NUVERA FUEL CELLS

Building Hydrogen Infrastructure

Nuvera's On-Site Solution

Presented to: Massachusetts Clean Cities Coalition
Nate Schomp, Manager, Field Service

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Nuvera Fuel Cells Overview

- Global leader in the development and advancement of multi-fuel processing and fuel cell technology
- 132 staff
  - R&D
  - Low Volume Manufacturing
  - Sales and Service
- 38 patent families spanning 18 years of fuel cell and fuel processing development
- ISO 9001:2008 certified
- Privately held by

HESS

World Headquarters (Billerica, MA, USA)

EU offices (San Donato, Italy)

Test facility (Osio, Italy)

NUVERA FUEL CELLS

Hydrogen Generation History

On-Board

STAR™, gen 1
2000

STAR™, gen 3
2007

CHP

PowerStream™, gen 1
2001

Avanti™, gen 4
2006

Hydrogen

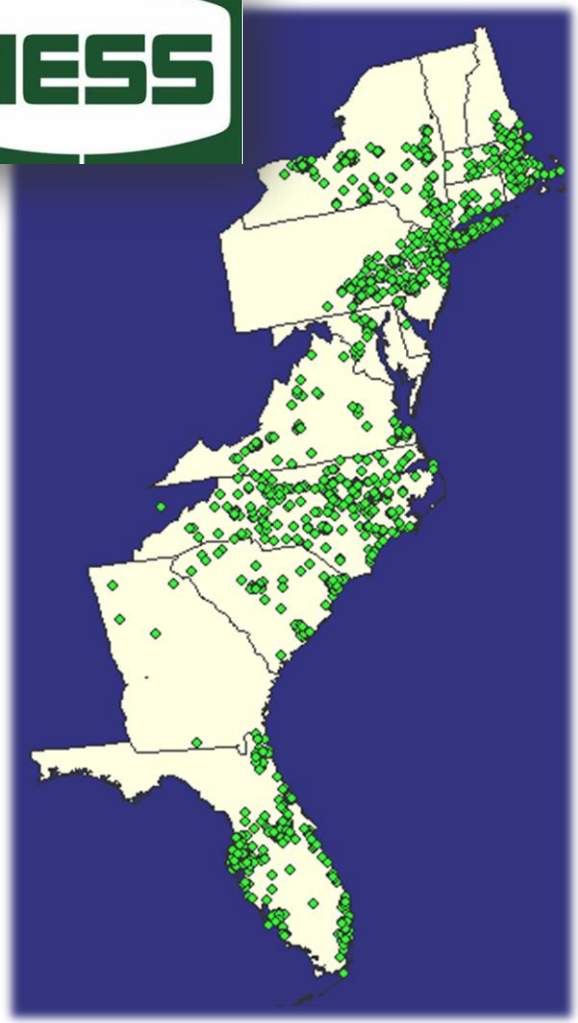
First Hydrogen Generator
1998

PowerTap™, GEN I
2005

PowerTap™, GEN II
2009 - Present

Infrastructure Challenges

US Refueling Opportunity



Hess station network (1400 stations)
>95% Corporate Owned & Operated

Covers 3 out of 5 rated sub-regions identified as early FCEV adopters locales (NREL 2006) and 30% U.S. Population

Newly discovered shale gas reserves creates window of opportunity for natural gas-based transportation, including hydrogen

PowerTap™ Hydrogen Appliance

On-site hydrogen from natural gas and water:
$CH_4 + 2H_2O \rightarrow 4H_2 + CO_2$

<u>Current System (industrial trucks):</u>
50 kg/day, 4.5’ x 12’

<u>Next Gen Product (automotive):</u>
250 kg/day, 6’ x 11.5’

Vision for Hess Hydrogen

PT-250 (2015)

Pad Footprint: 15’x15’
250 kg/day = 60–75 cars/day
10,000 psi refueling

SMR Commercial Durability

Nuvera's Steam Methane Reformer has demonstrated its capability for extreme daily thermal cycling

- Non-exotic materials
- Modular, low-stress design
- Design life 40,000hrs (250 cycles)
- Replaceable SMR Elements

Accelerated Testing Campaign:

S/N	Hours	Thermal Cycles
FP1C1	N/A	1942/2778(SG)
FP1C3	8010	284[1]
FP1R	10104	444[2]
FPZ K1	863	193
FPZ K2	330	101

