

Green ammonia

What is ammonia and what is it used for?

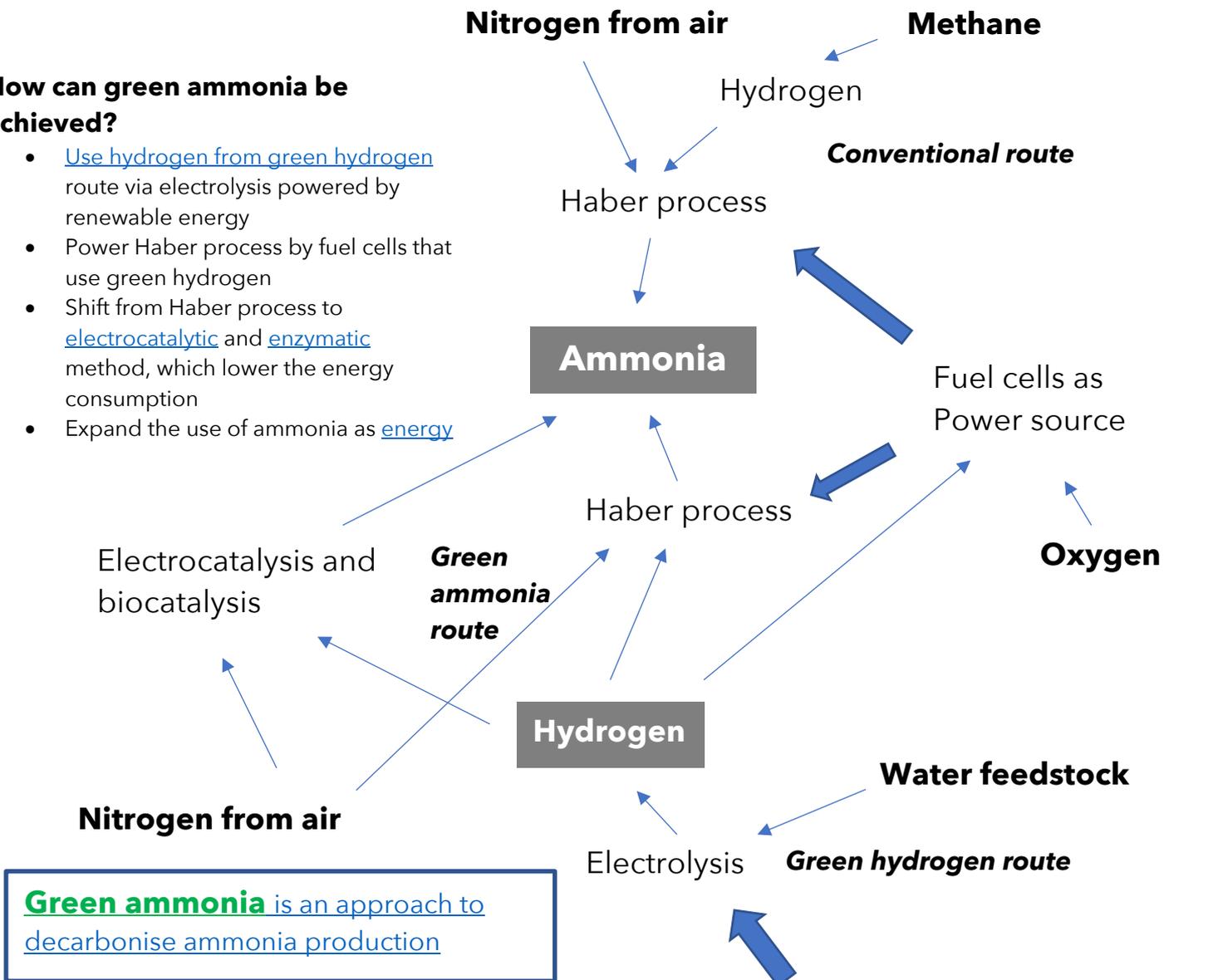
- [Ammonia \(NH₃\)](#) is colourless and pungent gas
- Base material for the [synthesis of many important nitrogen compounds](#)
- The [major use](#) is for [fertiliser production](#)
- [Other uses](#) are in textile industry, petroleum refining and catalysis
- Ammonia is a [hydrogen energy carrier](#) and can be used in a [fuel cell to generate electricity](#)

What are the issues of the current ammonia production?

- Produced via [Haber process](#) $N_2 + 3H_2 \rightarrow 2NH_3$ using catalyst at high temperature and pressure
- [Hydrogen comes from steam methane reforming, which produces 90% CO₂](#)
- The production process consumes so much energy, [emits more CO₂](#) than other chemical industries, and [contributes to 1.8% of global CO₂ emission](#)

How can green ammonia be achieved?

- [Use hydrogen from green hydrogen](#) route via electrolysis powered by renewable energy
- Power Haber process by fuel cells that use green hydrogen
- Shift from Haber process to [electrocatalytic](#) and [enzymatic](#) method, which lower the energy consumption
- Expand the use of ammonia as [energy](#)



What are the challenges of green ammonia?

- Limited availability of green hydrogen, making the process is overall expensive
- Electrocatalytic and biocatalytic reduction of ammonia is still in [laboratory scale](#)

Renewable energy sources

- Solar cells
- Wind turbine
- Hydropower
- Biomass