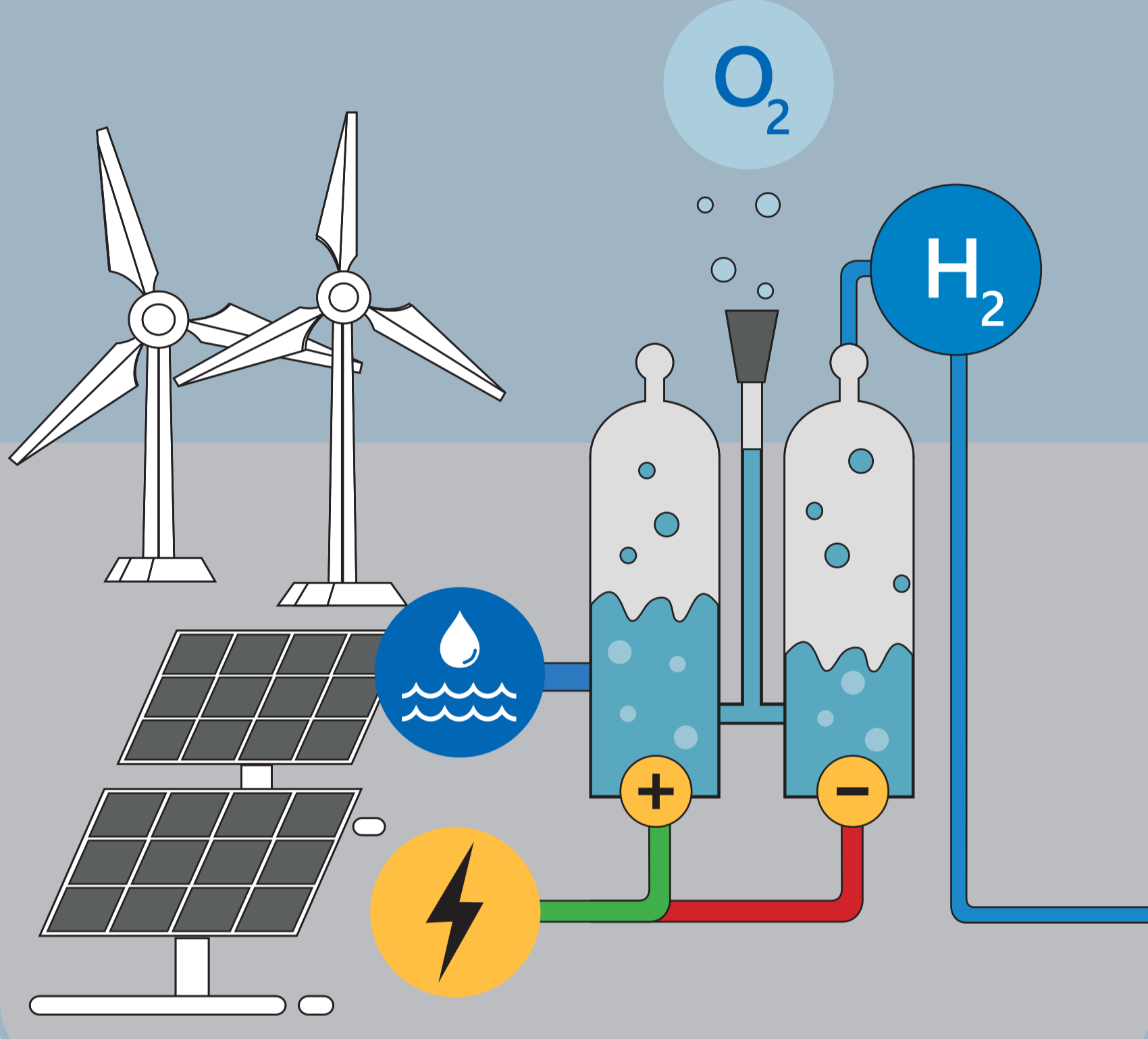


Importance of hydrogen for the energy transition

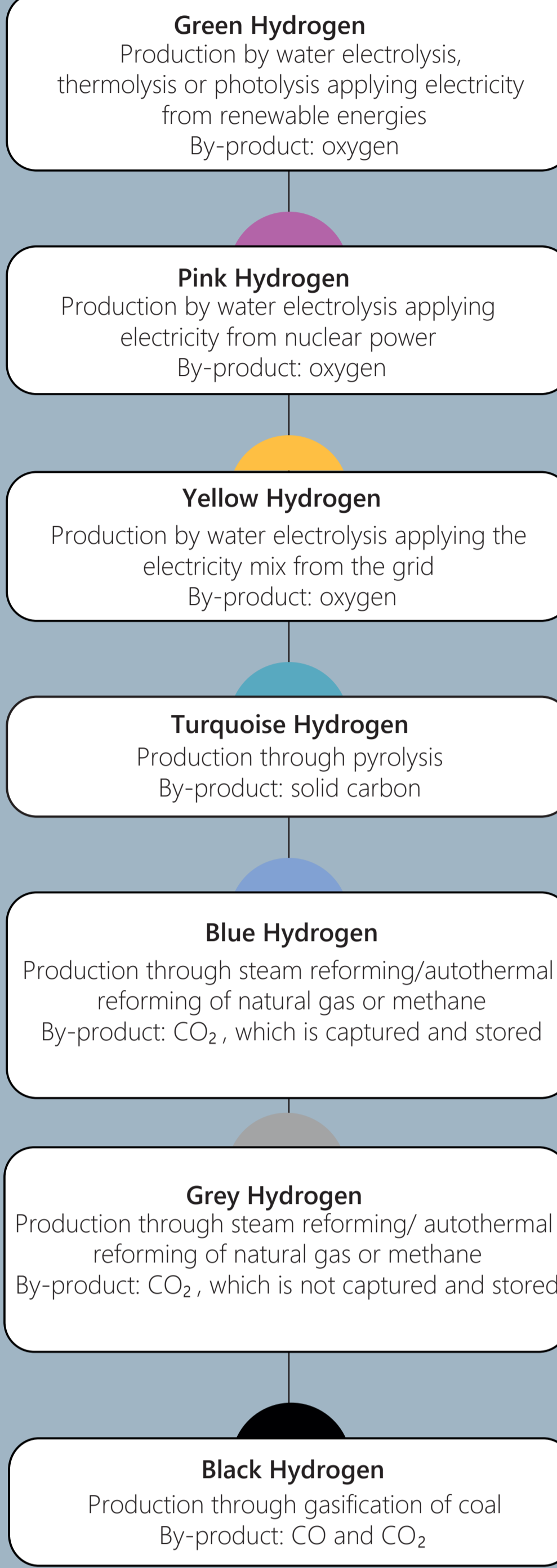
Hydrogen (H₂) is the most common, smallest and lightest element in our universe. On Earth, the colourless and odourless gas occurs almost exclusively in bonded form and is found in many compounds, e.g. in water (H₂O). With the application of energy, hydrogen can be extracted from hydrogen-containing compounds and can be employed in a wide variety of areas.

In our future energy system, which relies on renewable energies, hydrogen will therefore play a key role. As an important link, hydrogen enables the utilisation of volatile renewable wind and solar energy: by converting and storing the irregularly generated green electricity in the form of hydrogen. The latter can be applied downstream when needed.

