Warm Gas Clean-Up
and
Carbon Capture & Sequestration
Demonstration
Project Overview

Presented to: Gasification Technologies Council
April 6, 2011
Tampa FL

Warm Gas Cleanup & CCS Project

❑ Warm Syngas Clean-up Objectives

- Design, construct, commission, and operate a 50 MWe warm syngas cleaning demonstration system with real syngas
- Establish relevant commercial operating experience
- Establish RAM (reliability, availability and maintenance) targets
- Mitigate design and scale up risk for commercial plant
- Completion of the work by September 2015

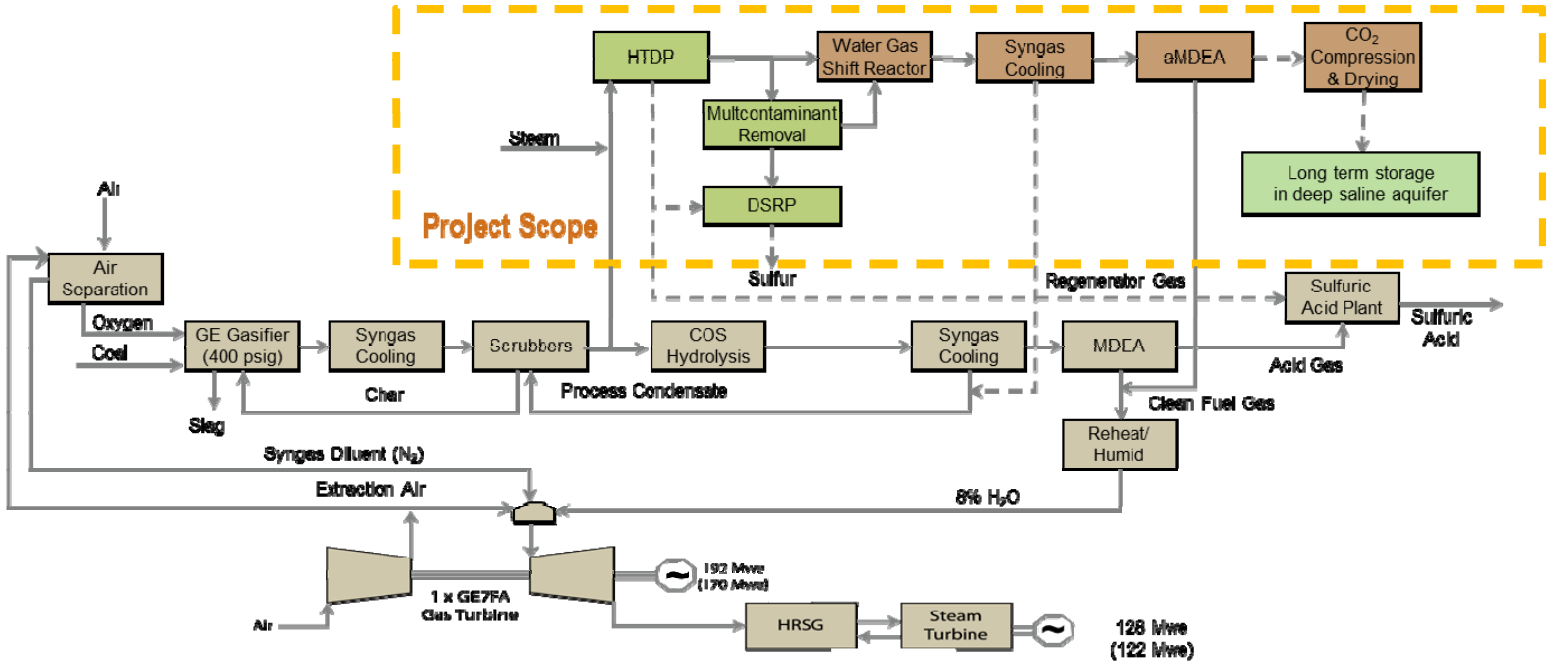
❑ Carbon Capture and Sequestration

- Demonstrate CCS on operating IGCC
- Sequester 300,000 tons of CO2/year
- Use of conventional capture technology

PRIMARY PARTICIPANTS:

- Funding/Support
- Technology Owner
- Engineer
- Site Host
- BASF Corporation, Süd-Chemie, Inc., and Eastman Chemical Company
- ECT, ASRus, Sandia, USF, SECARB

