Fuel cell systems

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Driving change
fuel cell is key technology for Hyundai
Battery vs. fuel cell electric vehicles (BEV vs. FCEV)

Both concepts offer advantages in their specific applications: urban environments and long distance driving.

Fuel cell system with advantage in:
- **cost** in long range environment. BEV with cost advantage in urban traffic.
- **charging time**: FCEV a few minutes (5-12min), BEV a few hours (1h-10h DC/AC).
- **payload**: energy density of batteries is much lower than that of Hydrogen.

Price of fuel cell: Fuel cell system + High-Voltage battery + Hydrogen storage system
Price of battery system: Electric battery system
BEV: battery Electric Vehicle  FCEV: Fuel Cell Electric vehicle
Hydrogen and oxygen are caused to electro-chemically react in order to generate electricity.

The fuel cell stack developed by Hyundai Motor.
Fuel cell electric system

Hydrogen Tank → Air Processor → Fuel Cell → Electricity → Battery → Water vapor
6.7 billion $ investment in hydrogen technology

Increase in **annual capacity** for fuel cells systems to **700,000** by 2030

**Move beyond transportation** into power generation and storage systems

**World class technology**
High power density (0.21kW/L)
High efficiency (62%)

**Performance under extremes**
Cold start capability -30°

**Total Engineering Service**
Customized solutions
Components

Controller

Battery System

BOP (Balance of Plant)

H2 Tank

Motor

Stack
Hyundai NEXO

- Maximum power output of 120 kW/163 PS
- Unprecedented durability 160,000 km/10 years
- Filters for air purifying 99.9% of particulate matter
- World best fuel cell: System efficiency 62%
- World leading driving range of 666 km (WLTP-rated) / 756 km (NEDC)
- Five-year unlimited mileage, eight-year HV battery and stack warranty
Hyundai fuel cell electric heavy duty truck

Hyundai FC trucks for Switzerland:
- **1600** FC trucks by 2025
- **50** FC trucks in operation in 2020

**Specifications:**
- **FC Stack Power:** 190 kW
- **H₂ Tank:** 34.5 kgH₂ @ 350bar
- **Traction Motor:** 350 kW
- **Range per charge:** Approx. 400 km
- **Gross Combination Weight:** 34 ton

**Components:**
- Hydrogen Tanks
- Fuel-Cell Stack
- Electric Motor + ATM
Hyundai offering with the right partners complete mobility solutions

- **fuel station industry**
  - “green fuel stations”

- **gas industry**
  - “green hydrogen”

- **electricity industry**
  - “hedging electricity prices”

- **automotive industry**
  - “well to wheel”

- **transport & logistic industry**
  - “More value to customers”

- **Financial institutions**
  - “sustainable investments”
Driving change
fuel cell is key technology for Hyundai

- World class mature technology
- 6.7 billion $ investment in H2 technology
- 700,000 fuel cells by 2030
- Mass production vehicles
- Complete hydrogen mobility solutions

Thank you

Nabil Nachi, Fuel Cell Electric Commercial Vehicle Development