innovative and proven electrolysis technology enables the transformation of carbon-intensive industries that are currently dependent on fossil-based oil, gas, or coal. The company employs more than 650 people located in Germany and Switzerland.

For more information visit www.sunfire.de

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