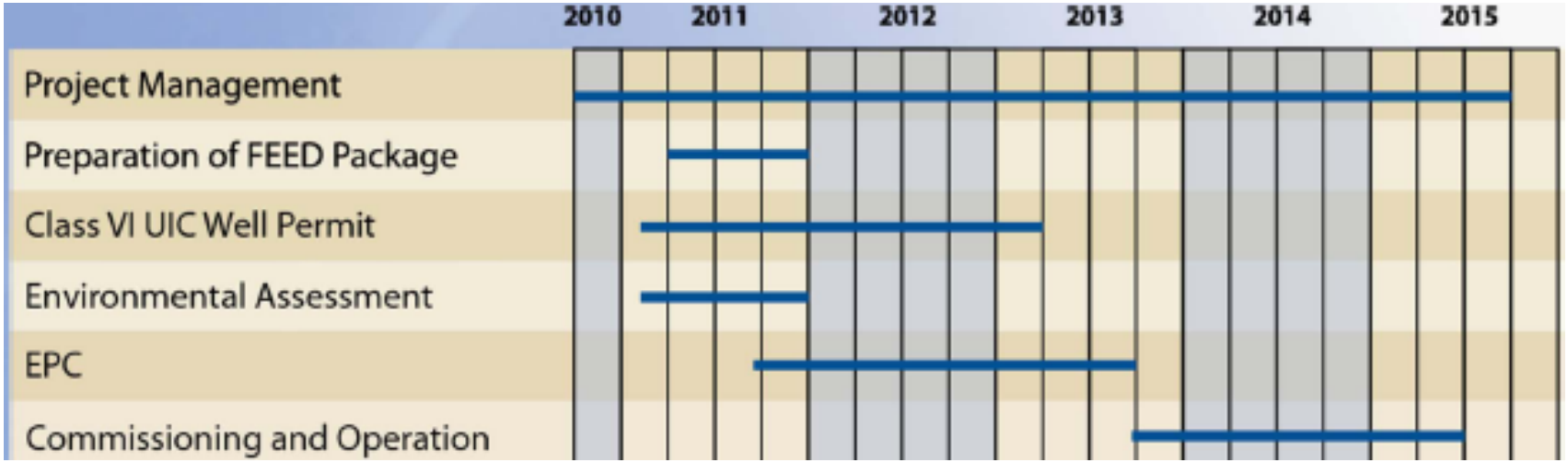
Integration of Syngas Cleaning and CCS



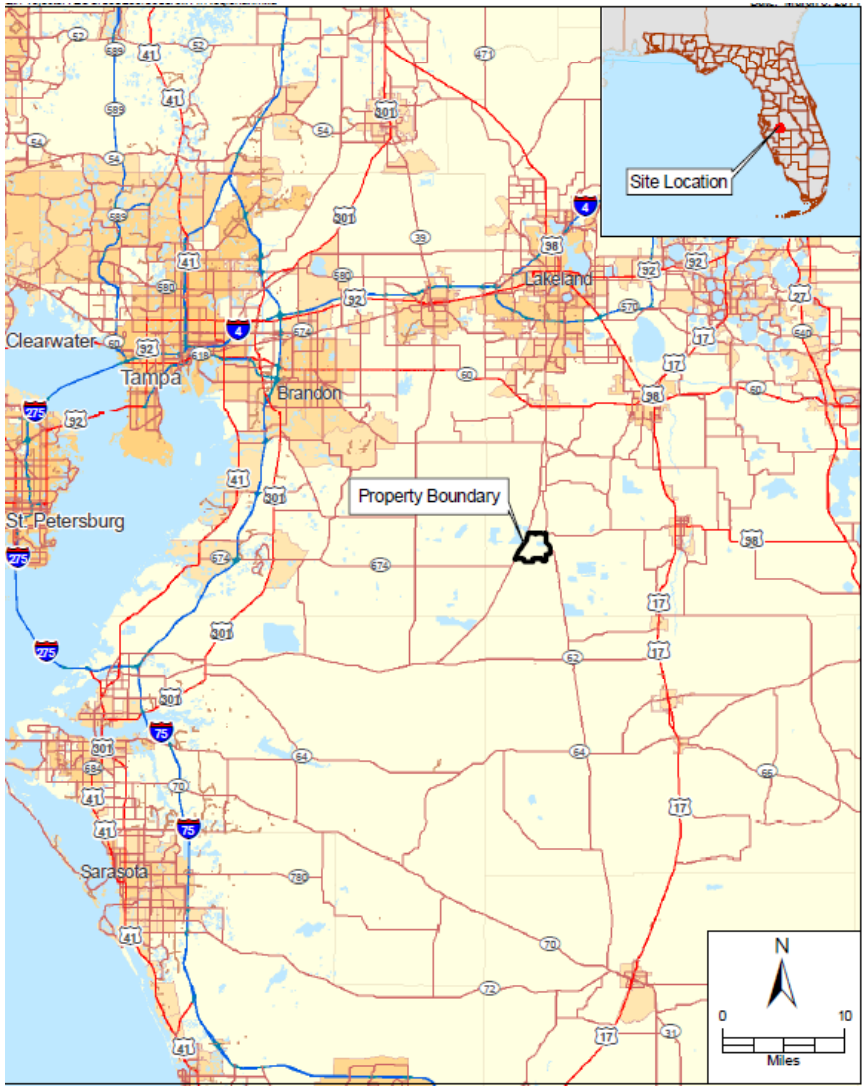
RTI Technology Benefits Overview

- The technology has been successfully demonstrated in a pre-commercial pilot phase at Eastman's Kingsport, Tennessee (USA), site using coal-derived syngas
- DOE-funded system study predicts a 2-3 percentage point increase in overall IGCC thermal efficiency and a six percent reduction in the cost of electricity by using the RTI contaminant removal process for an IGCC plant
- Continuous Regenerable Process (Fluid Beds)
- Sorbent Resistant to Attrition (Sud Chemie)
- Removes both H_2S and COS to Single Digit ppm Concentrations
- Operates equally well at any pressure
- Good Fit with Shift Conversion for Carbon Capture

