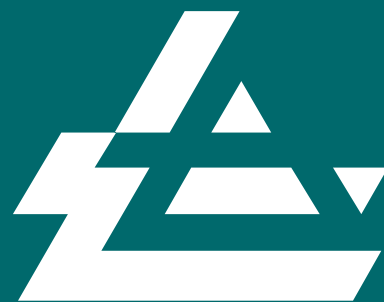
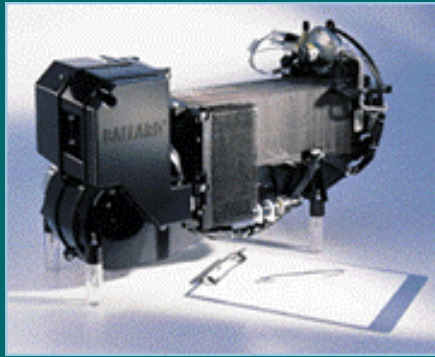


**AIR**  
**PRODUCTS**





# Infrastructure Opportunities in Fuel Cells

Venki Raman  
Air Products and Chemicals, Inc.

Merrill Lynch Global Energy Technology Conference  
New York  
22 May 2002

# Forward Looking Statements

The forward-looking statements contained in this presentation are based on current expectations regarding important risk factors. Actual results may differ materially from those expressed. Factors that might cause forward-looking statements to differ materially from actual results include those specifically referenced as future events, outlooks, goals, outcomes, or expectations which the company “expects”, (or a similar forward looking qualifier), as well as, among other things, overall economic and business conditions, in particular the success of the world economy, including the electronics industry, strengthening in the second half of the fiscal year and resulting in meaningful increases in the demand for Air Products’ goods and services during that time; competitive factors in the industries in which it competes; the ability to recover increased energy and raw material costs from customers; spikes in the pricing of natural gas; changes in government regulations; consequences of acts of terrorism impacting the United States’ and other markets; the success of implementing cost reduction programs; the timing, impact and other uncertainties of future acquisitions or divestitures; significant fluctuations in interest rates and foreign currencies; the impact of tax and other legislation and regulations in jurisdictions in which Air Products and its affiliates operate; and the timing and rate at which tax credits can be utilized.

***Presentation copyright 2002. All rights reserved.***



# The Fuel Cell Opportunity

- It is not a question of if but when?
- First generation products starting to appear
- Market projections subject to demand upswing driven by performance, utility, design and cost.
- Year 2015 Projections

Market Application	Units Sold in 2015*	Market Penetration*
Portable 1 kW	~15 million	3%
Stationary 250 kW	~40,000	1%
Auto 75 kW	~17 million	25%
Buses 205 kW	~31,500	35%

- Hydrogen production of about 20 million tons/year required to support this market

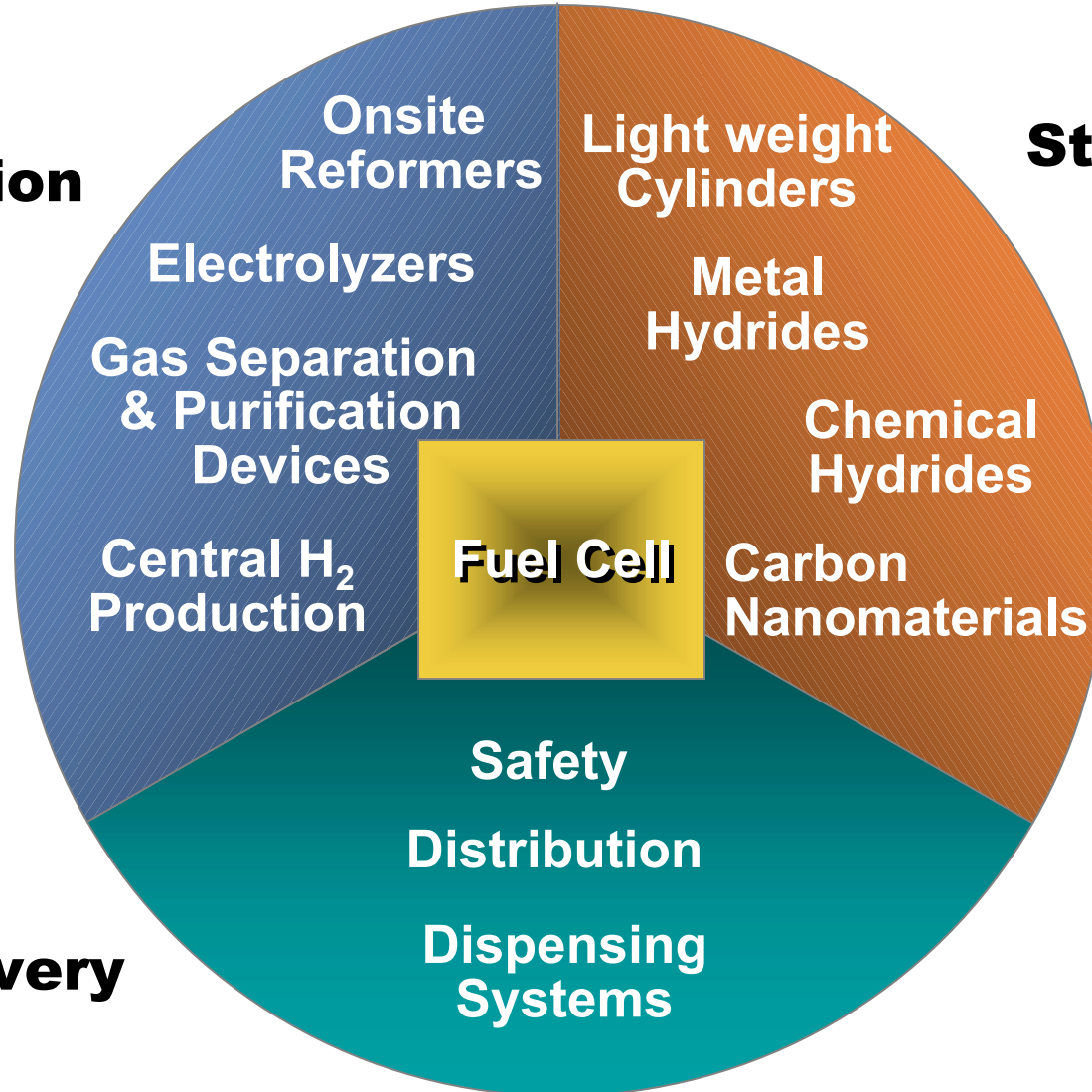
\* Derived from UBS Warburg Global Equity Research, Ballard June 2000