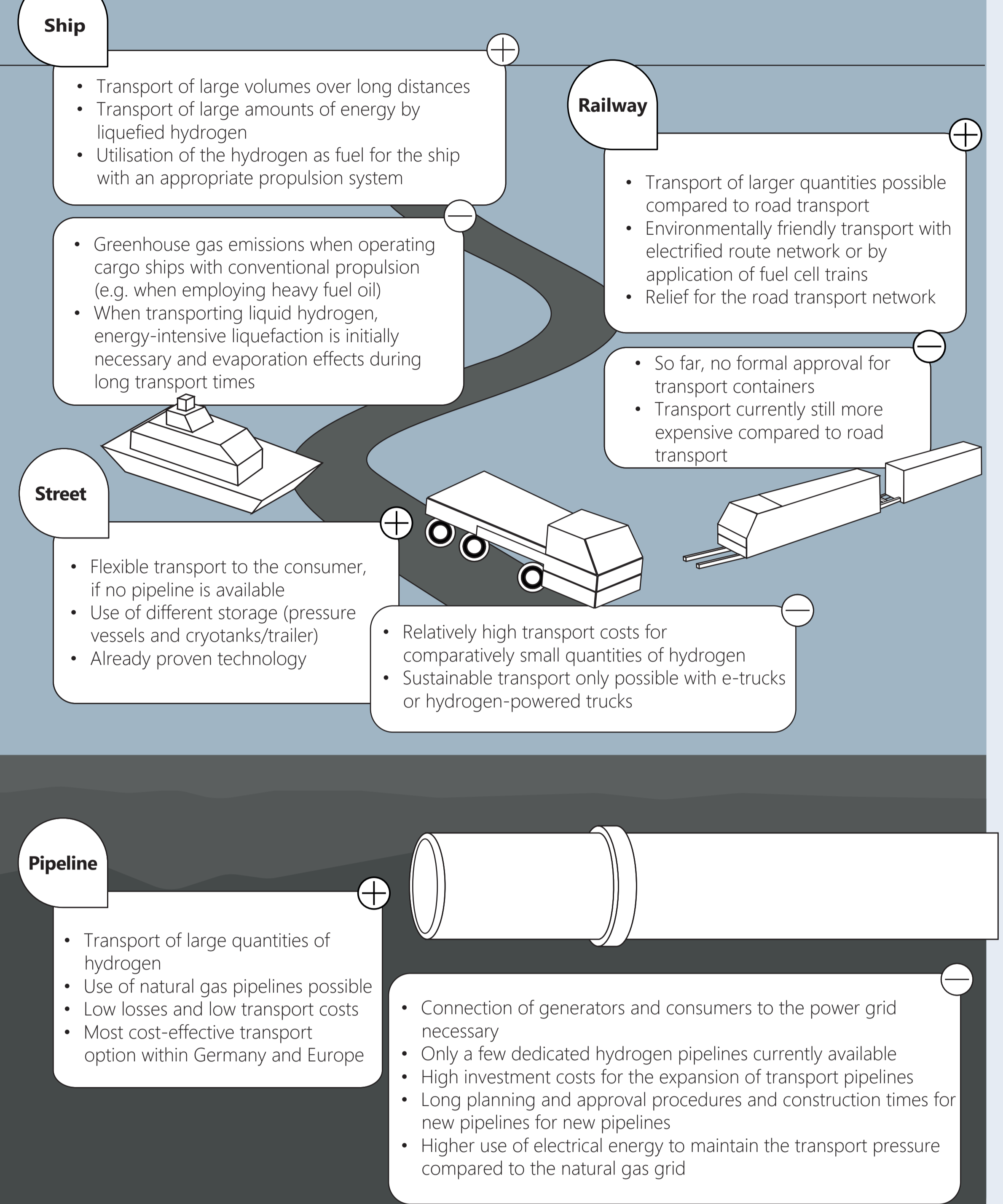
In the future, the implementation of green hydrogen will also allow those areas to be decarbonised that are currently still dependent on fossil fuels and cannot be directly electrified. These include the steel and chemical industries as well as parts of the transport and heating sectors.



