

Mesa redonda
“El Hidrógeno como combustible alternativo”

14 Noviembre 2017

Uso de hidrógeno en el transporte

Miguel A. Peña

Asociación Española del Hidrógeno

AeH₂
ASOCIACIÓN ESPAÑOLA
DEL HIDRÓGENO

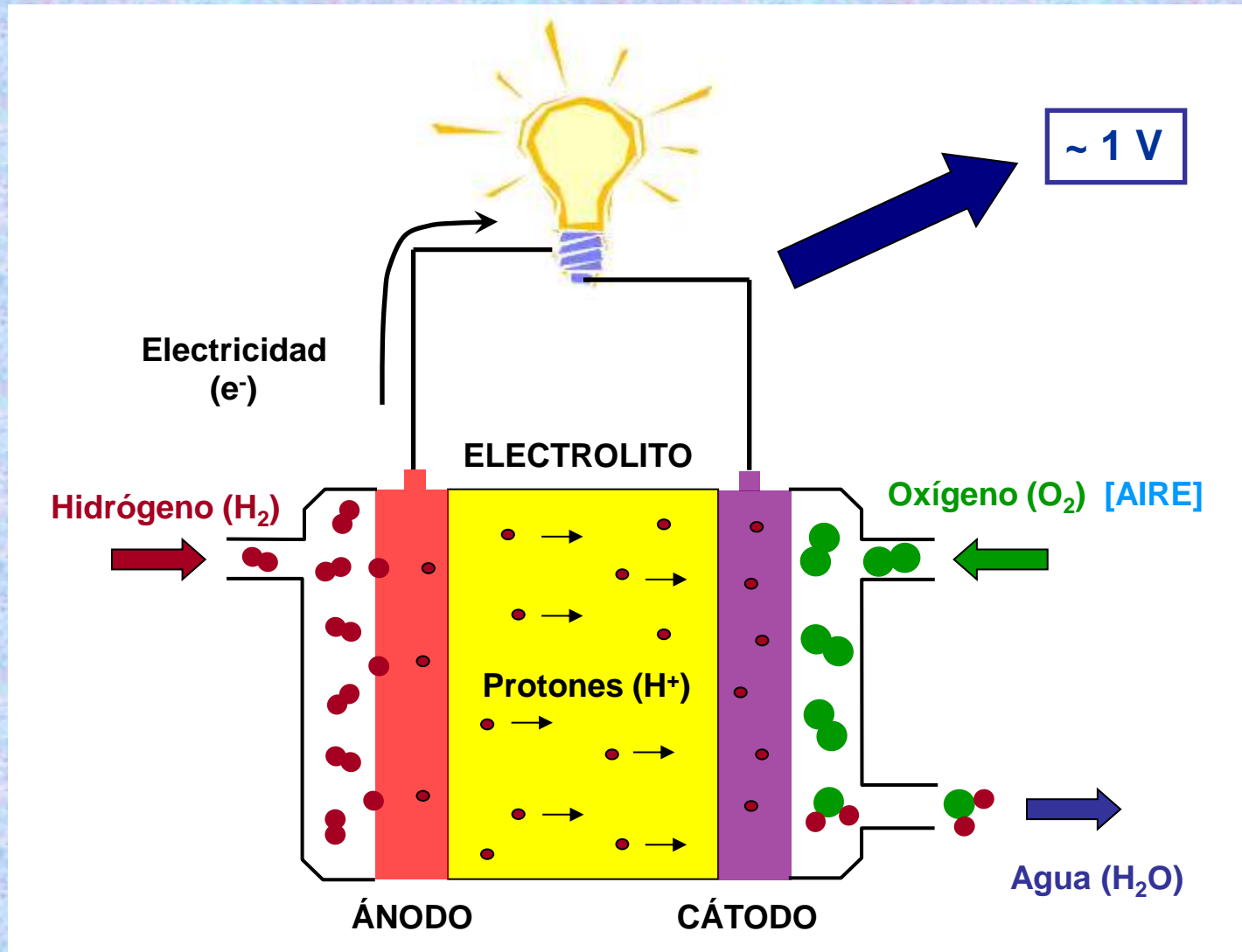


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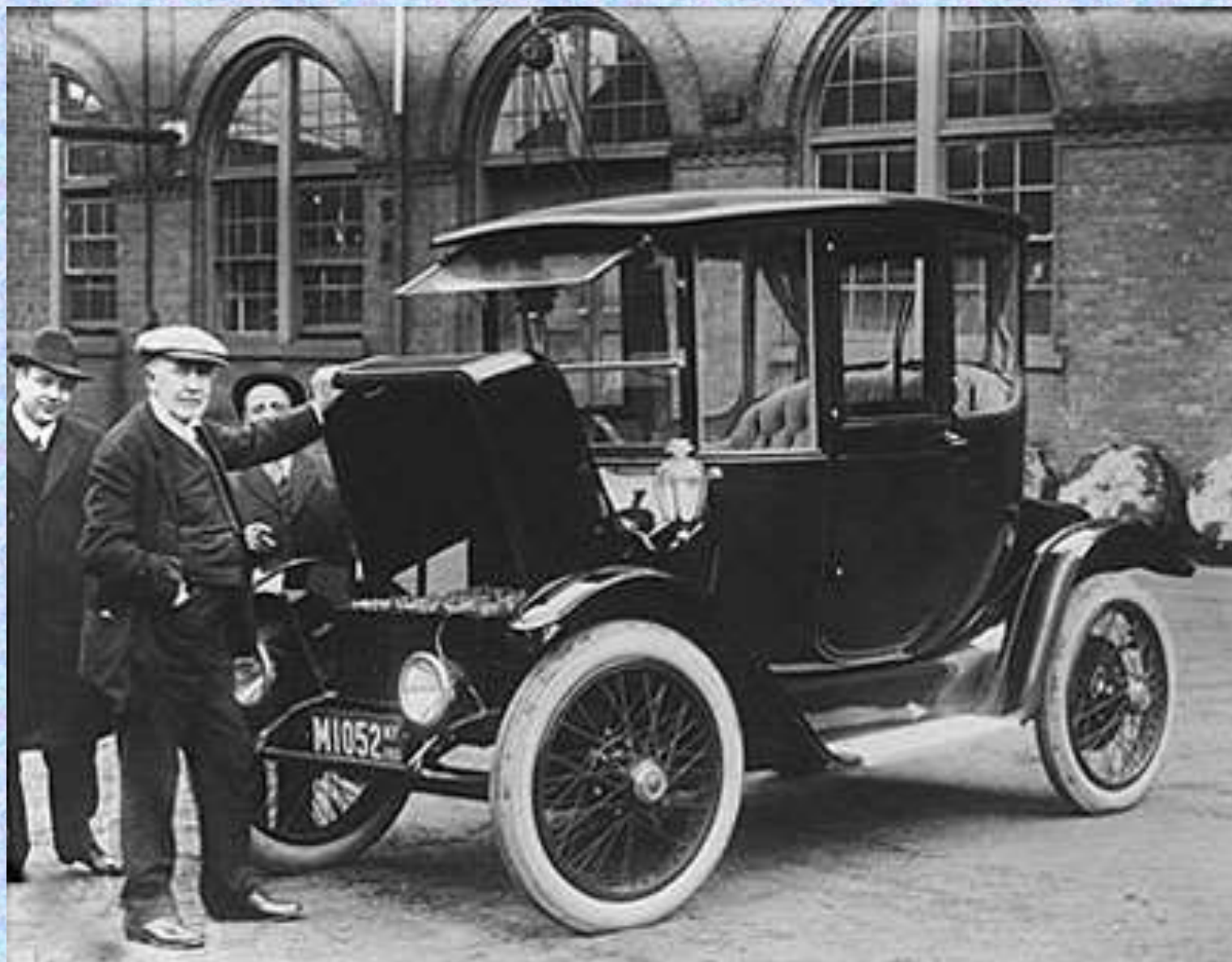
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Pila de Combustible (PEM)

