

Hydrogen and Hythane[®] in Fort Collins, CO

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Plug Power Fuel Cell

- Provided by OEMC
- Input = Hydrogen (currently from industrial gas supplier, eventually from electrolyzer-filled bottles)
- 5 kW output (4.5 kW from inverter)
- 50+% thermal efficiency



Hydrogen in Fort Collins

- September, 2000: *Forum on Converting to a Hydrogen Economy – HydrogenNow!*
- January 2001: City Hydrogen Task Force (HTF) formed
- March 2002: Resolution approved by City Council
- 2003 – Present: Project development, partnerships, grant solicitations

JIM BREMAN LINE INNOVATION & AIRER 03/03

NATURALLY, OUR
PROTOTYPE FOR THE
HYDROGEN CAR
STILL HAS SOME
BUGS TO
WORK OUT...



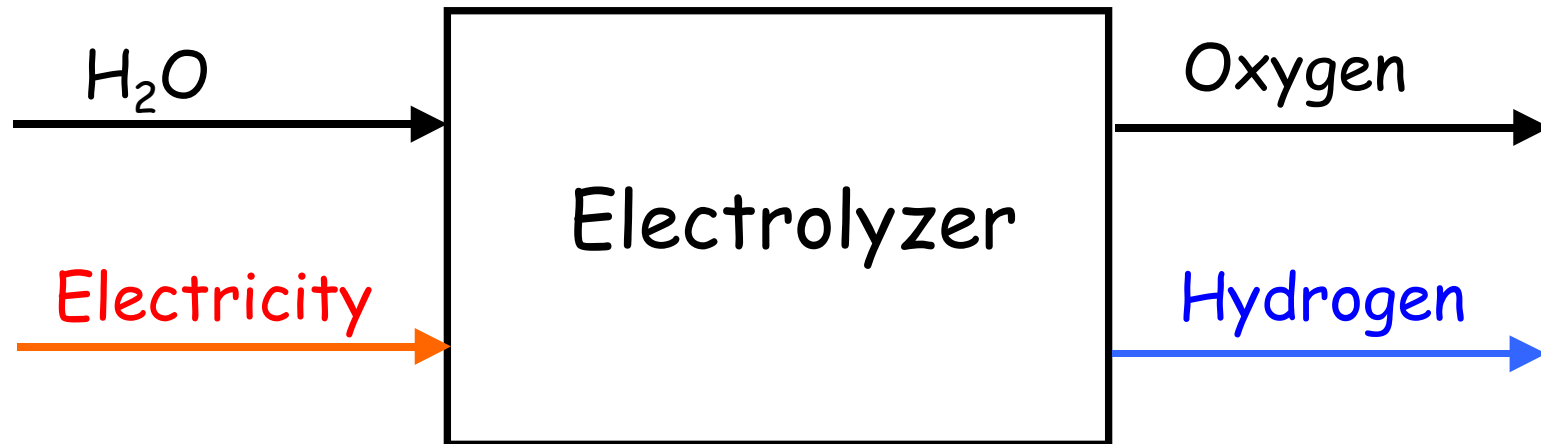
Hythane[®] Advantages

- Can use OEM CNG vehicles
- Relatively low fueling infrastructure cost
- 40%-50% reduction in emissions with 15% by volume hydrogen
- Leverage – lower emissions with given amount of H₂
- Opportunity to educate safety officials

Vehicle Fueling Project

- Phase I - Hydrogen / Hythane[®] fueling infrastructure
 - Electrolyzer and dispenser
 - Start with one Hythane mini bus
 - Compare emissions with CNG bus
 - Expand up to 5 mini buses + Fleet vehicle
- Phase II – Utilize pure H₂ dispensing
 - Fill portable cylinders for use with fuel cell
 - Acquire pure H₂ vehicle (Hybrid?)

Electrolyzers



Avalence Electrolyzer

- **Hydrofiller 175 – 6000G**
 - 25 kW Input Power
 - 175 scfh production (~0.4 kg/h)
 - 7000 psi
 - Grid Input Power (480V, 3 Phase) - Wind
 - H₂ Cascade (4 tanks, 24 kg of H₂)
- **Delivery in January 2005 (we hope!)**

