



The Road to Hydrogen – Challenges Ahead in Technology and Manufacturing



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CTV Hydrogen Strategy

- Develop organizational capability to be a market leader should hydrogen be adopted in the fuels portfolio
- Leverage hydrogen as an extension of our existing businesses
- Ensure CVX is positioned to actively participate in the development of hydrogen technologies and related regulations and legislation
- Enhance CVX's reputation as a leader in fuel processing

Chevron Hydrogen Energy Stations



Integrated Hydrogen Energy Stations: Scalable, Distributed Manufacturing Technology



- Convergence and integration
- Molecular-scale design
- Advanced materials
- Digital control technology

*Hydrogen may be leading the way
into a fundamental shift in
manufacturing technology*

Chino hydrogen production unit



Current Storage Technologies are Inadequate for the Future

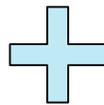


105 kg at 6,000 psi in a footprint 28' long x 5.5' wide x 7' high

What's Required: New Technical Approaches

- Thermally and mechanically integrate the reformer to maximize heat recovery, minimize heat loss, and minimize balance of plant
- Design the reformer to operate at pressure required for purification step
- Balance heat load to achieve passive temperature control and minimize the number of control loops

Monolith Reactor



Heat Exchanger



Catalyst-Coated Heat Exchanger/Reactor



What's Required: New Design Concepts

