Carbon Capture and Sequestration from Industrial Sources

DOE Funding Opportunity Number: DE-FOA-0000015

CO_2 Capture and Sequestration for Pt. Arthur, TX SMRs

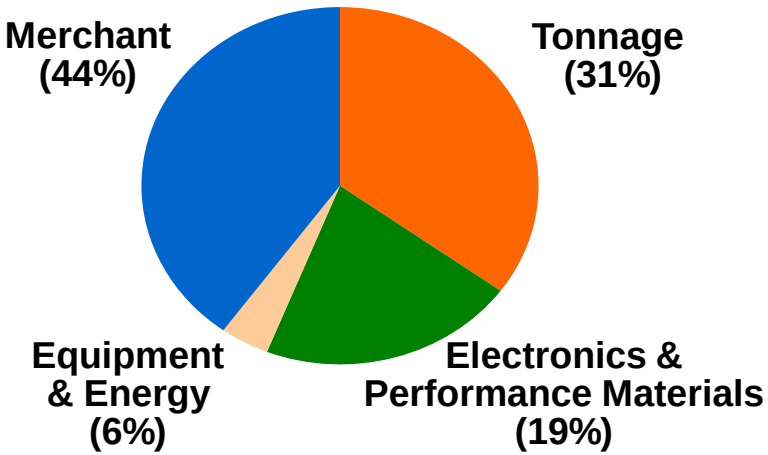
September 16, 2010

AIR PRODUCTS

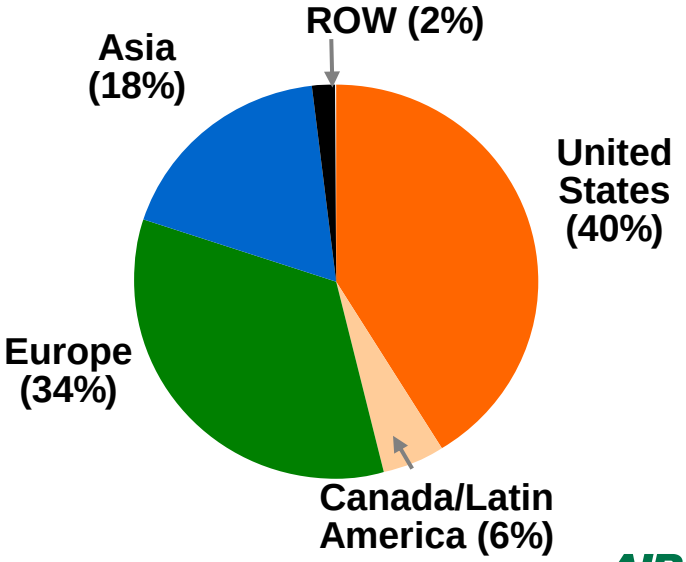
Air Products Overview:

- Fortune 500 Company founded in 1940
- $8.3 billion in 2009 revenue
- Diverse markets and geographies
- Positioned for continued long-term value creation
- $1.5 billion of capital expenditures in FY2009