[1]Data as of 05/20/2009; Test Stopped
[2]Data as of 06/28/2010; Test Stopped

Fuel Processor Test Stand

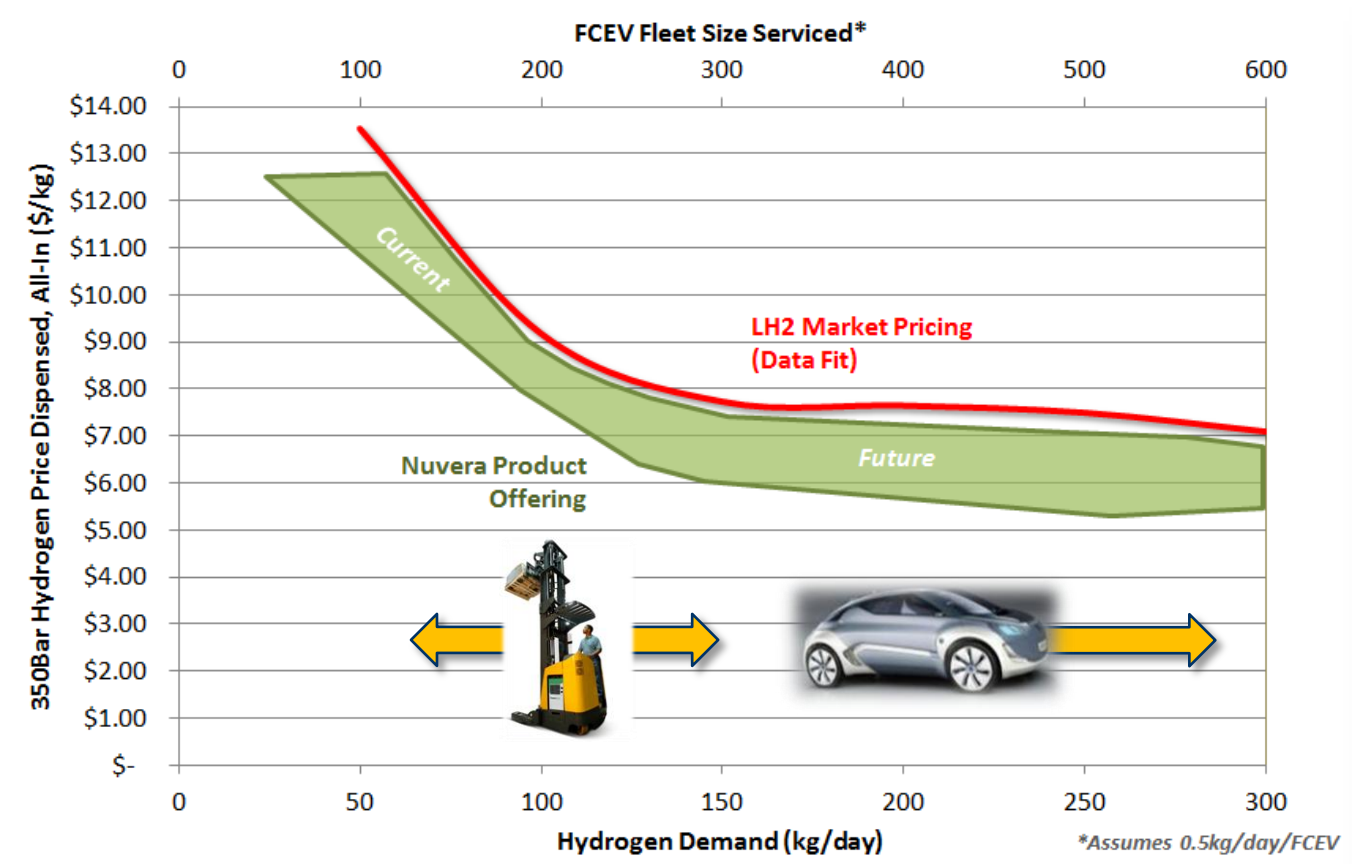
Durability Test Stand

Catalyst Test Stands

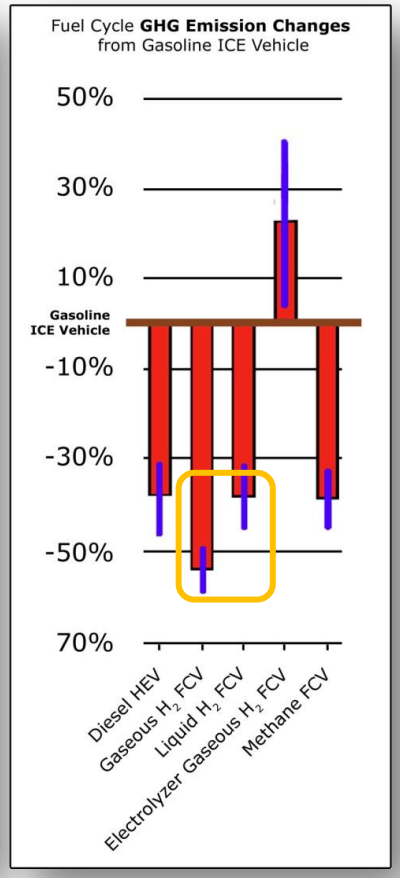
Most industrial & commercial SMR's are capable of only ~20-40 cycles

