

AIR
PRODUCTS 

Hydrogen Fueling Stations

Clean Cities 2004

Air Products and Chemicals, Inc.
David McCarthy – May 2004

Who is Air Products?

Air Products is a \$6 billion global company that supplies 50% of the merchant hydrogen market

Demonstration leader
>30 H₂ fueling stations

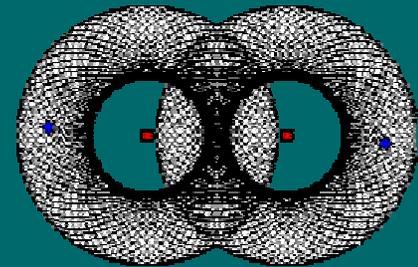
Developing solutions for the H₂ economy - sourcing, onsite generation, storage

Global safety leader
- codes & standards team
- KnowH₂owSM Safety Training

Founding member of the National H₂ Association

Where Does H₂ Come From?

- It doesn't exist in nature on Earth it is not mined or extracted
- Hydrogen is DERIVED from other sources
 - Hydrocarbon based fuels, reforming (80% today)
 - By-product of chemical processes, purification (20% today)
 - Water, electrolysis (niche applications today)



The Existing Infrastructure



H₂ Storage Vessels

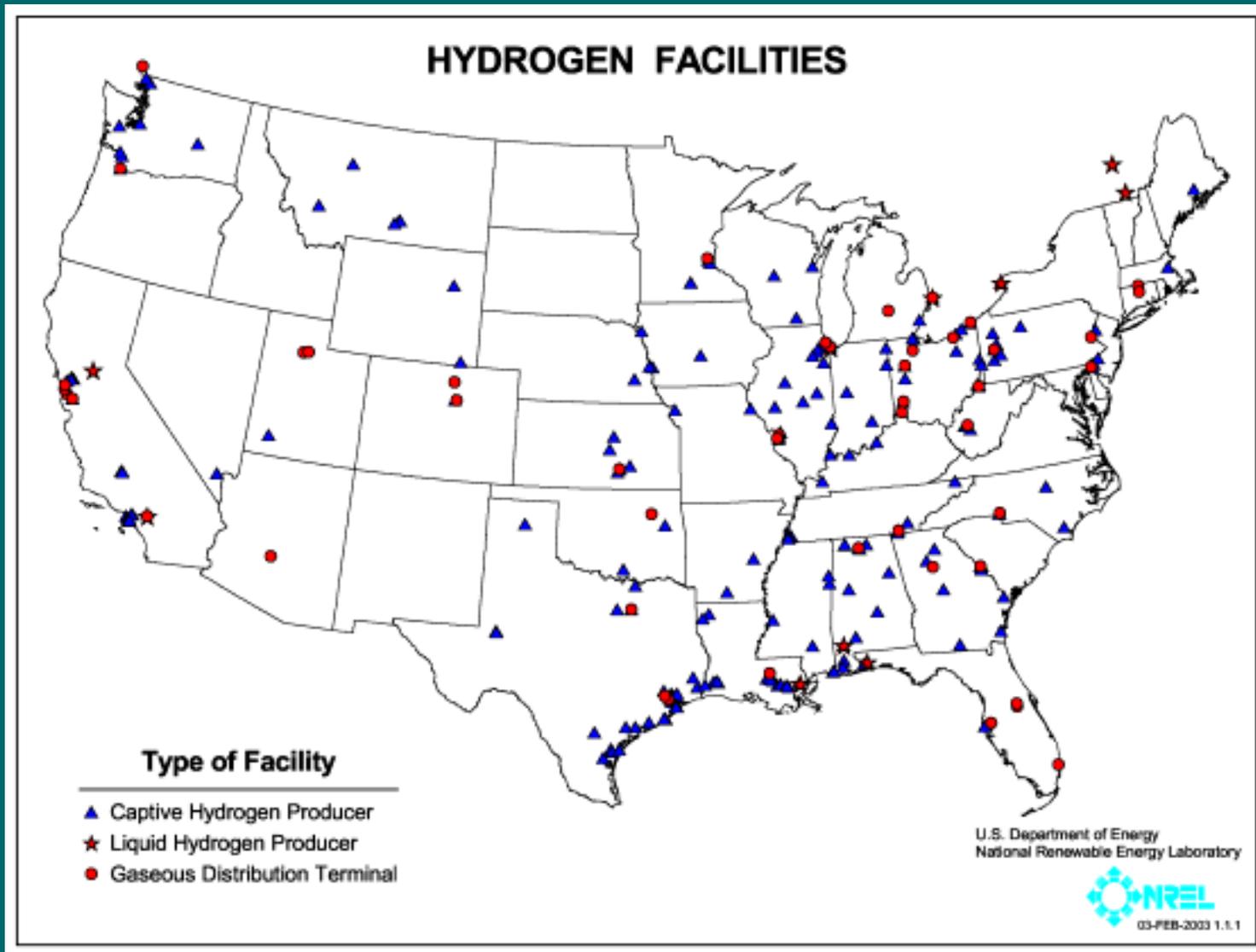


Tube Trailers



Cylinders

The Existing Infrastructure



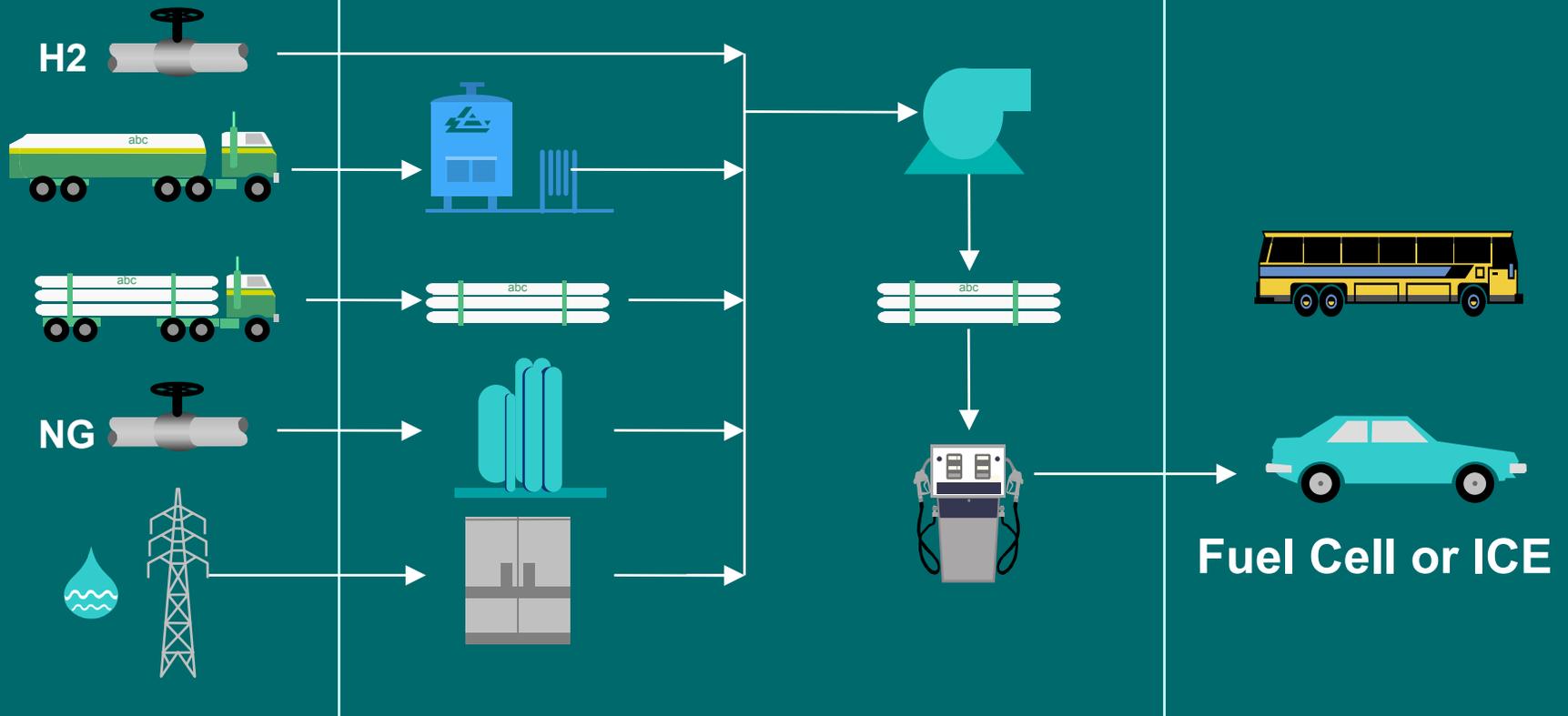
Hydrogen Supply Modes for Transportation