FY'09 Business Segment Sales



FY'09 Geographic Sales

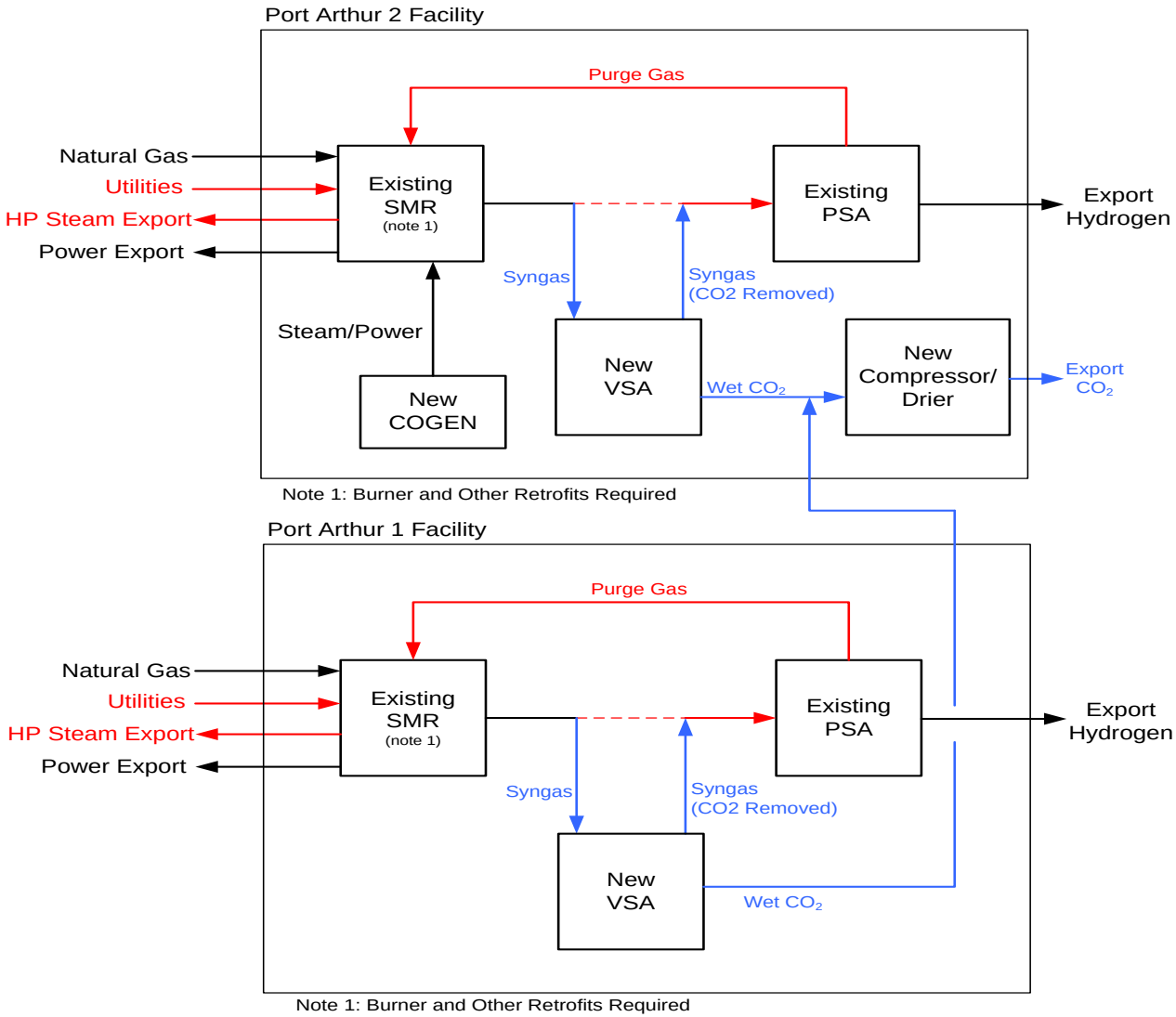


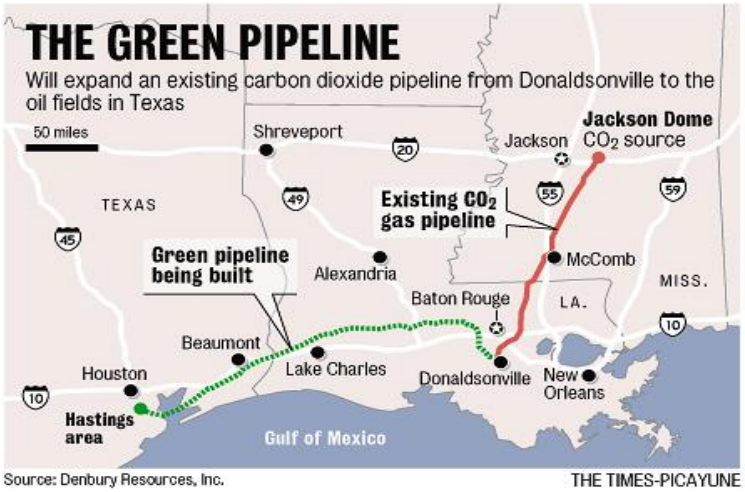
AIR PRODUCTS

Project Overview:

- 1 of 3 Projects selected for funding under the Industrial Carbon Capture and Sequestration ("ICCS") Program
- Project Summary: Capture CO_2 off two world-scale steam methane reformers located in Port Arthur, TX. The CO2 will be sold to Denbury Resources which will be utilized for enhanced oil recovery
- DOE Funding: $284 MM DOE Cost Share: 66%
- Projected On-stream Date: November 2012
- Project Participants: Air Products and Chemicals, Inc and Denbury Resources
- Project Objectives:
  - Capture and sequester approximately 1 MM TPY of CO_2
  - Structure commercial arrangements for operation beyond DOE Demonstration Period (Sept 2015)

