

# Comparison of Hydrogen Supply Options



Chengdu, China

# Make vs. Buy Analysis

## Air Products Onsite H<sub>2</sub> “Buy” Case Provides Lower Unit Price Than “Make” Case

- Energy Consumption: 3-5% Better Efficiency
  - Continuous feedback from 60 SMRs
  - Ongoing development and optimization
  - Focus on long term efficiency/capital trade-offs
  - New technology improvements during contract life
  - Air Products bears performance risk over life of facility vs. make case only at performance test
- Capital Costs: 5–10% Lower
  - Multi-plant execution/Repeat engineering
  - Global/Preferred Supplier Agreements
  - Ongoing value improvements
- Operating Costs: Up to 10% Lower
  - Extensive preventive maintenance program
  - Discounts on large catalyst volumes
  - Plant management and operations labor are integrated into overall area network
  - Shared spare parts

# Reliability through Standardization

- Design
  - Top Fired Technip Reformer (since 1992)
  - Company Specific Criteria
- Technology and Hardware
  - Digital Control System, Transmitters, Valves, Compressors, etc.
- Execution
  - In house process, systems, environmental engineering (up-front)
  - Project, construction, start-up and commissioning
- Operations
  - Global HyCO Line Management, central support
- Maintenance
  - Global HyCO specialists for turnarounds, trouble-shooting

# Risk Matrix Comparison

Risk Category	Sale of Equipment (Customer Make Case)		Sale of Gas (Third Party Onsite)	
	Customer	Service Provider	Customer	Service Provider
Design & Construction	X	X		X
Operating – Cost & Efficiency	X			X
Operating – Performance	X			X
Schedule	X			X
Financing	X			X
Permitting	X			X
Income Tax (national)	X			X
Property Tax (if any)	X		X	
Force Majeure	X		X	
Commissioning	X			X
Insurance cost (loss)	X			X
Termination	X		X	
Regulatory	X		X	

Sale of Gas transfers many risks from customer to Air Products

# Advantages of Supply of Gas

- In addition to significant money saved in energy, capital, and operating costs, customers benefit from:
  - **Experience**: Air Products / Technip 35+ reformer projects and operating experience
  - **Risk Mitigation**: Air Products is responsible for capital and operating cost risk
  - **Long Term Reliability**: Customers benefits from Air Products' extensive operating experience and reliability features built into our plants
  - **Power**: New or upgraded utility systems needed by customers for their projects can be incorporated into the hydrogen plant
  - **Resource Flexibility**: Customer capital and manpower are dedicated to their core businesses

# Contact Us for Specific Benefits to Your Operation

- To learn more about how you can benefit from the long standing Air Products/Technip Hydrogen Alliance, contact us today!

<http://www.h2alliance.com/contacts.htm>

**Thank You**      谢谢你！      **Obrigado**

ありがとう!

Bedankt

Danke

Grazie

Gracias

Doh Jeh

Terima Kasih



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