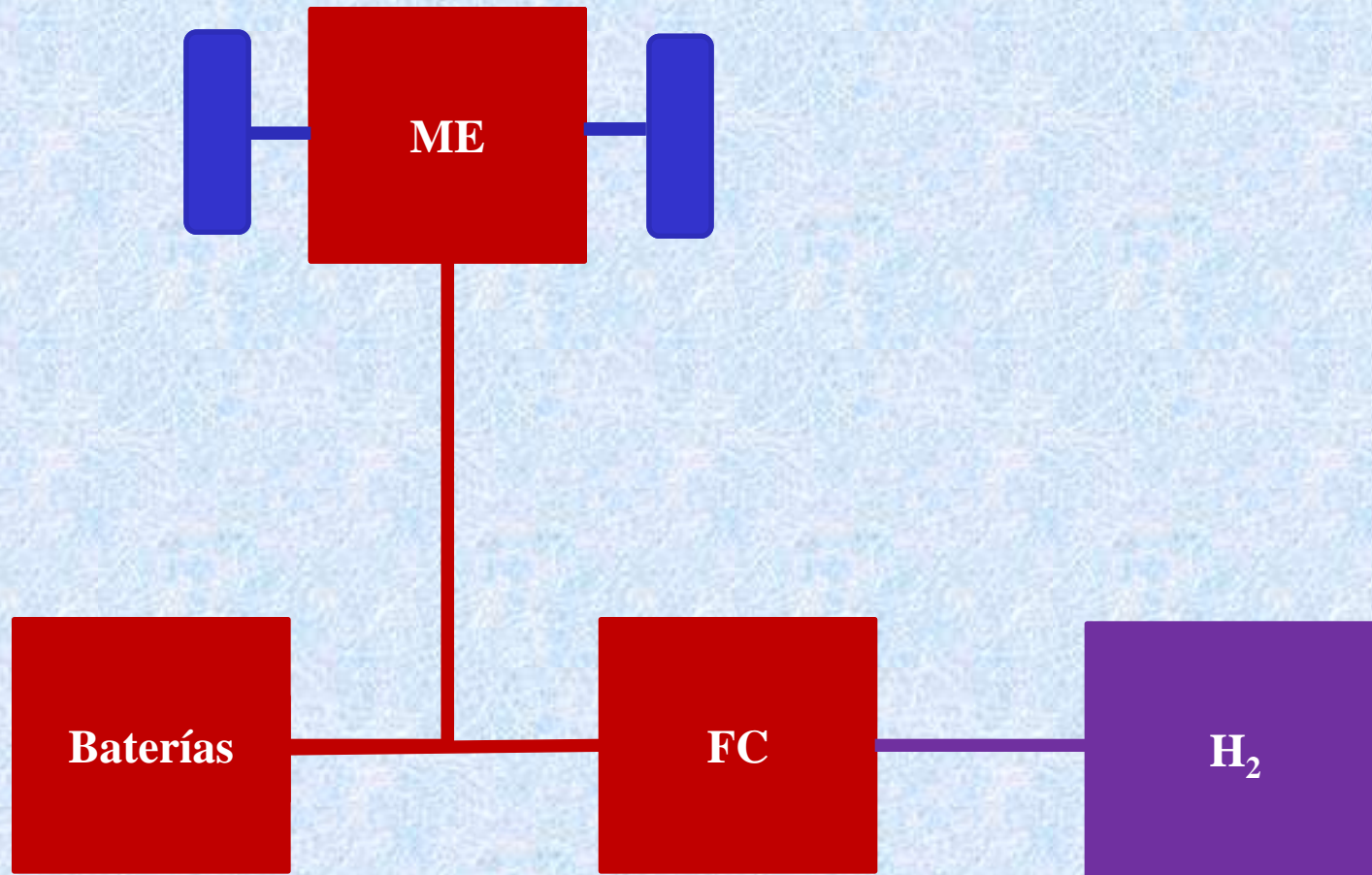


- **Energía Limpia ($H_2 + 1/2 O_2 \longrightarrow H_2O$)**
- **Alto Rendimiento, comparado con los motores de combustión.**

