

Hydrogen as an opportunity for energy-intensive industry

Green hydrogen is considered a key technology for decarbonizing industry. It can store energy, be converted into electricity, and replace crude oil and natural gas in production – without emitting greenhouse gases. Hydrogen therefore provides all energy-intensive industrial sectors as well as those with high process-related emissions the opportunity to reduce CO₂ emissions.

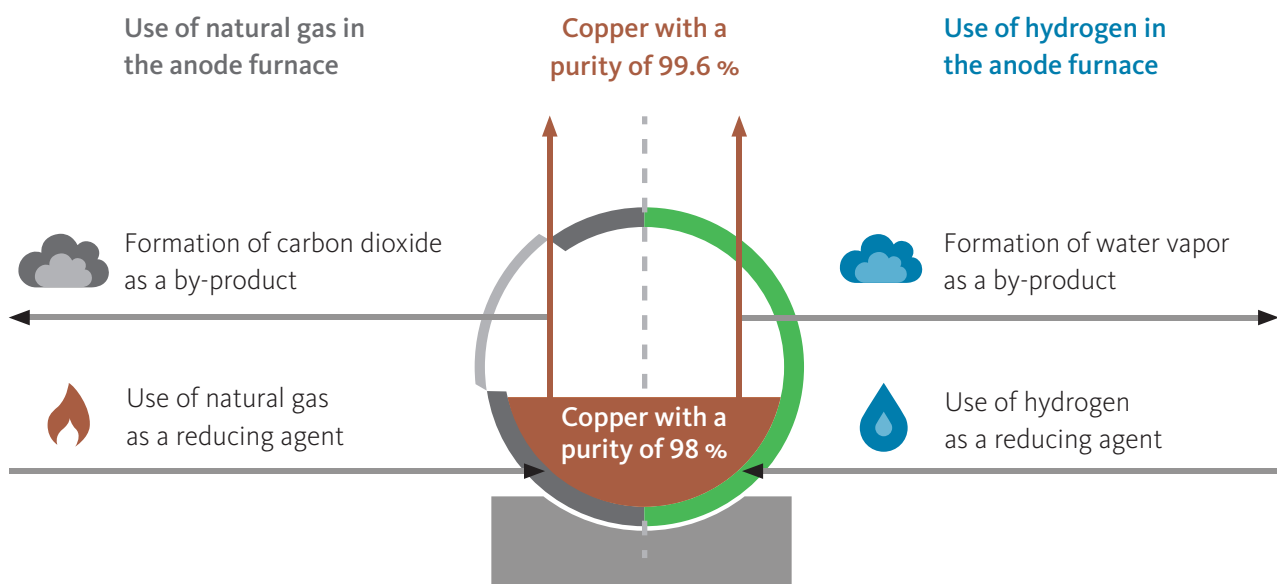
Aurubis has long been working on using energy more effectively and efficiently. Aurubis' CO₂ footprint is already considerably lower than the industry average: Today, Aurubis is emitting – compared to the average of all copper smelters – about half of the global CO₂ footprint per ton of copper output. With the existing production processes, we are now at the limit of what is physically possible. In this context, innovations related to using hydrogen could enable significant CO₂ reductions.

Our goal:

to reduce CO₂  Initial reduction potential in Hamburg:
6,200 t/year

Potential in copper production

Aurubis has been researching how hydrogen can be efficiently integrated into its production processes for several years. We currently see the greatest potential for hydrogen in the anode furnace. Here, hydrogen could replace natural gas as a reducing agent to increase the purity of the copper. The hydrogen reacts with the copper and dissolves oxygen from the copper oxide, forming only water vapor.





Hydrogen does not exist in its pure form in nature but has to be produced by means of electrolysis. Water is split into oxygen and hydrogen using a very high amount of energy. If electricity from renewable energies is used, the hydrogen is CO₂-free and is labeled "green."

Opportunities and challenges at a glance



Climate-friendly: When it is burned, there are no greenhouse gases, but water vapor. It's therefore considered THE possibility for decarbonizing industry.



Available: No other element occurs more often in the universe – especially as an integral part of water.



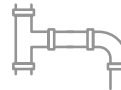
Storable: Hydrogen can be produced in a decentralized manner and transported frozen or in a compressed form. It can then be converted to gas again on site.



Cost: Hydrogen based on renewable energy is still around six times more expensive than fossil gas, according to estimates from the International Energy Agency (IEA).



Capacity: It is still unclear how Germany can meet carbon-neutral industry's enormous demand for green hydrogen. Alternative options are hydrogen imports or manufacturing hydrogen from natural gas.



Infrastructure: Infrastructure has to be expanded for the use of hydrogen. This requires large investments and is a joint task of industry and the public.

Industry and politics join forces

Hydrogen offers the huge opportunity to transform energy-intensive industry sustainably and thus keep it a permanent, central economic factor in Germany. The integration of hydrogen into industrial production, however, requires significant investment in the years to come, and it will determine the economic course for many decades. Industry therefore needs a clear political framework:

- » **Funding of investment and operating costs** to make hydrogen competitive,
- » **Technology-neutral promotion** of CO₂-saving hydrogen production,
- » **Expansion of the infrastructure** (electrolyzers and pipelines for hydrogen only),
- » **Planning security and carbon leakage protection** as a basis for investment, and
- » Recognition of the fact that **hydrogen imports** will remain necessary in the long run.

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