Distribution

Onsite

Station

Vehicle



Hydrogen Fueling- Early Years

- **Demonstration and Pre-production Vehicles**
- **Primarily fleet users, particularly government**
- **Don't expect parity in cost or convenience for vehicles or fueling**
- **Many on-board vehicle fuel requirements**
- **Vehicles will not be restricted to a single geography**

Hydrogen fuel station Demonstrations

CaFCP,
Sacramento, CA



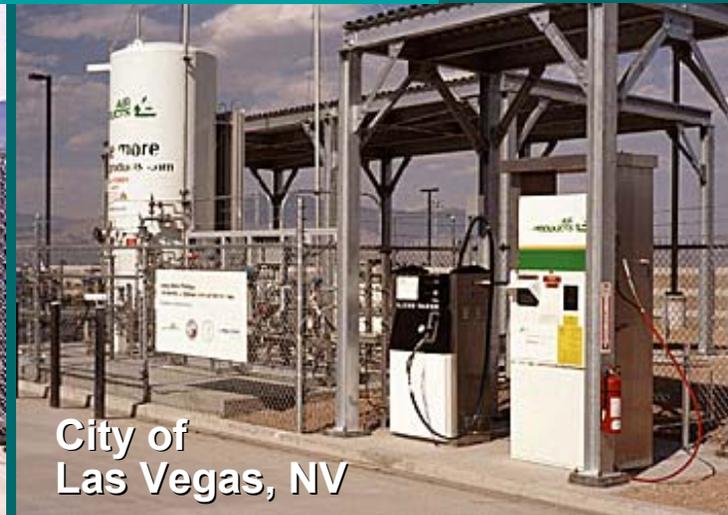
Chicago
Transit
Authority, IL



Ford,
Dearborn, MI



City of
Las Vegas, NV



Flexible Systems – Hydrogen fueler

- Totally self-contained
- No site installation
- High reliability
- Zero emissions



