

Switzerland's first public hydrogen filling station

At the site of Coop Mineraloel AG's existing filling station in Hunzenschwil, Coop is opening the first public hydrogen filling station in Switzerland purely relying on renewable hydrogen.

Worldwide there currently are already over 220 public operational hydrogen filling stations. As of mid-2016, Germany alone already had 33 operational hydrogen filling stations and will be gradually increasing its network to around 400 over the next few years. The expanding hydrogen network in many other European countries will soon allow to cross Europe in a fuel cell car. This development clearly documents today's advanced status of fuel cell technology for mobility. Furthermore, efforts to reduce CO₂ emissions have driven filling station operators to include and market alternative and climate-neutral fuels in their offering.

Hydrogen offers the same convenience as modern combustion engines (range, fuelling time etc.) without any CO₂ and other exhaust fumes polluting the environment. Coop Mineraloel AG wants to ensure that its customers are able to buy hydrogen at a price per Km comparable to fossil fuels.

By opening the first public hydrogen filling station Coop is taking the first step towards readying its network for the environmental demands of the future. Coop will be extending the availability of hydrogen to other filling stations. Initially Coop's first hydrogen-fuelled truck and another 12 Coop fuel cell cars will be the main customers for the hydrogen. The filling station of course is also available to all other fuel cell customers.

The filling station part of the hydrogen system

As hydrogen is a very lightweight gas. It is always transported and stored in the Coop system under high pressure. At the production stage the output pressure is 30bar. It is then compressed by a special compressor to 200bar for transport. The hydrogen trailer must be able to unload the hydrogen as quickly as possible; this is why the hydrogen is transferred to the 50-bar large tank at the filling station where it is then compressed to 950bar in high-pressure tanks. The fuelling process is time sensitive. Therefore hydrogen is transferred from the high-pressure tanks to the 700bar tanks of hydrogen cars.

Hydrogen compression in high-pressure tanks

Compressing the hydrogen to 950bar presents the biggest technical challenge at the filling station. Compressor failure is the most common cause of operational failures at existing hydrogen filling stations around the world. Therefore Coop Mineraloel AG has chosen a highly reliable and innovative compressor made by Linde.

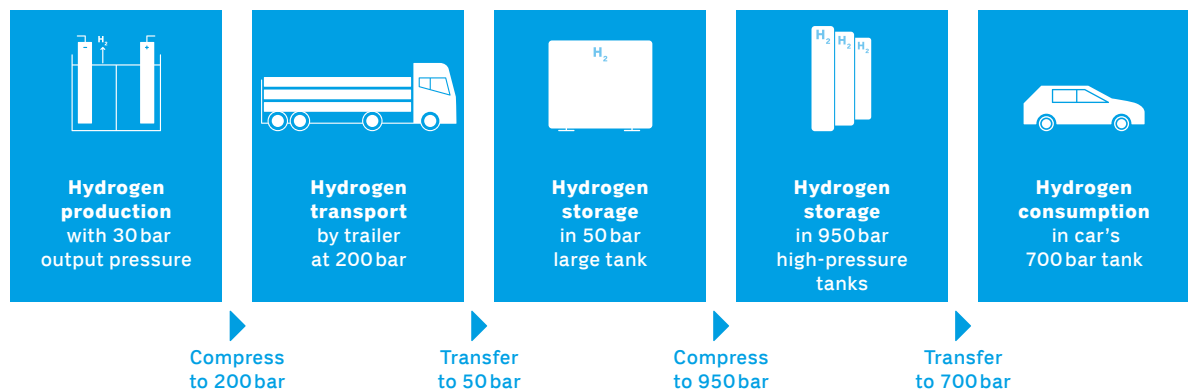
Fuel cell cars are fuelled at 700bar and hydrogen trucks and buses are usually fuelled at 350bar. The Coop filling station in Hunzenschwil offers both pressure levels. The storage bottles for 700bar fuelling are housed in the same container as the compressor while those for 350bar fuelling are placed in a separate container.

Dispenser and fuelling process

Both the 350bar fuelling system for trucks and buses and the system for cars are integrated into the dispenser. Trucks and cars can be fuelled at the same time.

Like conventional filling stations, the gaseous hydrogen is transferred to the vehicle via a pump nozzle. This process takes just a few moments and is comparable to conventional fossil fuels (petrol and diesel). For cars (700bar), the hydrogen is pre-cooled during the fuelling process through a cooler to -40°C.

Coop hydrogen process and pressure levels up to and including fuelling



Coop Pronto filling station in Hunzenschwil offering hydrogen



Linde's Ionic container (IC 90)



Coop hydrogen dispenser

Technical data

Hydrogen filling station capacity

Hydrogen volume	
max. at filling station	388 kg hydrogen
Number of fuelling sessions in succession, car	12 x 3 kg in 2'
	6 x 6 kg in 3'
	Standing time approx. 10'
Number of fuelling sessions in succession, truck	4 x 15 kg in 4'
	2 x 30 kg in 7'
	Standing time approx. 12'
Time take to fill all tanks	2 hours

High pressure tank

Bottles 700 bar	18 units, 3 sections
Fuelling	scalable
Bottles 350 bar	39 units
Fuelling	scalable
Storage	In 2 20 foot containers, 6 m, with compressor

Compressor

Manufacturer	Linde
Type	5-stage ionic compressor, IC90
Output pressure	7 bar
Final pressure	950 bar
Consumption of compressor 7-900 bar	2.7 kWh/kg
Storage in	20 foot containers, 6 m

Medium pressure tank

Manufacturer	Ludwig Elkuch AG
Contents	87 m ³
Tank length	17.7 m
Tank diameter	3 m
Weight	40 to
H ₂ capacity	310 kg
Storage	Underground