Regionalverkehr Köln, Gemany

Challenges and Lessons Learned

- Early development of hydrogen refueling station (HRS) capacity was essential
- Mobile HRS enable quick deployment, but are less efficient than stationary HRS regarding time and pressure
- Stationary HRS are schedulable, but have high maintenance costs and depend on the HRS supplier
- Using liquid hydrogen enables large capacity in storage and transport and has low compression effort, but lots of energy needed for liquefaction
- Hydrogen production on site is lower costs, but higher maintenance

Best practices

- Implementing a combination of onsite and public, stationary and mobile HRS enabled short term development of HRS capacity and schedulable hydrogen supply
- Combination of BEB for short city routes and FCEB for long distance and more challenging routes

12 Mio kilometers driven

1.000 t of hydrogen used

Start of operation	Number of buses	Type of bus	Type of fuel cell
2014	2	A330 FC VanHool	FCveloCity®-HD6 (150kW)
2020	35	A330 FC VanHool	FCveloCity®-HD85 (85kW)
2021/2022	15	Solaris Urbino 12 hydrogen	FCmove®-HD (70kW)
2024	30	Solaris Urbino 12 hydrogen	FCmove®-HD (70kW)
2024/25	78	Solaris Urbino 18 hydrogen (18) Solaris Urbino 12 hydrogen (22) Wrightbus Kite Hydroliner (38)	FCmove®-HD+ (100kW) FCmove®-HD (70kW) FCmove®-HD (70kW)