Low Cost Fueling Options - Series 100



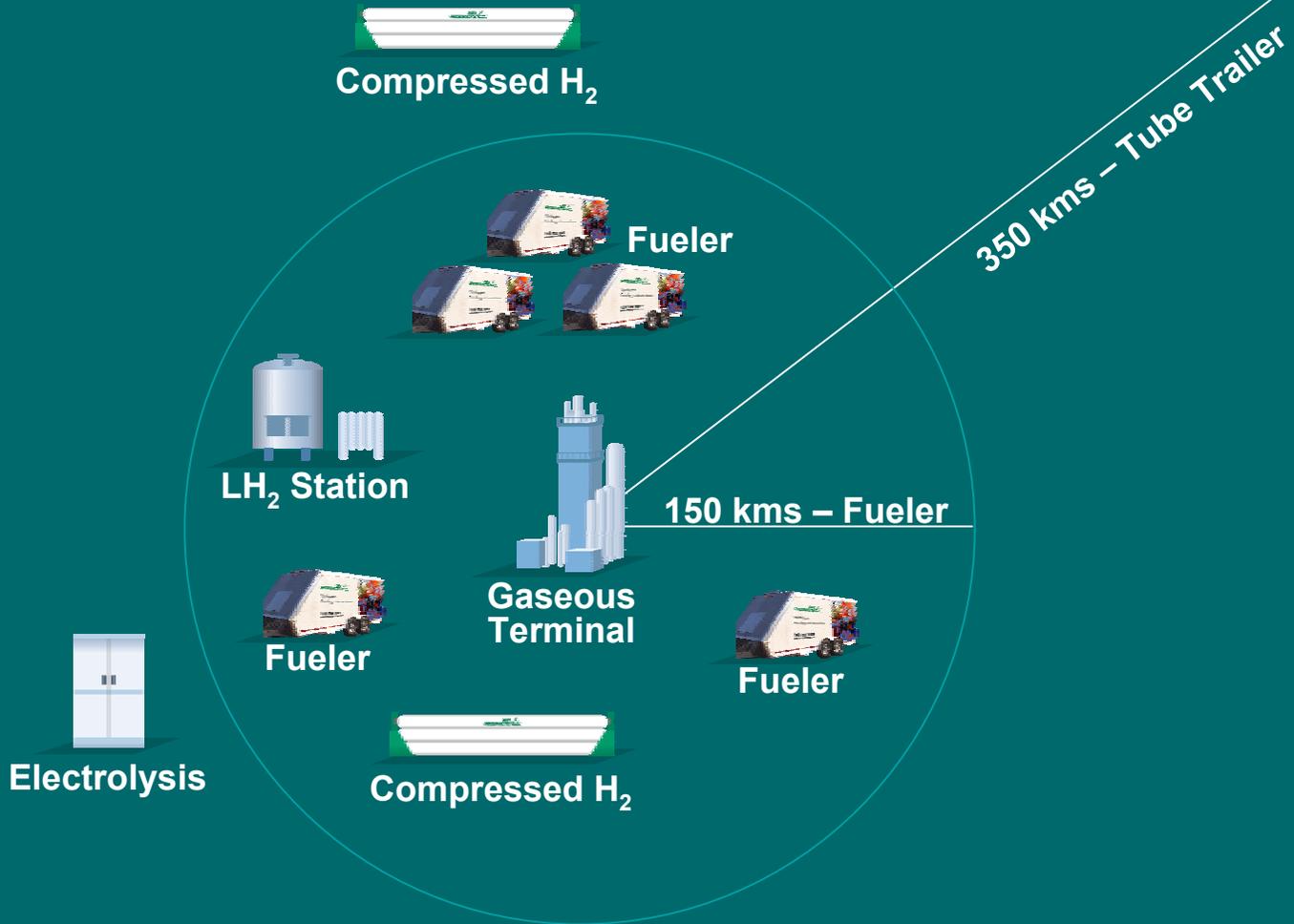
- Flexible H2 Source
- Portable
- Easy Installation
- Minimal Plot Space