Colour theory hydrogen



Advantages and disadvantages of the individual transport routes for hydrogen



Strenghts

With approx. 97 % large share of locally installed capacity for electricity generation from renewable energies

Strengthening hydrogen mobility and the entire hydrogen value chain in the Northwest through Hyways for Future (BMDV funding programme)

Many interested and partly already active local players in the hydrogen sector

Natural occurrence of salt and clay rock layers in the region

German Offshore Industry Centre (DOIIZ)

Good transport system to Cuxhaven as well as well-developed public transport sector and connection to the rail network

Deep-water harbour with developed port infrastructure and industrial area close to the harbour with further open spaces

Construction of a hydrogen on land filling station for heavy goods traffic (H₂Move project)



Opportunities

Exploiting the natural rock strata to build cavern storage facilities for large-volume hydrogen storage

Establishing companies in the value chain of the offshore hydrogen industry

Conversion of buses and trains to hydrogen drive

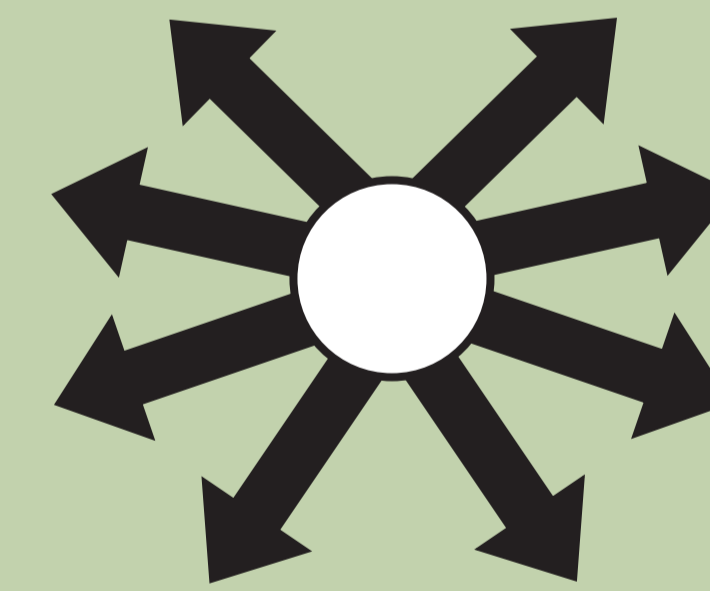
Establishment of a bunkering station for green marine fuels and thus green maritime transport

Existing hydrogen projects motivate further market participants to convert their logistics or production to hydrogen

Medium-term: Hydrogen production in the northern sea and landfill in Cuxhaven

Ship imports of green hydrogen

Further processing of hydrogen into other hydrogen-based energy carriers such as ammonia or methanol



Recommended actions

1. Secure political backing in the region

- Establish a common vision with local stakeholders and politics
- Provide human resources, e.g. in the form of a site manager for hydrogen
- Examine the possibility of political incentive options for companies in the region

2. Consolidate and expand the German Offshore Industry Centre and the port as a basic building block

- Expanding the infrastructure on site - developing and connecting the land
- Contacting local companies to identify further requirements
- Establish a round table between electricity producers, grid operators and large-scale consumers or prospective hydrogen producers
- Continuation of the active approach incl. advertising of further supplier companies in the offshore sector
- Creation of political incentives for settlement
- Strengthening the training of skilled workers on site and establishing a knowledge centre

5. Construction of large storage facilities for hydrogen or a bunker station for hydrogen and its synthesis products

- Assessment of the surrounding salt and clay rock layers as prospective cavern storage facilities for hydrogen
- Establish contact with the stakeholders of the offshore hydrogen pipeline for consideration of a stub pipeline
- Planning of a bunker station

3. Promote the regional hydrogen economy in Cuxhaven by enhancing the mobility sector

- Hydrogen demand analysis and forecast in the mobility sector, both on land and on water, depending on the hydrogen vehicle ramp-up
- Expansion of hydrogen production capacity
- Expansion of the filling station infrastructure and conversion of the fleets or introduction of hydrogen-powered ferry connections

4. Establishment of industry and provision of hydrogen-based synthesis products - especially as maritime fuel

- Identification and analysis of stakeholders in the methanol/ammonia sector
- Establishing contacts with stakeholders and discussing the vision of a hydrogen processing industry in Cuxhaven
- Identification of initial requirements of the stakeholders
- Examination of the open spaces in terms of licensing law with regard to the establishment of an ammonia and methanol production