Air Products' CCS Project Overview

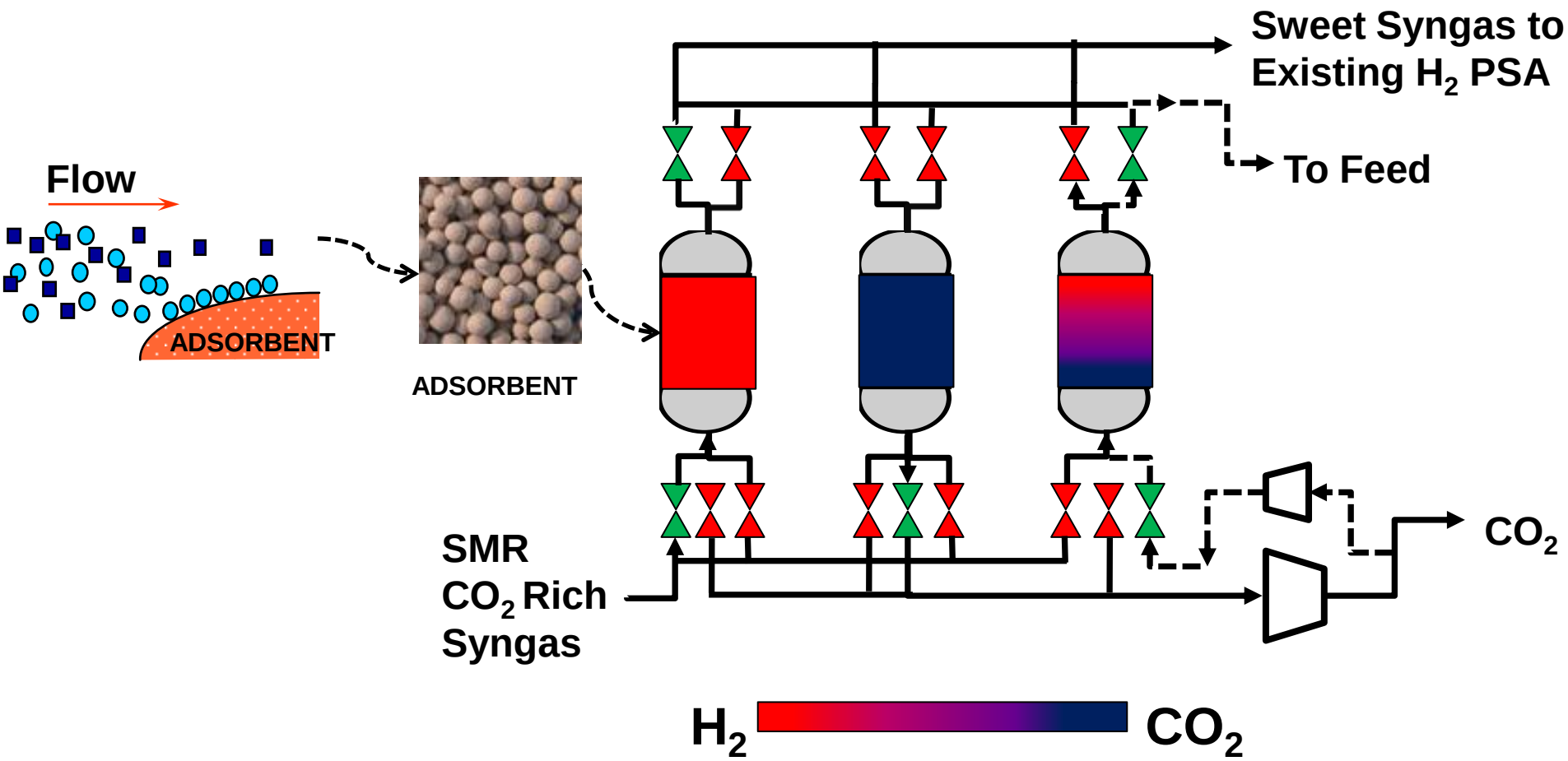




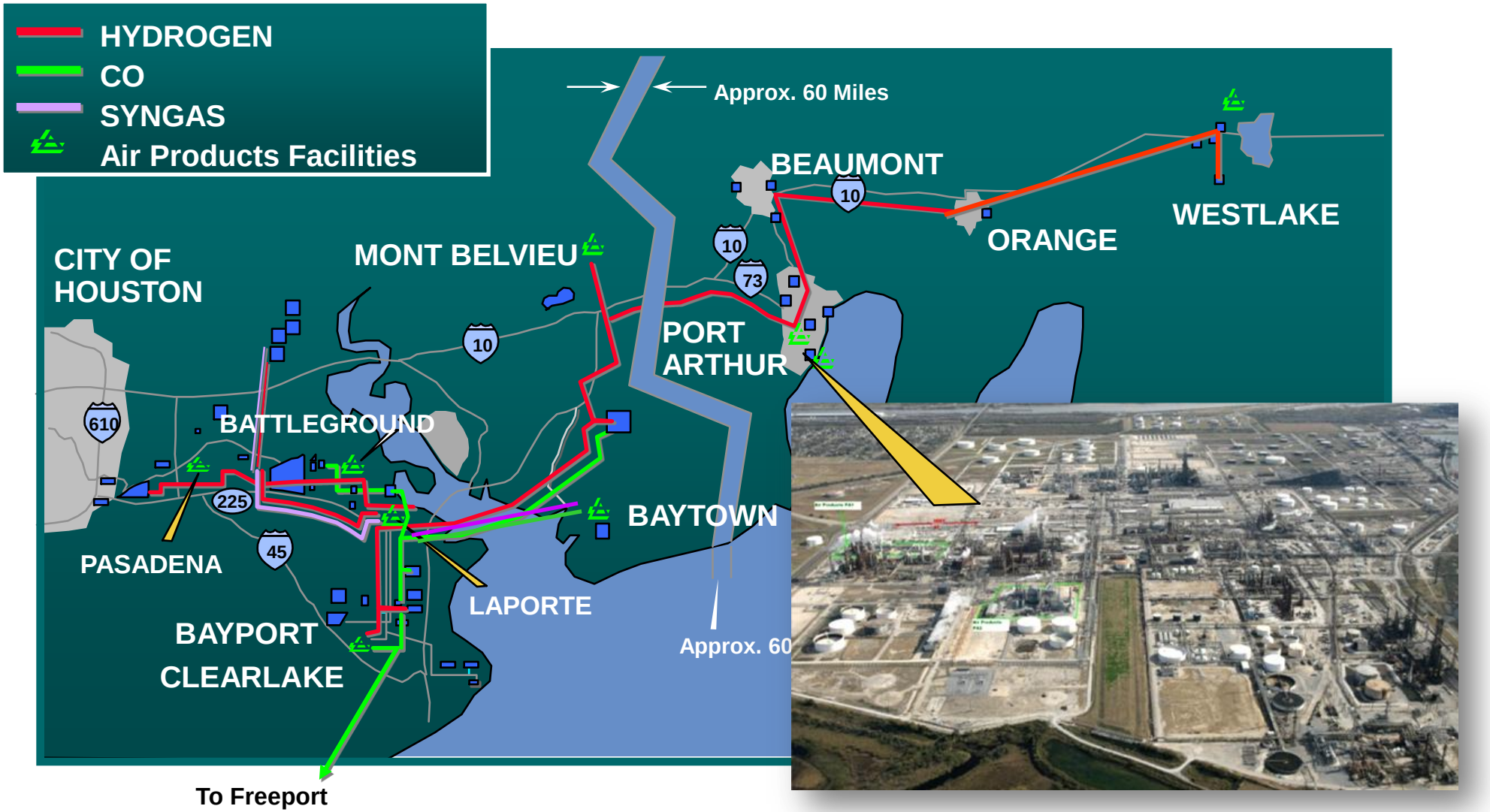
Stream Color Legend
Existing Stream – Black
New Stream – Blue
Revised Stream - Red

AIR PRODUCTS

Technology Overview: VSA CO_2 Process



Air Products HyCO Pipeline - West Gulf Coast



2012 Air Products Gulf Coast Hydrogen Pipelines

Phase I Summary

- VSA vs. MDEA
  - Lower operating costs
  - Lower capital
  - Less impact to Valero
- Developed plant and operating cost estimate
- Negotiated pricing and general T+Cs with Denbury
- Further developed project with Valero
  - Plot
  - Low-cost utility supply
  - ROW
  - Co-gen

Phase I Summary cont.

- Completed EIV
  - Carbon capture facility
  - CO2 pipeline lateral
  - Denbury MVA

Phase II Update

- Finalize VSA process development
- Finalize Agreements with Valero and Denbury
- Finalize plant design/scope
  - Compression
  - Co-gen sizing
  - Interfaces w/Valero
- Finalize definitive cost estimate
- Complete Environmental Assessment
- Build and operate CO2 capture facility/pipeline lateral

Thank you

www.airproducts.com/CO2_capture