



*Auto-Thermal Reforming Based Refueling
Station at SunLine*

DOE Merit Review 2004



This presentation does not contain any proprietary or confidential information

Project Objective

Demonstration of Auto-Thermal Reforming based refueling station

DOE Objectives

Demonstrate hydrogen fueling station

On-site Auto Thermal Reforming of natural gas

Cost analysis vs. target of \$3/gge in 2008

Evaluation of FC vehicles under real-world conditions

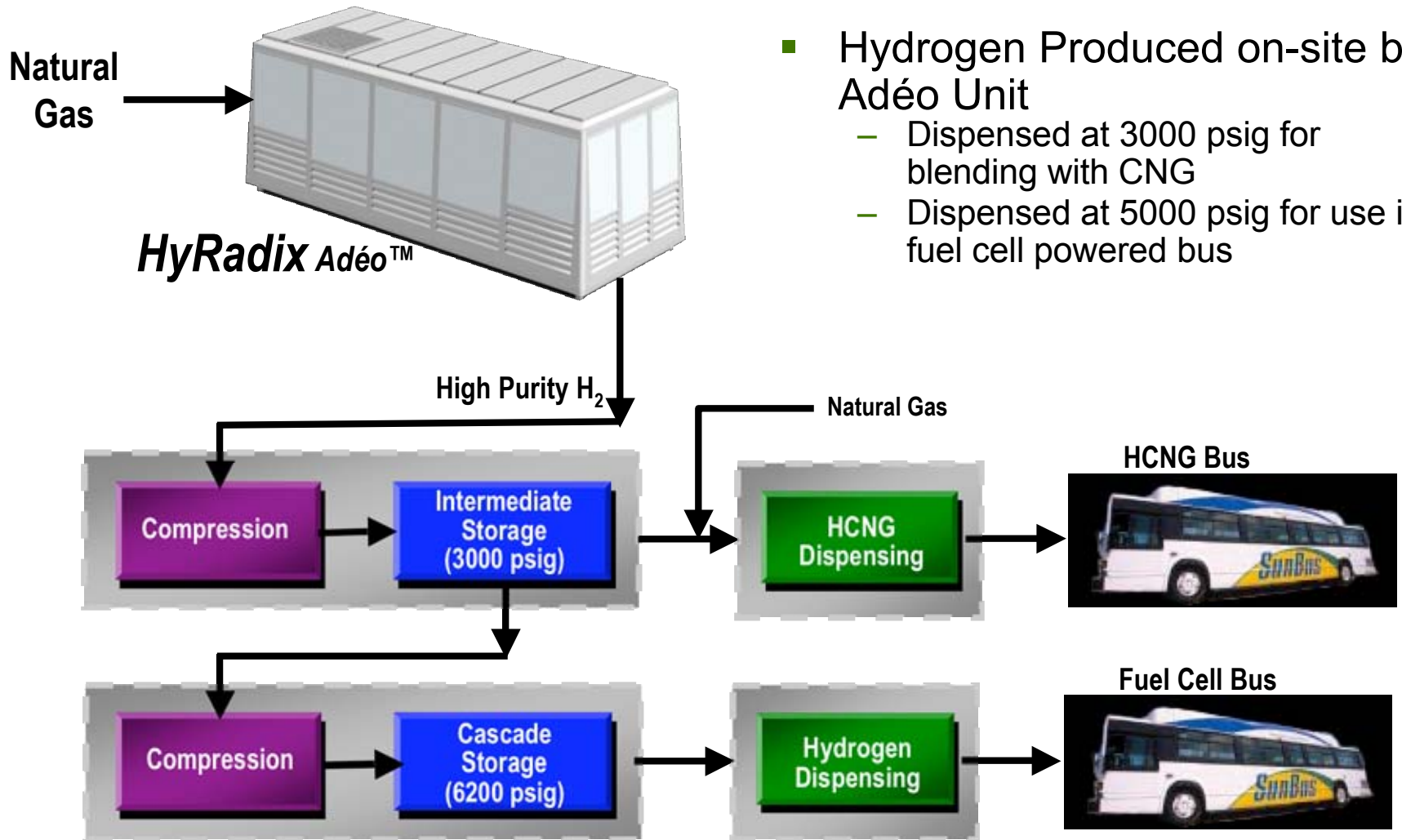
Public education on hydrogen and fuel cells

Performance goals

	Design
Hydrogen Purity	>99%
Flow Rate	100 Nm ³ /hr
Compression & Storage	6250 psig
Dispensing	5000 psig
Refueling rate	15 min per bus 3-5 min per car

Hydrogen Fueling Station based on HyRadix Adéo

- Hydrogen Produced on-site by Adéo Unit
 - Dispensed at 3000 psig for blending with CNG
 - Dispensed at 5000 psig for use in fuel cell powered bus



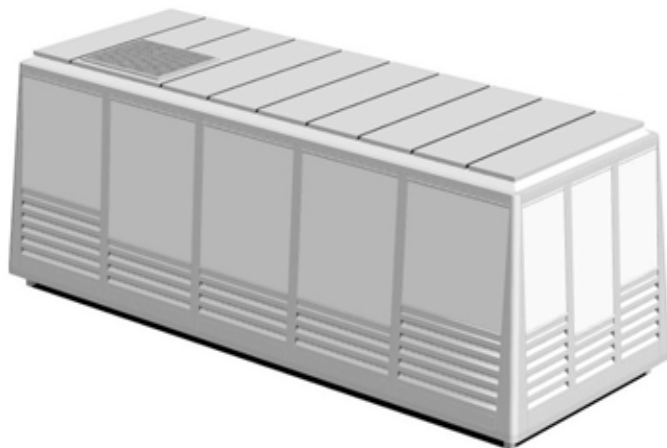
SunLine: Hydrogen Refueling Today

- Applications:
 - Fuel cell buses & vehicles
 - Hydrogen internal combustion engines
 - HCNG buses
- Refuel a bus in 15 minutes & car in 3-5 minutes
- SunLine Transit will meet new California emissions standards for 2007

HyRadix On-site Generation Unit

Performance Characteristics

- Feed
 - Natural Gas
 - 52 Nm³/h
- Product Hydrogen
 - 100 Nm³/h
 - Product Purity 99.95%
- Emissions
 - NOx <20 ppm
- Operation
 - Unattended operations
 - With fully automated start-up and control
 - Start-up:
 - 3 hours (cold)
 - 2 hours (warm)
 - Turndown: 4:1
 - Transient Capability
- Packaging
 - Skid mounted appliance
 - Enclosure option
 - Footprint: 8' X 22'
 - Integrated with existing compression & storage



HyRadix Adéo Installed at SunLine



Compression, Storage & Dispensing System

- 2 PDC Inc. metal diaphragm compressors
- Compressor 1: 3000 psig
- Compressor 2: 6250 psig
- Automated compression

Compression, Storage & Dispensing System

- Automated cascade filling
- Storage at 3000, 5000 & 6250 psig
- Fueling Technologies Inc. dispensers for H₂ & HCNG (mixed at pump)
- Dispenser 1: 3600 psig for H₂ and HCNG
- Dispenser 2: 5000 psig for H₂

Safety

- Meets all applicable codes
- Thorough Haz-Op performed with UOP
- Local permitting including fire marshal review

Funding Support



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