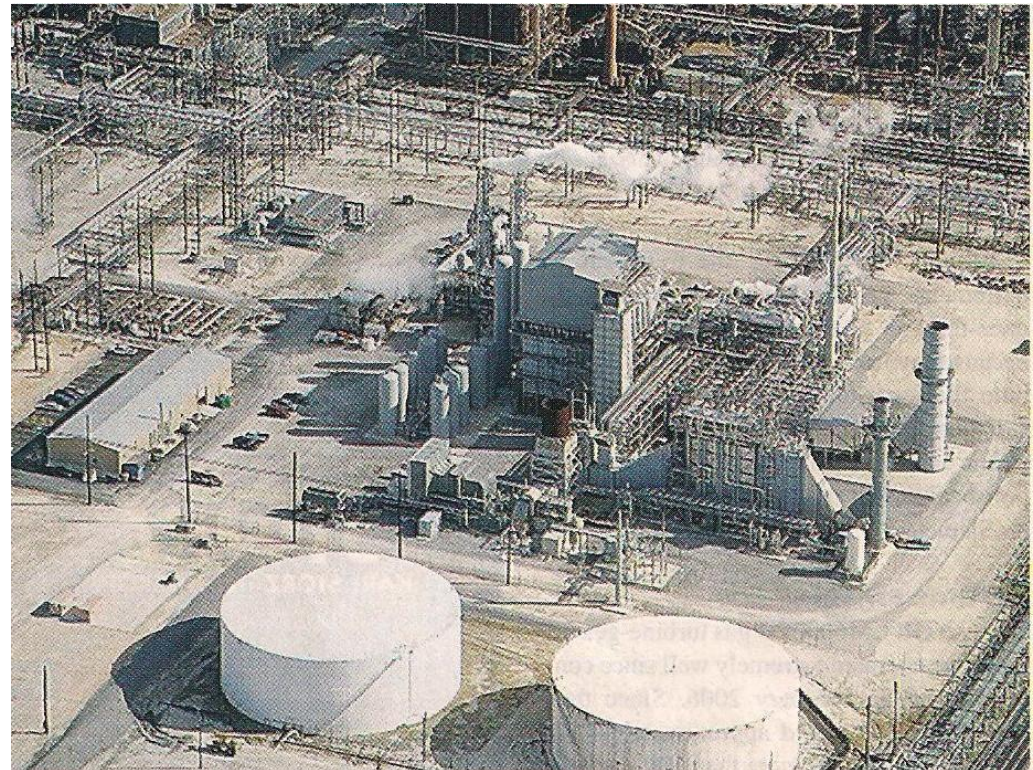


# PORT ARTHUR II INTEGRATED HYDROGEN/COGENERATION FACILITY

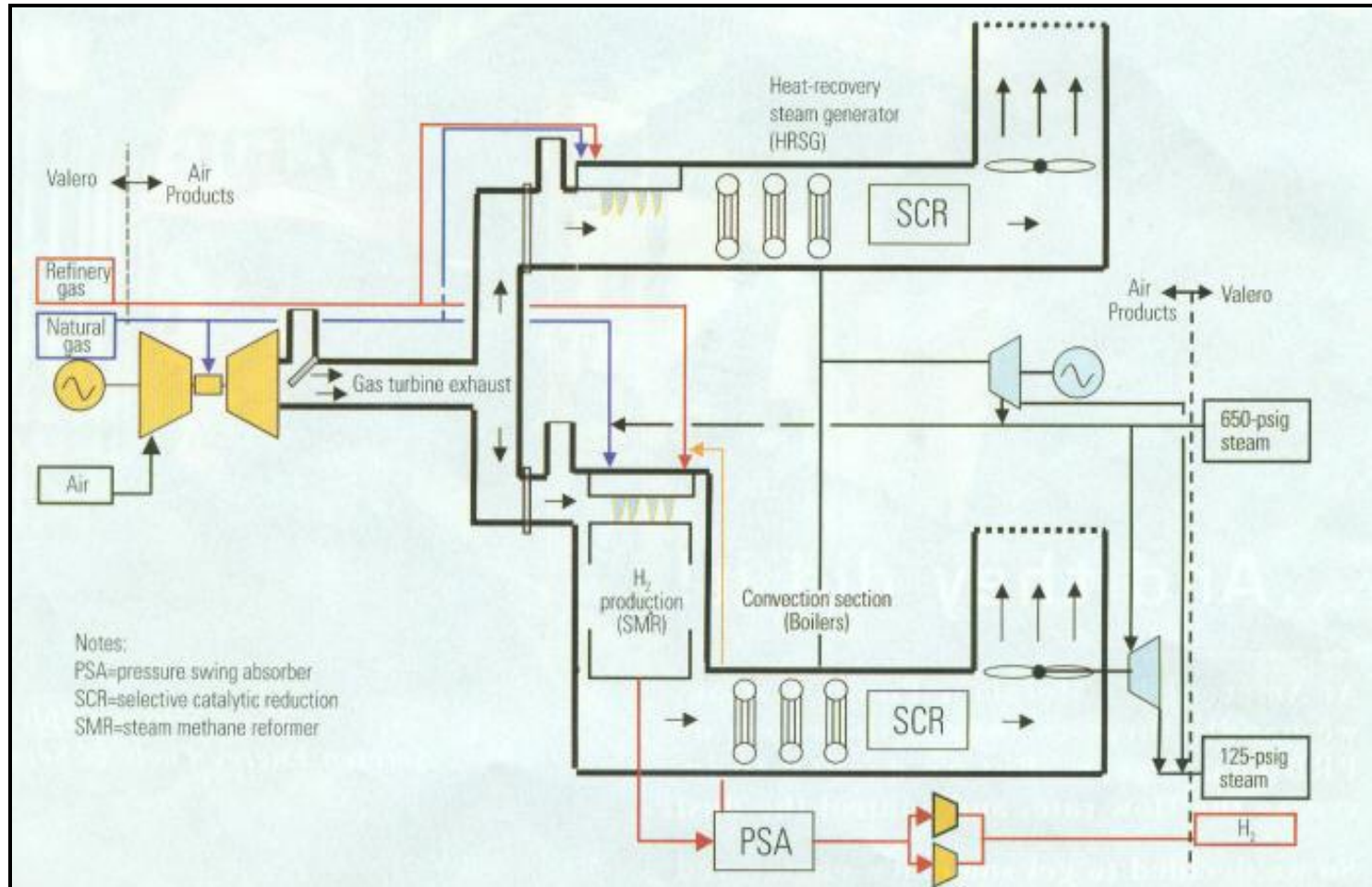
- Owner/Operator: Air Products
- Refinery Partner: Valero Energy Corp.
- Major Suppliers
  - Gas Turbine Generator: GE Frame 7EA
  - HRSG: Deltak
  - Steam Methane Reformer Design: Technip
  - Steam Turbine Generator: Dresser Rand

## PORT ARTHUR II INTEGRATED HYDROGEN/COGENERATION FACILITY

- Adjacent to Valero 300,000 bpd Port Arthur Refinery
- Supplies:
  - 100 MW Power
  - 110 MMSCFD of hydrogen
  - 1.2 million pph of steam
- Operational late 2006



# Air Products Hydrogen Cogeneration Plant Port Arthur, TX



# PORT ARTHUR II INTEGRATED HYDROGEN/COGENERATION FACILITY

- High efficiency
  - Supplemental Firing
  - Backpressure steam turbines
  - Utilize by-product fuel
- Fuel Charged to Power efficiency 80 to 90%
- Complex controls optimize operation
- Designed for high reliability
  - Less backup equipment
  - Fewer startup and shutdown losses

# Environmental Benefits

- Shutdown of old refinery boilers reduced NOx emissions in non-attainment area
- Baseload power output reduces coal firing in SERC
- No cooling water required for condensers
- Source of hydrogen for ULSD production

# PORT ARTHUR II INTEGRATED HYDROGEN/COGENERATION FACILITY

- Integrating power production with process operations dramatically saves energy and reduces emissions
- Process heat can be supplied directly to process heaters in addition to steam generation.
- Highly integrated and complex process arrangements can be optimized and controlled with current control technology.