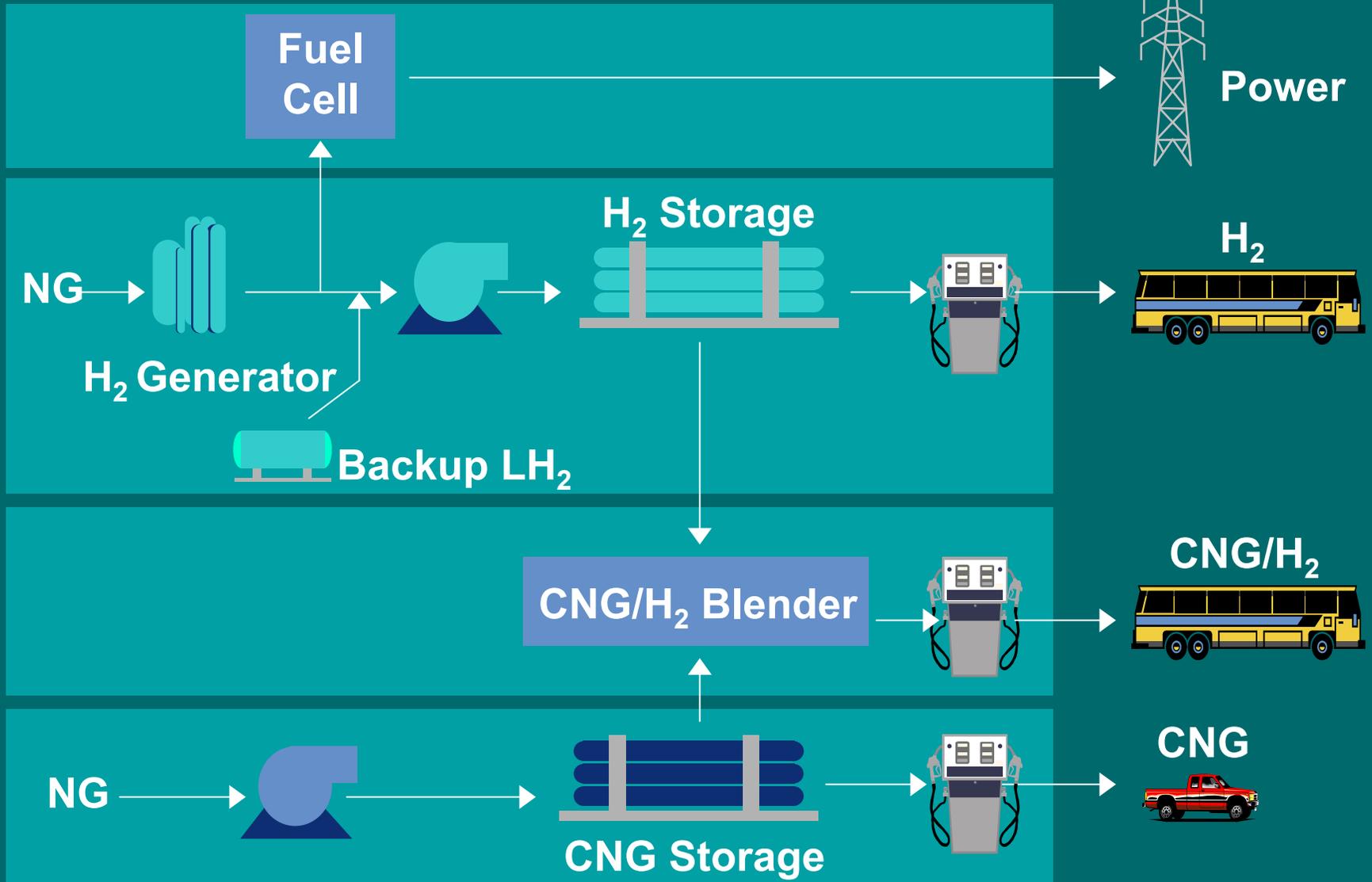
Emerging Hydrogen Fleets - Series 200



Deployment near existing hydrogen infrastructure



Las Vegas Energy Station



Upcoming H2 Fueling

- **Liquid Hydrogen (LHY) Mobile Fueler**
- **Underground LHY Storage**
- **10,000 psig (700 bar) Dispensing and Storage**
- **Renewable H2 Fueling**
 - **Proton / DOE Wind Project**
- **Infrastructure Demonstration**
 - **California Hydrogen Highway**
 - **Air Products, DOE, Honda, Toyota, Nissan, BMW**
- **Reformer Technology Advancements**
- **CNG / H2 Applications**
- **Remote Access Monitoring**

California Hydrogen Highway



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Summary

- **Hydrogen is available now**
- **There will not be a single pathway solution**
 - **It will be based on application needs and locations of existing hydrogen infrastructure**
- **The long term solution to achieve lowest cost is still being developed**
 - **It will be dependent on the ultimate fuel cell, vehicle and device needs**

Thank you

tell me more

www.airproducts.com/h2energy

mccartdj@airproducts.com