



FUEL CELL STORY



1839: William Grove the 'Gas Battery'. The first Fuel Cell



1956:
General Electrics
invents the proton
exchange
membrane fuel cell



1960s: NASA first uses Fuel Cells in space missions

1959:

1980s: US Navy uses Fuel Cells in submarines.

2003: IPHE (international Partnership for Hydrogen and Fuel Cells in the

Economy) has been established.

2007:

Fuel Cells begin to be sold commercially as APU (auxiliary power unit) and for stationary back up power

1801: Humphry Davy demonstrate the principle of what become Fuel Cells

1889:

Charles Langer and Ludwing Mond developed Grove's invention and name the fuel cell

Francis Bacon demonstrate a 5 KW Alkaline Fuel Cell

The oil crisis prompts the development of alternative energy technologies including PAFC

1970s:

1990s:

Large stationary Fuel Cell are development for commercial and industrial locations.

2008:

Honda FCX Clarity Fuel Cell electric vehicles

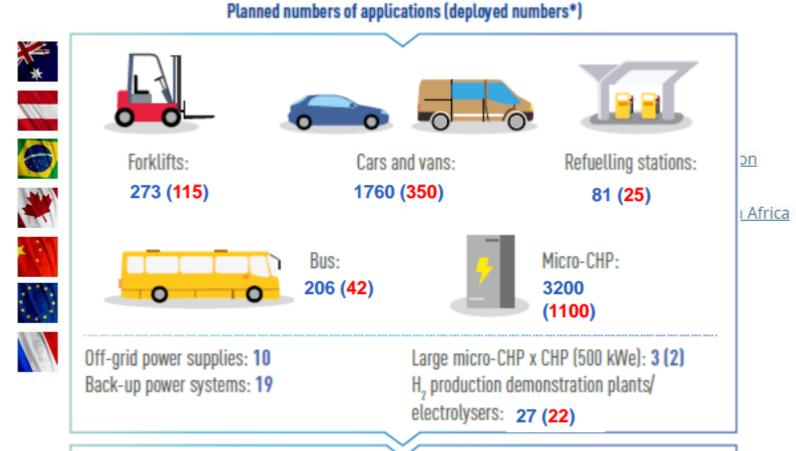




CURRENT SITUATION



International Partnerships for Hydrogen and Fuel Cells in the Economy



'IPHE serves as a mechanism to organize international research, development, de hydrogen and fuel cell technologies.'

. CREATING THE BRIDGE BETWEEN TODAY'S ADVANCED TECHNOLOGY AND TOMORROW'S WIDESPREAD DEPLOYMENT.

Planned numbers of applications by 2025 (deployed numbers) * As of November 2017

ed to



BACKGROUND

- Web research
- Manufacturers (Ballard)
- Fuel Cell Technology Handbook, Hoogers, Gregor CRC Press 2003
- Conference
 - Passenger ship Sustenability
 - Busworld in Kotrijk
- First Fuel cell powered Pleasure boat