# What it means for Air Products

- **Discernible shift in fuel strategy for autos in favor of hydrogen**
- **Fuel cell hydrogen requirements will dwarf current merchant hydrogen production - 2.5 million tons/year**
- **Current world energy production if achieved via fuel cells - requires about 2 billion tons/year hydrogen**
- **Opportunities exist to support a variety of products and services**

# Hydrogen Infrastructure Requirements

**H<sub>2</sub>  
Production**



**Delivery**

**Storage**

# Air Products Strategy

- **Driven by hydrogen consuming fuel cells**
- **To provide the infrastructure needs of Fuel Cells and the Hydrogen Economy**
- **Leverage leadership position in the production and distribution of hydrogen for over 40 years**
  - **Safety**
  - **Reliability**
  - **Technology leadership in gas separations, process integration**
- **Markets of interest**
  - **Portable, Stationary and Transportation**

# Leadership in Hydrogen Fuel Infrastructure

- Engaged since 1993
  - Over 20 hydrogen study and demo projects
  - Acknowledged leader in H<sub>2</sub> Fuel Station
- Provide KnowH<sub>2</sub>ow<sup>sm</sup> safety training service
- Major role in hydrogen fuel safety codes & standards
- Broad technology base and intellectual property position





# Some H<sub>2</sub> Fuel Stations - U.S.

CTA  
Chicago, IL



Ford Dearborn, MI

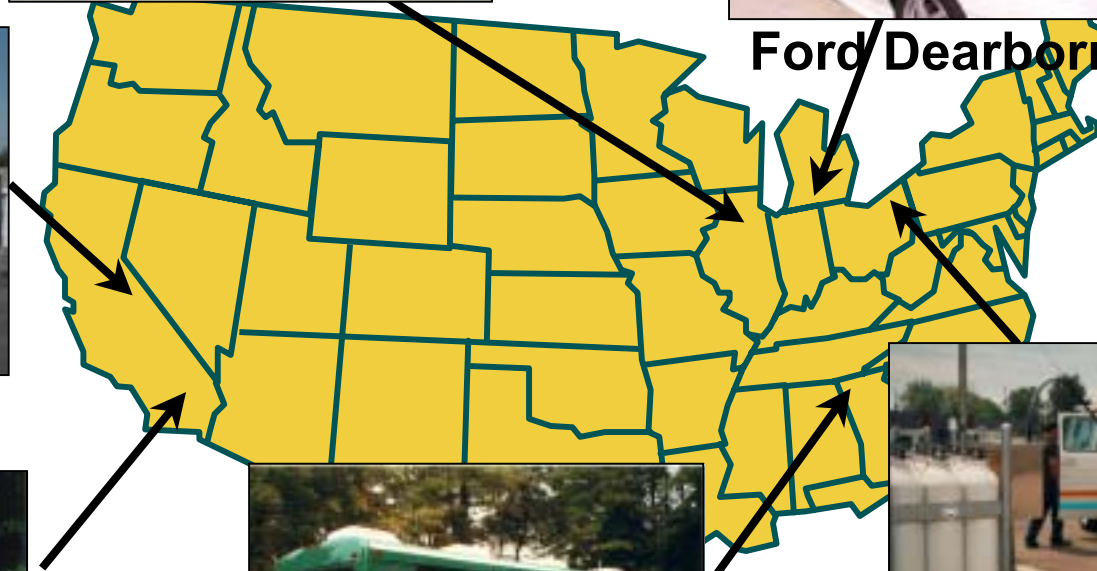
CaFCP



Sacramento CA



Palm Springs, CA



Atlanta, GA



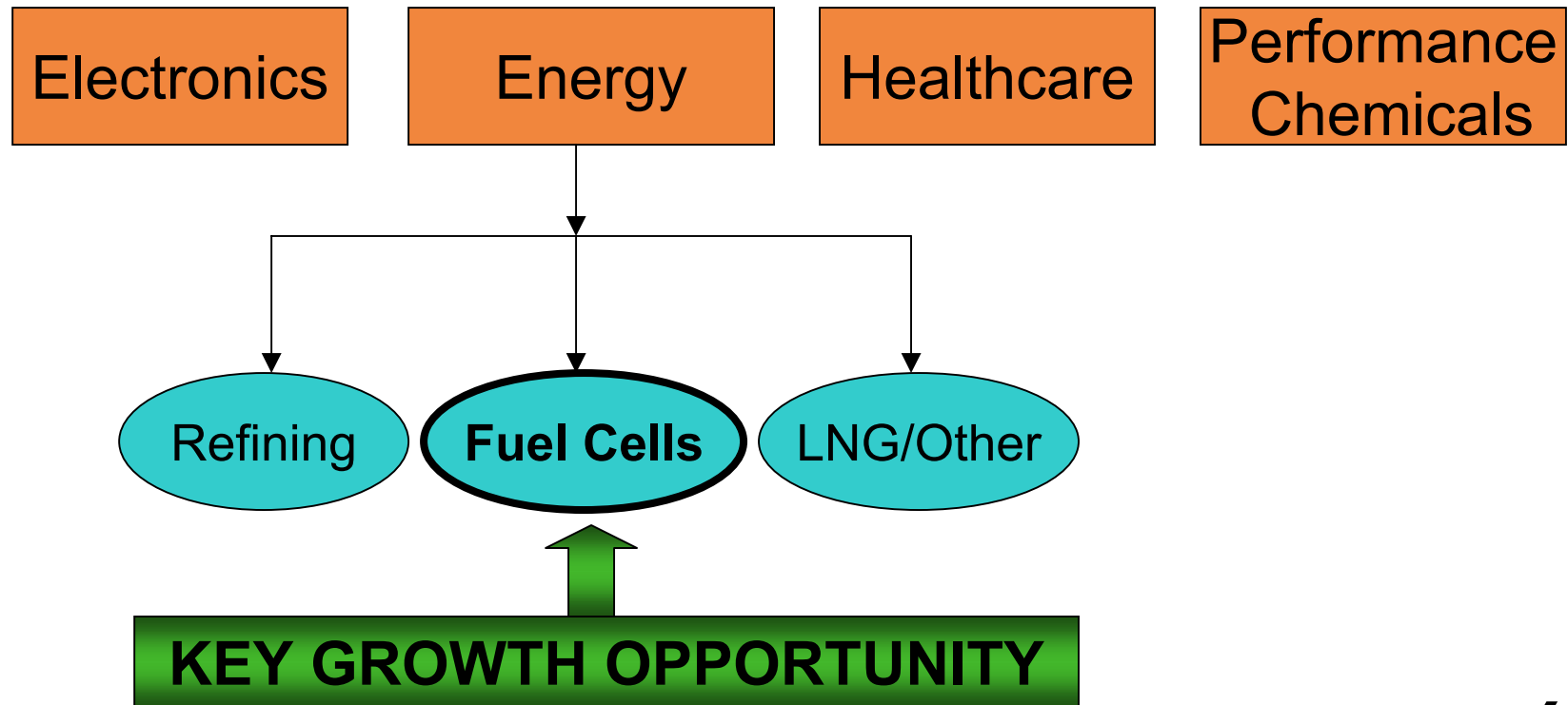
Erie, PA

# Air Products Partnerships

- **Partnerships are necessary to provide total capabilities needed for integrated system offerings**
- **Hydrogen Generators**
  - H<sub>2</sub>Gen Innovations
- **Storage**
  - Japan Metals and Chemicals - metal hydrides
  - Millennium Cell - chemical hydride
- **California Fuel Cell Partnership**
  - Autos, Energy Cos., Transit Cos.
- **U. S. DOE - Technology and Demo programs**
  - Plug Power, Ballard, H-Power, Harvest, Questair, Penn State

# APD – Leveraging Core Skills for Growth

- Large Multinational Industrial Gas & Chemical Company
- Broad Market Access
- Expanding Leadership Positions in Growth Markets



Thank you

tell me more

[www.airproducts.com](http://www.airproducts.com)