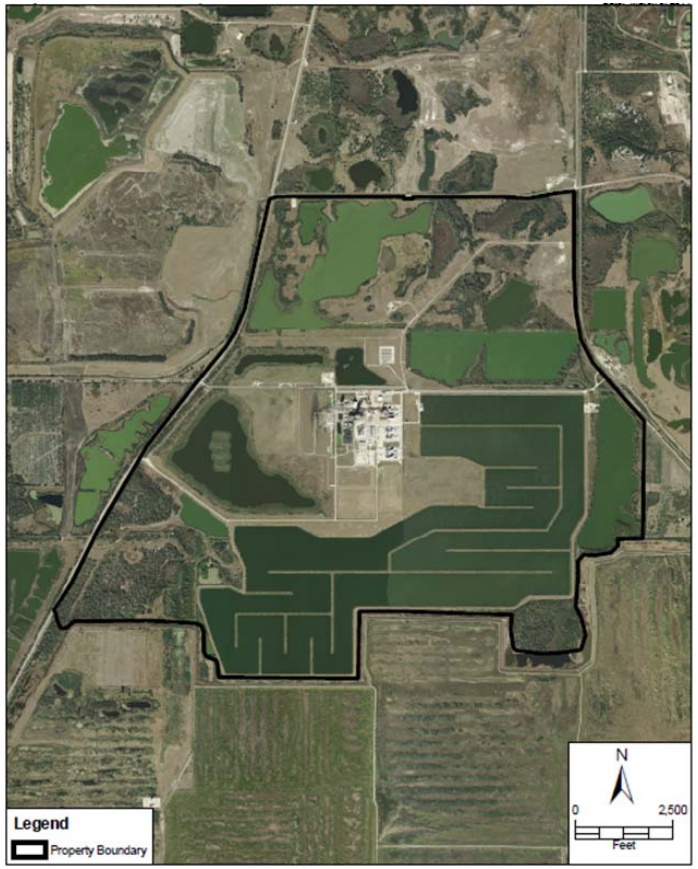
Schedule Summary



Polk Power Station Location



Polk Power Station Boundaries



CO_2 Sequestration Capability

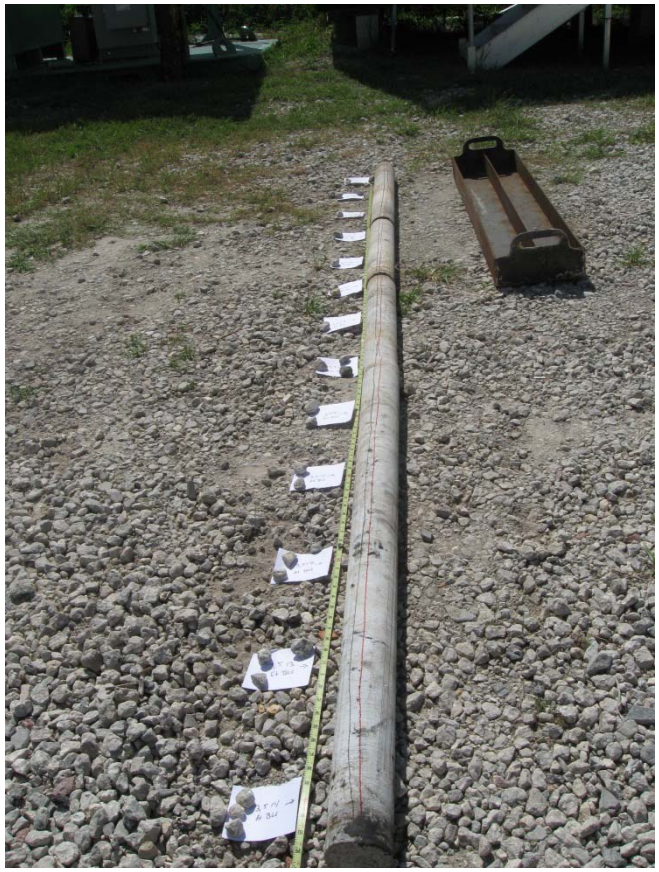
- Site geology has been studied by University of South Florida
- Suitable CO_2 injection zone was identified between 4,400’ – 8,000’.
- Carbonate geology with regionally extensive saline aquifer.