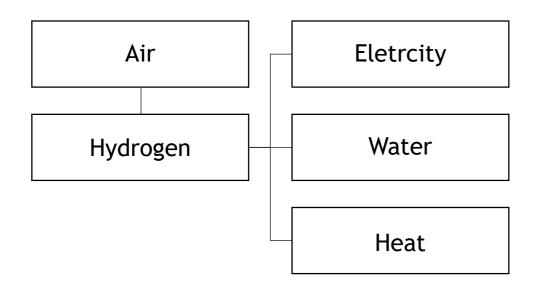


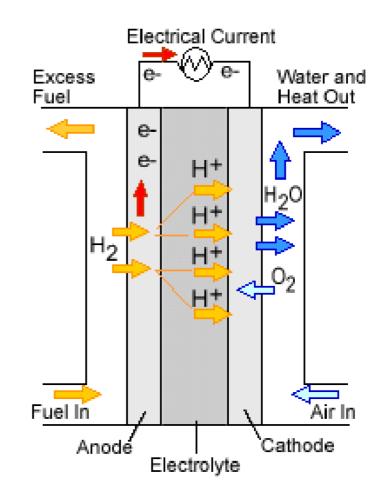






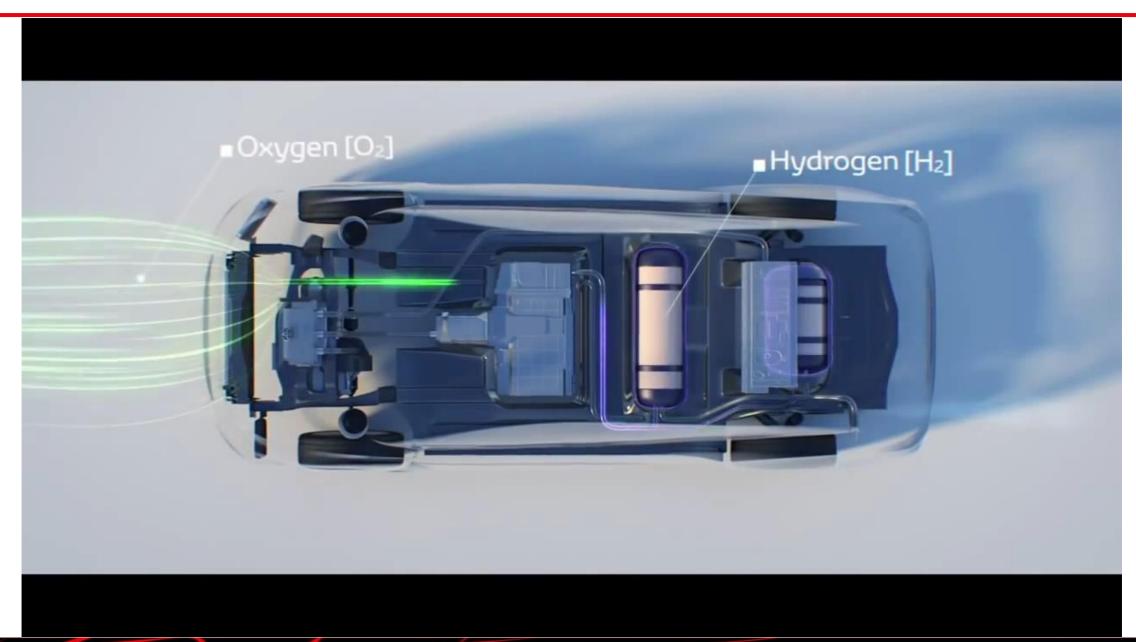
FUEL CELL





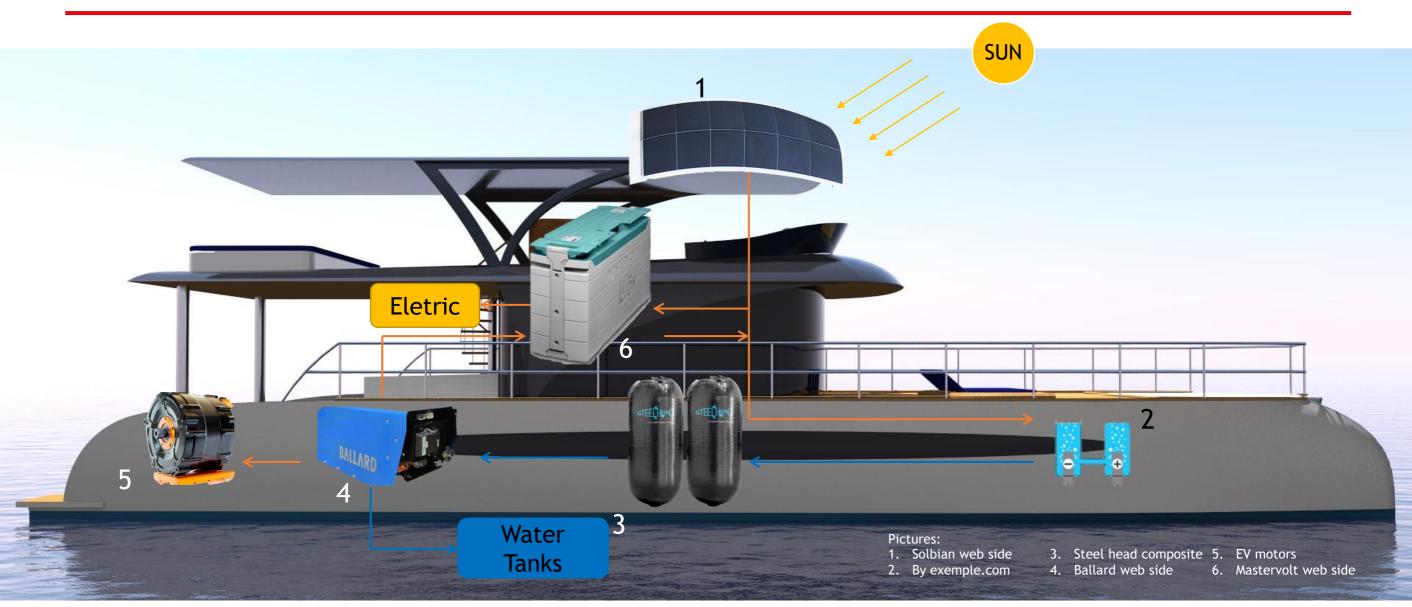


AUTOMOTIVE APPLICATION





A CLOSE SYSTEM





THE VESSEL







REFERENCES

Pictures:

- 1. http://www.fuelcelltoday.com/history
- 2. https://www.toyota.de/automobile/brennstoffzellenautos.json
- 3. https://www.wired.com/2016/10/50-years-making-hydrogen-cars-still-no-one-cares/
- 4. https://www.iphe.net/