HYDROGEN ACTIVITIES OF TOTAL GERMANY

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In 2002 TD started H₂ activities with a first station delivering gaseous hydrogen to the BVG Busses (Berlin public transports)

HYDROGEN ACTIVITIES OF TOTAL DEUTSCHLAND (TD): LONG-TERM INVOLVEMENT WITH CLEAR OBJECTIVES

- Analysis and evaluation of distribution technologies and operation of Hydrogen Refueling Stations (HRS)
  - Monitor technology
  - Contribute to technical improvements
  - Gain experience through day-by-day operation of HRS to increase internal know-how
  - Evaluate cost structure (CAPEX and OPEX)
  - Study consumers behavior (customers expectation)
- Create and/or improve relationships with automobile OEMs
HYDROGEN EXPERIENCE FOR MORE THAN 10 YEARS

**First TOTAL H₂ station**
Test unit supplying the first H₂ busses in Berlin in a bus depot of the Berlin public transport (BVG)

**First public H₂ station of TOTAL combined with a conventional station**
First self-service station for cars and buses; the world’s most frequented HRS

**Shared investment with Statoil and Linde**
TOTAL Station with on-site electrolyzer communicational hot-spot for hydrogen

**H₂-Upgrade of an existing station**
Test for subsequent integration of H₂ during conventional site is fully operational

**HRS fully integrated in conventional station with new corporate design**
Gas station offers all kind of products (CNG, conventional fuels, LPG, H₂)
EXPERIENCE WITH PERMISSION PROCESS OF TOTAL HRS
TOTAL-HRS: HEIDESTRASSE IN BERLIN, GERMANY

HRS
H₂ @ 700bar for cars

Heidestraße

Conventional station
CNG, LPG, Diesel, Gasoline
APPLICATION

▪ Company guidelines (e.g. filling procedure)
▪ CEP-Commissioning of refueling protocol (SAE J2601)
▪ Training of operator
▪ Customer training
▪ …

OPERATION

▪ Expert’s opinion (Technical Inspection Agency)
▪ CE certificate for HRS container
▪ Construction (including fire protection plan)
▪ Operation
▪ Additional (e.g. Water Resources Law)

INSTALLATION

▪ Approval for construction
▪ Approval for operation
▪ Explosion protection (ATEX, including documentation)
▪ Additional company requirments (e.g. crash sensor in Dispenser)
▪ Commissioning certificate (Technical Inspection Agency)
▪ Commissioning by local authorities
▪ Involvement of fire brigade
EXCURSE/ADDITIONAL: EXISTING INTERNATIONAL STANDARDS AND REFERENCES

- EC-wide regulation and permitting framework
  - ...

- Gaseous hydrogen refueling stations
  - ISO/TS 20100 (IS in preparation)

- Dispenser testing/acceptance
  - ISO 20100 IS in preparation
  - CSA NGV 4.1 in preparation

- Hydrogen production
  - ISO 22734 Electrolysers
  - ISO 16110 Fuel processing technologies

- Stationary storage of hydrogen
  - [ISO 15399 in preparation]

- Hazardous area classification
  - IEC 60079 - 10

- Safety distances
  - Local German regulations
  - ISO/TS 20100 (IS in preparation)

- Refueling procedure
  - SAE TIR J2601

- Refueling Safety
  - ISO/TS 20100 (IS in preparation)

- H₂ quality
  - ISO/TS 14687 (IS in preparation)
  - SAE TIR J2719

- Refueling connection
  - SAE J2600 (35 Mpa)
  - SAE TIR J2799 (70 MPa)
  - ISO/TS 17268 (IS in preparation)

- Liquid hydrogen refueling interface
  - ISO 13984

- Hydrogen detection apparatus
  - ISO 26142 (FDIS)

- Hydrogen components
  - ...
  - ...

- H₂ metering
  - ...

- Hydrogen fuel tanks
  - ISO/TS 15869 – Gaseous H₂ fuel tanks
  - ISO 13985 – Liquid H₂ fuel tanks

SOURCES: H₂ Mobility, CEP, TD internal
TOTAL’S EXPERIENCE

- Excellent collaboration with TÜV (Technical Inspection Agency) due to long-time cooperation (gained together experience for 10 years)
- Know-How of local authorities for HRS in Berlin
- Pre-communication, sensitization of local authorities before application
- Standardized integration in conventional business shortened application process
- Learnings:
  - Local authorities need to be as much informed as possible
  - Overall guideline for permission of HRS (DIN, EN or ISO) to feel comfortable with permission process → Acceleration of process
  - Communication between local authorities within Germany is inevitable
  - Exchange of experience in Industry (currently CEP)
- Commercialization, crucial open topics as:
  - Measuring
  - H₂ quality sampling
  - Commissioning of refueling protocol of 700bar H₂ need to be solved (currently discussed within CEP).
UPCOMING PROJECT
H₂BER
CO₂-NEUTRAL STATION @ BERLIN AIRPORT BER
THANK YOU!