Measuring hydrogen: which units?

The unit of measurement for hydrogen varies according to the context and use:

- When it is distributed at petrol stations, the fill-up is invoiced in **kg**
- When it is delivered in cylinders for industry or the tertiary sector, its volume is expressed in **liters**
- When it is used as fuel (industrial furnace or boiler), consumption is in **MWh**
- When it is transported by pipeline, the flow rate is expressed in **m^3/h**

Mass and Volume

The mass - expressed in kg - is the unit of reference, as it is invariable and reflects the quantity of matter. To calculate the volume (cubic meter or m^3), the pressure and temperature conditions must be specified. When it is gaseous, the volume occupied varies with temperature or pressure.

Hydrogen Gas

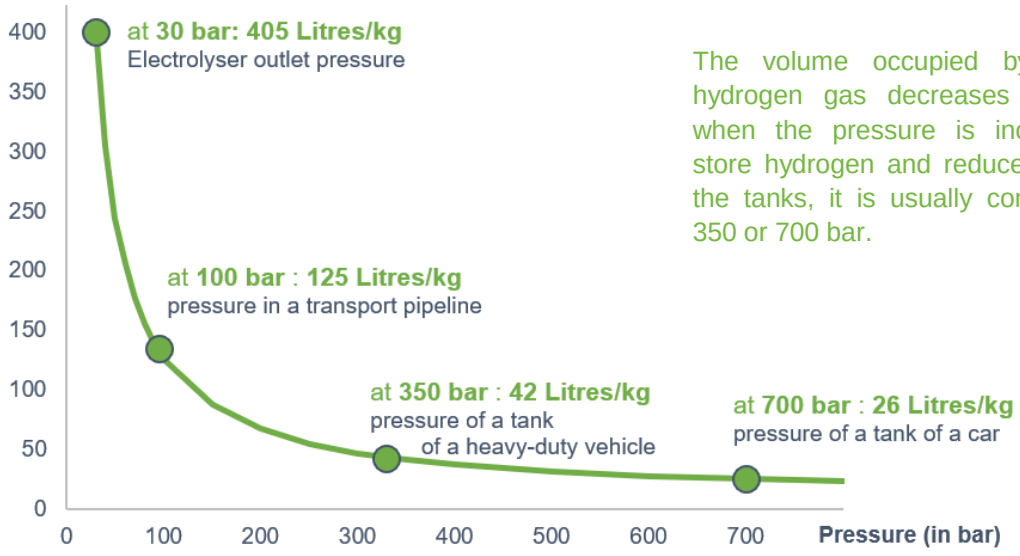
1 kg = 11,74 Nm^3 (1,013 bar, 15°C)

1 Nm^3 (1,013 bar, 15°C) **= 0,0852 kg**

To avoid this constraint, the volume can be expressed under normal conditions, i.e. at atmospheric pressure (1.013 bar) and a temperature of 0°C or 15°C depending on the standards. This is referred to as normo-cubic meters, symbolized as Nm^3 or $m^3(n)$.

At atmospheric pressure, hydrogen is gaseous. For it to become liquid, its temperature must be below -252.8°C. It then occupies a much smaller volume.

Influence of pressure - Volume occupied by 1 kg of hydrogen



The volume occupied by 1 kg of hydrogen gas decreases significantly when the pressure is increased. To store hydrogen and reduce the size of the tanks, it is usually compressed to 350 or 700 bar.

Energy

Calorific value is a property that allows the energy contained in 1 kg of hydrogen to be measured and thus compared with other fuels. It is expressed in kWh.

Energy contained in 1 kg of H_2

33,33 kWh/kg (PCI)

H2V invest, develops and builds large scale renewable hydrogen production plants by electrolysis of water from renewable electricity. H2V is a subsidiary of the French company Samfi Invest, which covers the entire renewable hydrogen value chain: wind farms with Samwind, photovoltaic facilities with Samsolar, production of renewable hydrogen with H2V, distribution stations with Distry and large fleet of trucks with Malherbe Transports, some of which will run on renewable hydrogen in 2023.