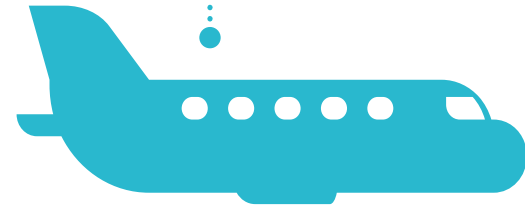


# What are the opportunities / risks of using hydrogen?

The use of hydrogen as a fuel can advance and accelerate the energy transition in Germany

## In the long-term

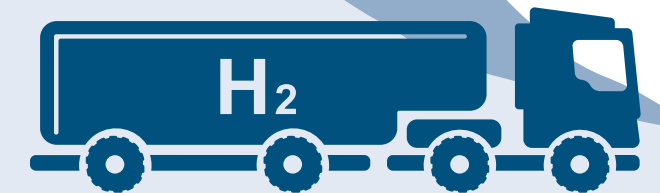
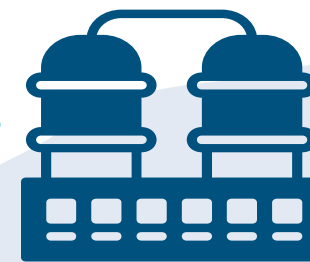
e.g. in shipping or aviation, the market for green hydrogen is estimated to be **worth about US\$1 trillion by 2050**. The Institute of the German Economy has also calculated that the manufacture of hydrogen electrolyzers could **generate about €27 billion** and create about **350,000 new jobs**; manufacturing would generate about **€11.7 billion**, the indirect value-added effect on suppliers would be about **€11.8 billion** and about **€3.5 billion** would be generated through consumer spending.



## Green hydrogen

The production of green hydrogen produces a **climate-neutral fuel** that is easy to store but it comes with **significant efficiency losses** (efficiency <50%). Such losses can be economically justified in certain circumstances, e.g. where the green electricity generated could not be used or when wind turbines had to be switched off even though the wind was blowing.

Hydrogen could be **an alternative for conventional combustion engines** (Verbrennungsmotoren) as engines could be powered with climate-friendly fuels (e-fuels) made from green hydrogen.



## General Transport

At €9.50 per kilogramme, **hydrogen is still too expensive for use in general transport**, not least because the required infrastructure is lacking (i.e. network of filling stations) and the technologies required to be used are very expensive; production costs are currently about €5 per kilogramme. **Electrolysis also requires rare and expensive metal catalysts** such as platinum and iridium to work efficiently.



## Africa and Europe

Green hydrogen offers **opportunities for African energy infrastructure** and **enables Europe to achieve climate neutrality** through imports from Africa where wind and sun are abundant resources. Germany has already announced that it will make cooperation with Africa on green hydrogen a priority for the second half of 2020 when Germany holds the European Union (EU) presidency. In February 2020, hydrogen partnerships were launched between Germany and 15 West African countries. In addition, **the first industrial hydrogen plant is being developed in Morocco**, which will not only create new jobs in the country, but will also save 100,000 tonnes of CO2 annually.

## The energy carrier of the future

In the long term, **hydrogen will have to be the energy carrier of the future** if industries with otherwise high carbon dioxide (CO2) emissions, such as the chemical and steel industries, are to remain in Germany. **CO2 pricing may become the central guiding instrument** for the attractiveness of the production of green hydrogen, which as a climate-neutral energy source is also becoming **increasingly important for investors** who are looking for 'clean' investments.