Forecourt Competitiveness

PowerTap provides a low cost & greener solution



Comparison of Customer All-in H2 Costs, 350Bar Dispensed On-Site.
Ground storage and dispenser costs included. PowerTap assumes $0.06/kWh & $6/MMBtu NG, service and ROIC Included. Liquid H2 source from central plant and trucked to site, using existing LH2 equipment (sources: multiple gas producers)



Comparison of Well-to-wheel GHG Emission Pathways.
Source: ANL, M. Wang, 2002

PowerTap vs. On-site Contenders

PT-250 GENIII+ Projection

250kg/day
>99.995%-UHP
400-800Bar
Configurable
6'x11.5' Footprint

Linde HydroPrime

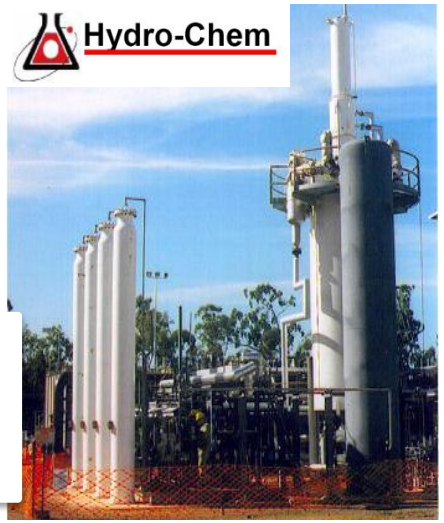
2.5X Flow
>99.9%
No Compression
4.8X Footprint

Appliance

Plant

HYOS-R (H2Gen)

3X Flow
>99.995%-UHP
No Compression
2.8X Footprint



Linde Hydro-Chem Modular Plant

8.6X Flow
>99.9%
No Compression
44X Footprint

FTA Logan Airport Bus Project

BAE, El Dorado, AVSG, National Grid, Mass Bay Transport Authority

Refueled Quickly

Avoid Battery Charging

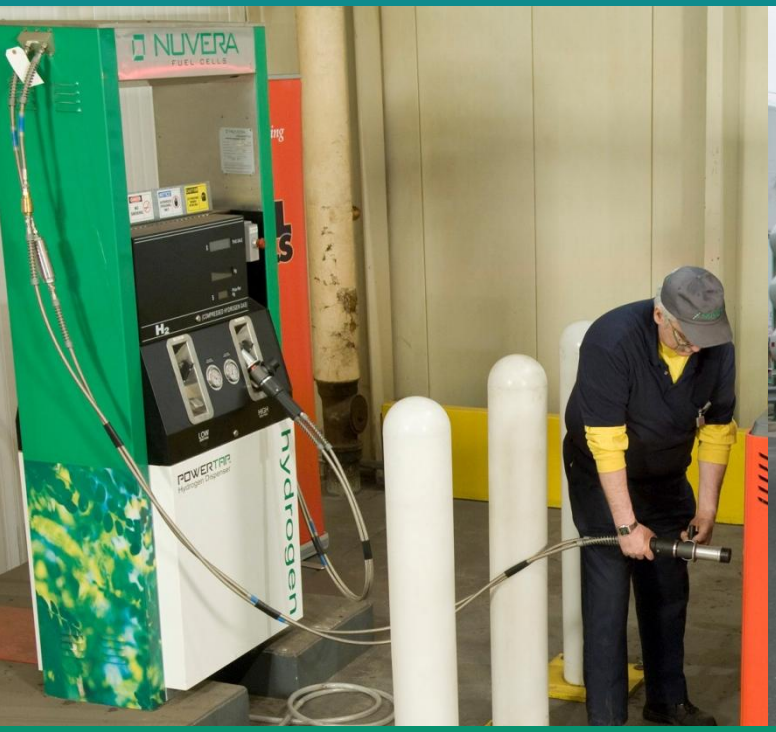
Allow for Fleet Reduction

Low/Zero Emissions

Excess hydrogen potentially available for other vehicles and GSE. Expected launch: Q4 2013

Summary

- Natural Gas: Abundant, low-cost domestic energy supply
- What are the automakers waiting for? Infrastructure!
- Nuvera is developing compact appliances for generating hydrogen on-site and meeting automotive refueling requirements
- Northeastern Corridor may be best for FCEV introduction
- Hess network a key enabler



Thank you!

For more information, contact:

Gus Block
Nuvera Fuel Cells
(617) 245-7553
gblock@nuvera.com