



Case Study #1: Integrated hydrogen/cogen facility, major expansion, clean fuels

- Customer: Valero Port Arthur, TX
- Challenge: Single source reliable H₂ for refinery upgrade
- Value-Added Reformer Solution:
 - Provides steam
 - Integrated with gas turbine to provide power
 - Accepts refinery fuel gas to help maintain fuel balance



In addition to hydrogen, this unit provides the customer with high value steam and power.



Case Study #2: Heavy fuel conversion to meet environmental regulations

- Customer: Texaco/Shell JV and BP in California
- Challenge: Convert heavy sour (high sulfur and low API gravity) crude into valuable transportation fuels
- Value-Added Solution: Reliable H₂ along pipeline
 - Respond easily to planned or unplanned H₂ demand shifts
 - Flexibility to separate turnaround in H₂ production units from turnaround in H₂ consumption units



Air Products 96 MMSCFD SMR in Carson, CA is connected to a pipeline with another Air Products SMR, allowing refineries to meet environmental regulations and enjoy benchmark reliability.

Case Study #3: European environmental legislation and growing diesel demand, by-product integration

- Customer: Repsol-YPF, Spain
- Challenge: H₂ for hydrocracker from experienced H₂ provider and operator
- Value-Added Solution: 63 MMSCFD owned and operated SMR
 - Unique features to maximize availability
 - Feedstock flexibility: Pre-reformer to handle LPG or naphtha feedstock when natural gas is unavailable
 - Includes by-product liquid CO₂ recovery



Air Products' 63 MMSCFD SMR enabled an European refinery to meet environmental regulations and growing diesel demand.



Case Study #4: **Edmonton Canada Oil Sands;** **1. Clean diesel, 2. Total refinery conversion to heavy oil feedstock**

- Customer: Petro-Canada in Edmonton, Canada
- Challenge: Meet clean diesel regulations in 2006 and total oil sands crude conversion in 2008
- Value-Added Solution:
 - Significant economies of scale provided to customer
 - Pipeline infrastructure
 - Provided steam for refinery
 - Innovative water re-use
 - Site pre-investment for Phase 2 SMR

Air Products' provides 176 MMSCFD of H₂ via two SMRs to upgrade Petro-Canada's bitumen.