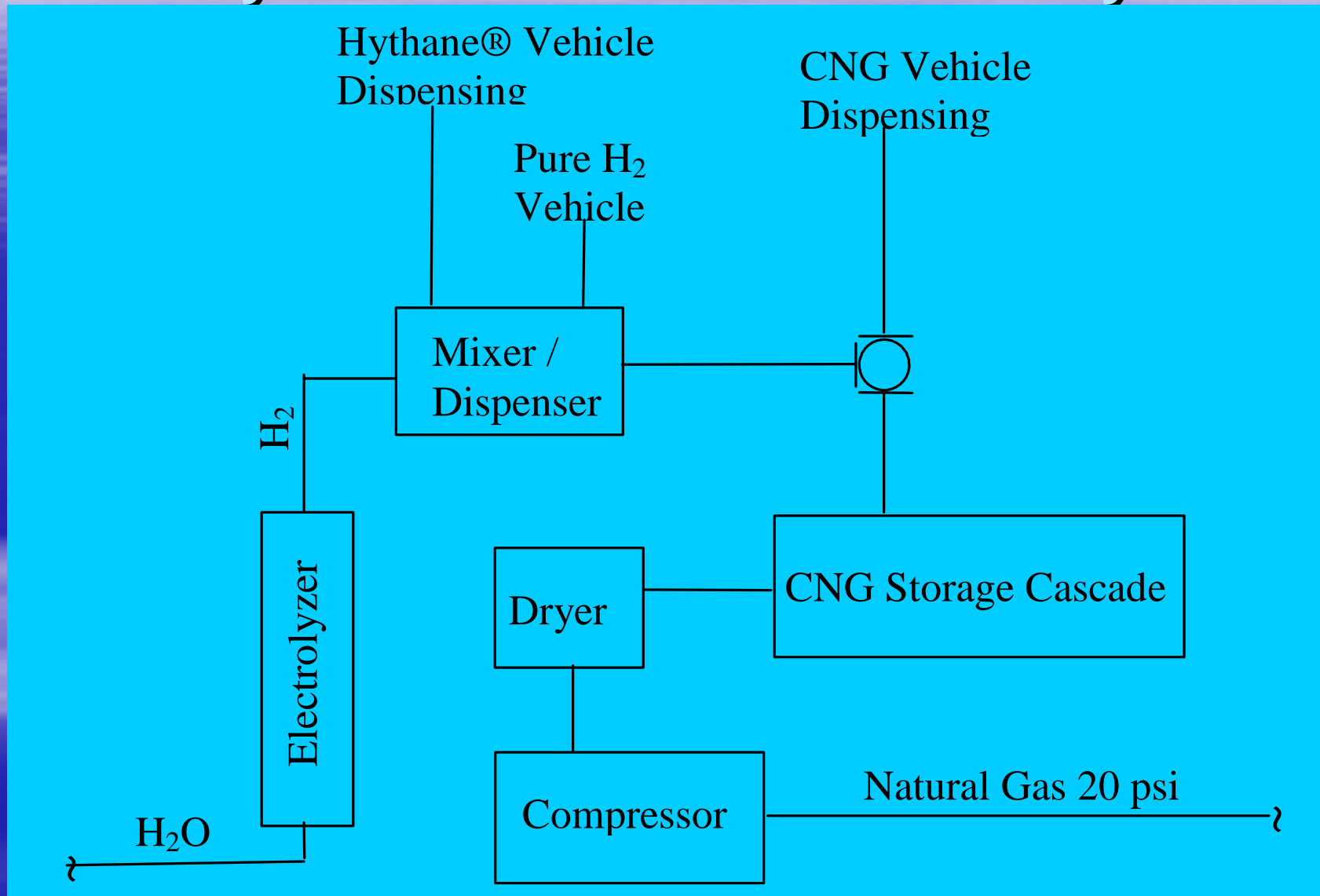
Fueling Technologies Dispenser

- Delivers Hythane[®] and Pure Hydrogen
- Hythane at 3,600 psi
- Hythane mixed during fueling
- Hydrogen at 5,000 psi

Costs

- Electrolyzer = \$179,000
- Dispenser = \$59,000
- Electricity cost of Hydrogen using off-peak electricity = \$1.70/kg H₂ (capital not included)

Hythane[®] / CNG Facility

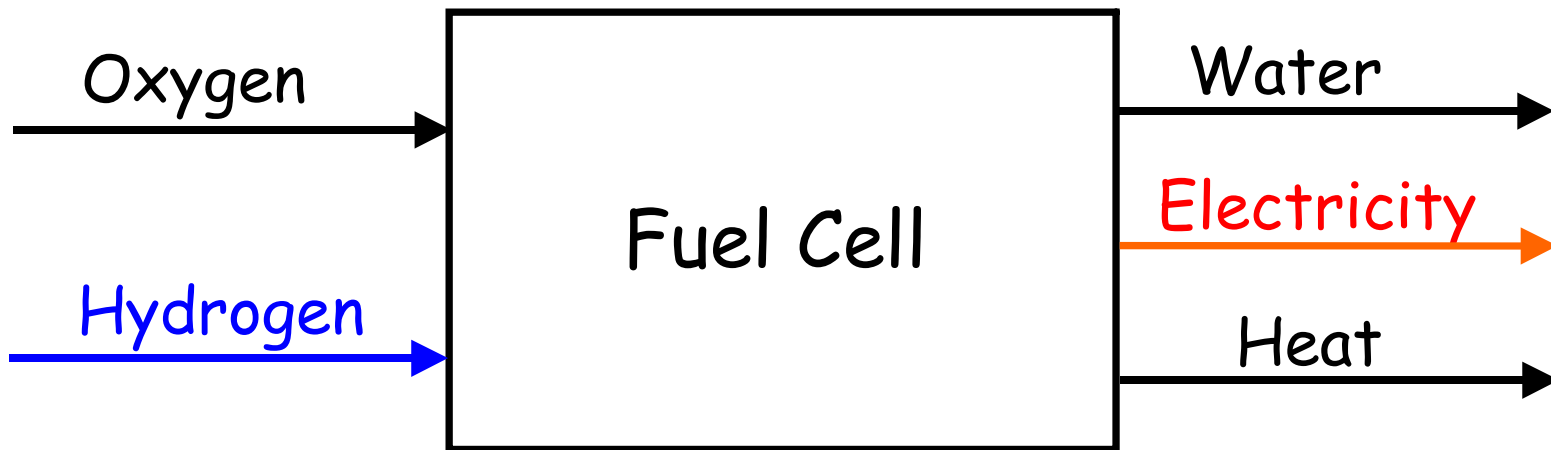


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Fuel Cells



Recent Developments

- Newly-formed Hydrogen Utility Group (HUG)
- Partnership with Xcel Energy

Thank you!

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