Vehículo eléctrico



Vehículo eléctrico de hidrógeno



Hidrógeno Comprimido

- ↪ Presión 200 bar
- Nuevos desarrollos 350-700 bar



Hidrógeno Licuado

- ↪ Líquido criogénico a -253 °C
- a la presión ambiente



Hidruros metálicos



PEM Comerciales (Ballard)



1990

1996

5 kW

10 kW

28 kW

50 kW

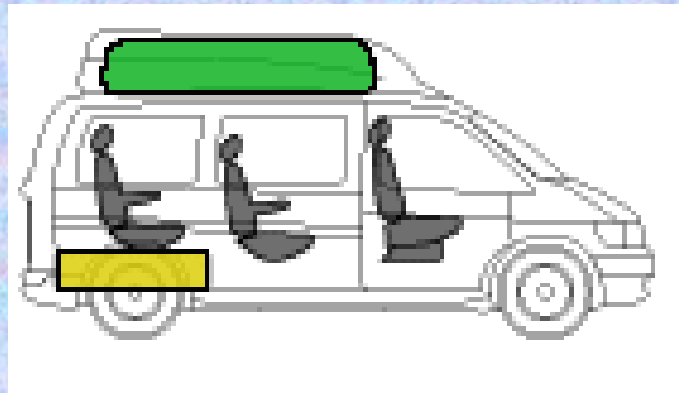
(0.1 kW/L)

(1.2 kW/L)

Daimler-Chrysler / Ballard



NECAR 1 (1994)



NECAR 2 (1996)



NECAR 3 (1997)

NECAR 4 (1999)

NECAR 5 (2001)

Primeros vehículos comerciales

Honda FCX Clarity

2009

H₂ 350 bar, 4 kg.

