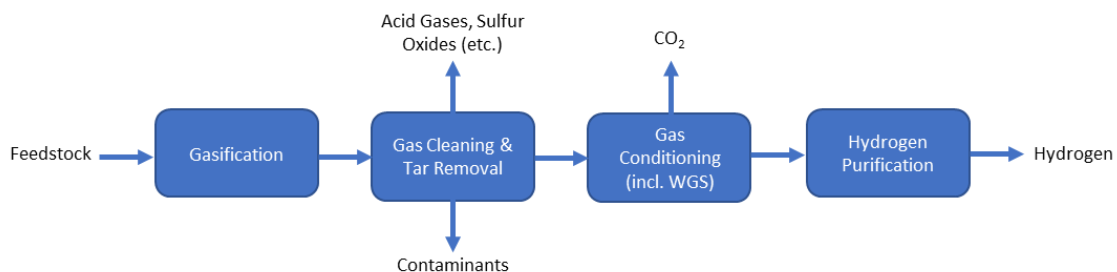




# Biomass gasification for hydrogen production

Low-emission hydrogen offers a variety of ways to reduce carbon emissions in a wide range of different sectors including long-distance transports, chemicals, and heavy process industry - i.e., so-called hard-to-abate sectors, sectors that are difficult to directly electrify. Biomass gasification is well-suited to produce low-emission hydrogen.



The producer gas can after conventional gas cleaning and conditioning steps, be upgraded to a high-purity hydrogen stream via Pressure Swing Adsorption (PSA). For every ton of dry biomass gasified, about 0.1 ton of hydrogen can be produced together with 1.5-2 ton of CO<sub>2</sub>, i.e., 15-20 kg CO<sub>2</sub> per kg of hydrogen.

- Hydrogen produced via biomass gasification is fossil-free, can be done in large-scale and is non-weather dependent.
- The CO<sub>2</sub> is separated into a concentrated residual stream as an integral part of the gasification process providing a favorable source for CO<sub>2</sub> capture and storage, thus obtaining negative CO<sub>2</sub> emissions.
- The process can generate other valuable products than only hydrogen, such as methane, biochar and food-grade CO<sub>2</sub>.

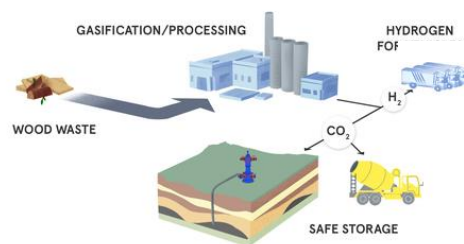


Figure from Mote (modified)

- Cost: 2.7 to 4 € per kg hydrogen at a biomass price of 20 € per MWh
- Carbon footprint: 0.75 kg-CO<sub>2eq</sub> per kg-H<sub>2</sub> to 2.1 kg-CO<sub>2eq</sub> per kg-H<sub>2</sub> (w.o CCS) (Lou et.al, 2023)

Lou et. al (2023). The Potential Role of Biohydrogen in Creating a Net-Zero World, Center on Global Energy Policy at Columbia Univ.