Autonomía 390 km

Potencia 100 kW

160 km/h



Mercedes-Benz B-Class F-CELL

2011

H₂ 700 bar, 3,7 kg

Autonomía 385 km

Potencia 100 kW

160 km/h



Primeros vehículos comerciales

Toyota Mirai

2015

H₂ 700 bar, 5 kg

Autonomía 500 km

Potencia 114 kW

160 km/h



Hyundai ix35

2015

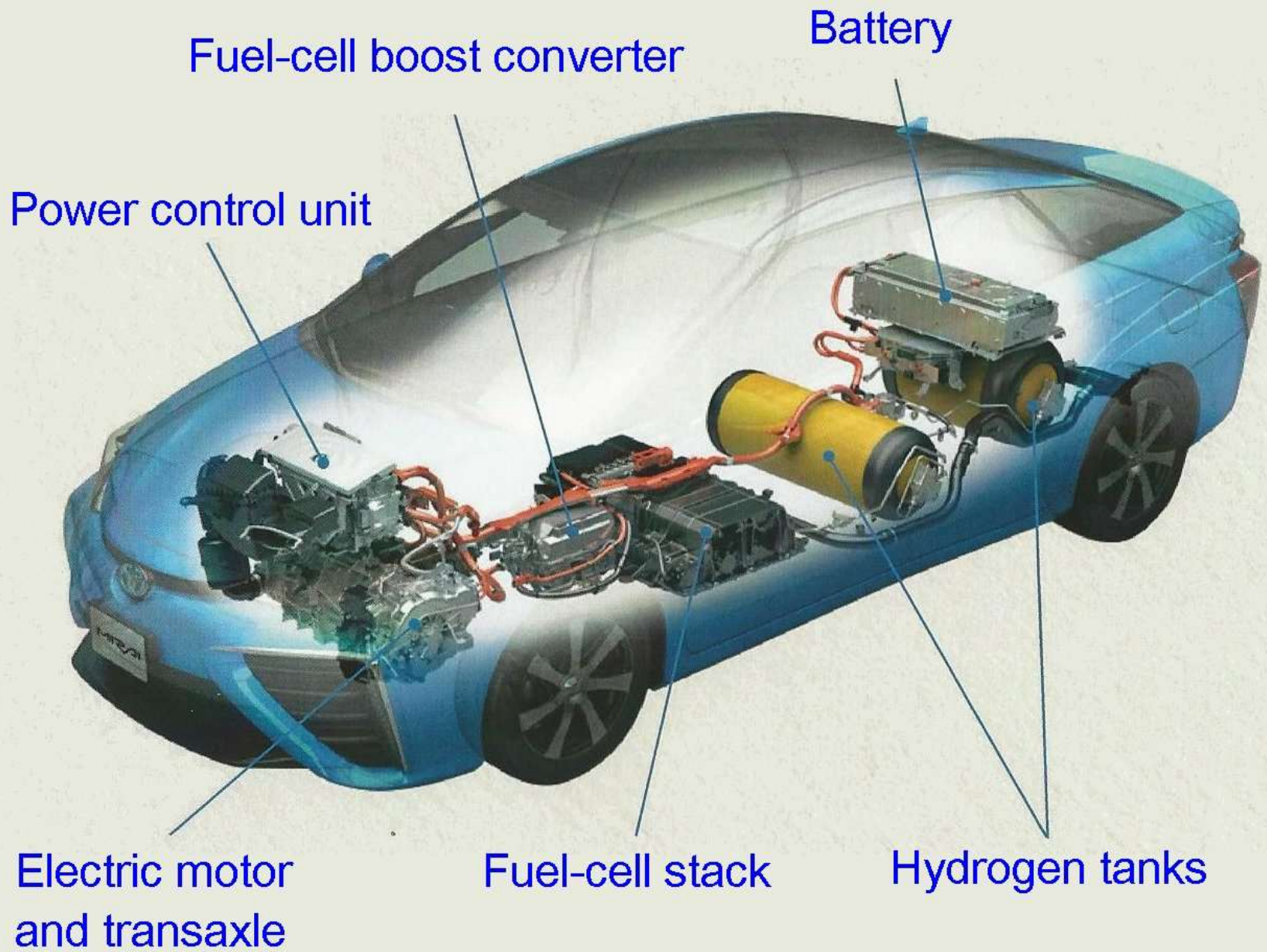
H₂ 700 bar, 5,5 kg

Autonomía 590 km

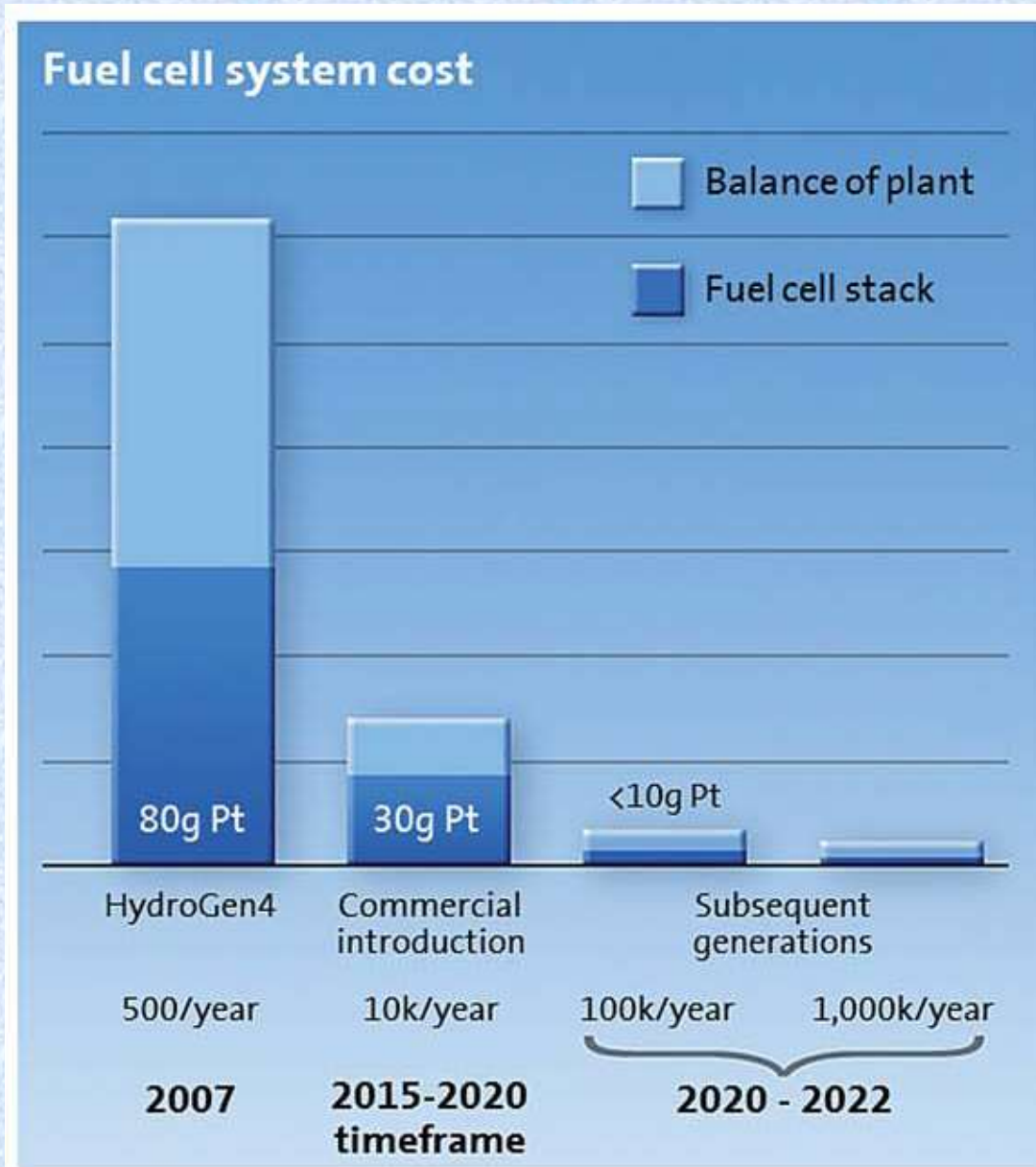
Potencia 100 kW

160 km/h





Evolución HydroGen4 (GM)



Hydrogen Filling Stations Worldwide

<http://www.netinform.net/h2/H2Stations>

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Current number of database entries: 594

Last Change(s):

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Químicos



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HINDENBURG BURNS IN LAKEHURST CRASH; 21 KNOWN DEAD, 12 MISSING; 64 ESCAPE

AMERICA'S NEW BARKLING STEEL SHIP LEAVE FLAME

Special: Burning Out of
Steamer, Newark
Bound From Manhattan

REAR END COLLISION IN LAKEHURST

Explosion, Flaming Fire
Ignited in Region of
Fuel Tanks, Cause

WRECKAGE SCATTERED OVER LAKE

Wreckage, Burning Debris
Littered Shore and
Surrounding Area

IN SOUTH BAY

Wreckage, Burning Debris
Littered Shore and
Surrounding Area

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THE HINDENBURG IS BLAZED ON THE FIELD AT LAKEHURST

The great airship, which crashed in the ground near the runway near at 10:30 a.m. last night.

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■ Coche hidrógeno

■ Coche gasolina

■ $t=0$



■ $t = 3$ segundos



■ $t = 1 \text{ mn}$



■ $t = 1 \text{ mn } 30 \text{ s}$