- Excellent primary and secondary confining layers.
- Reservoir modeled with TOUGH2 multi-phase fluid flow reservoir simulator.
- Test injection volumes projected to be contained within site property boundaries.

WGC & CCS Demonstration (Polk Power Station)

tampaelectric.com

Confinement

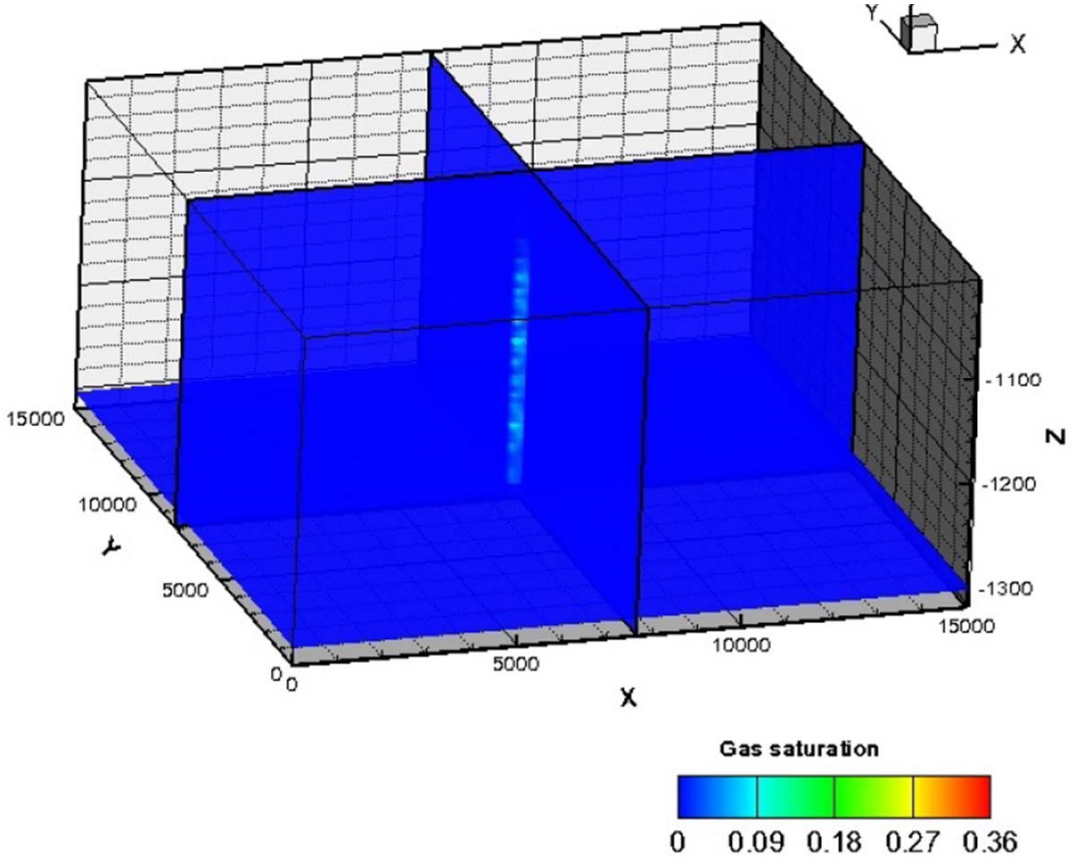
- Approximately 1100 feet of confinement between injection zone and base of USDW



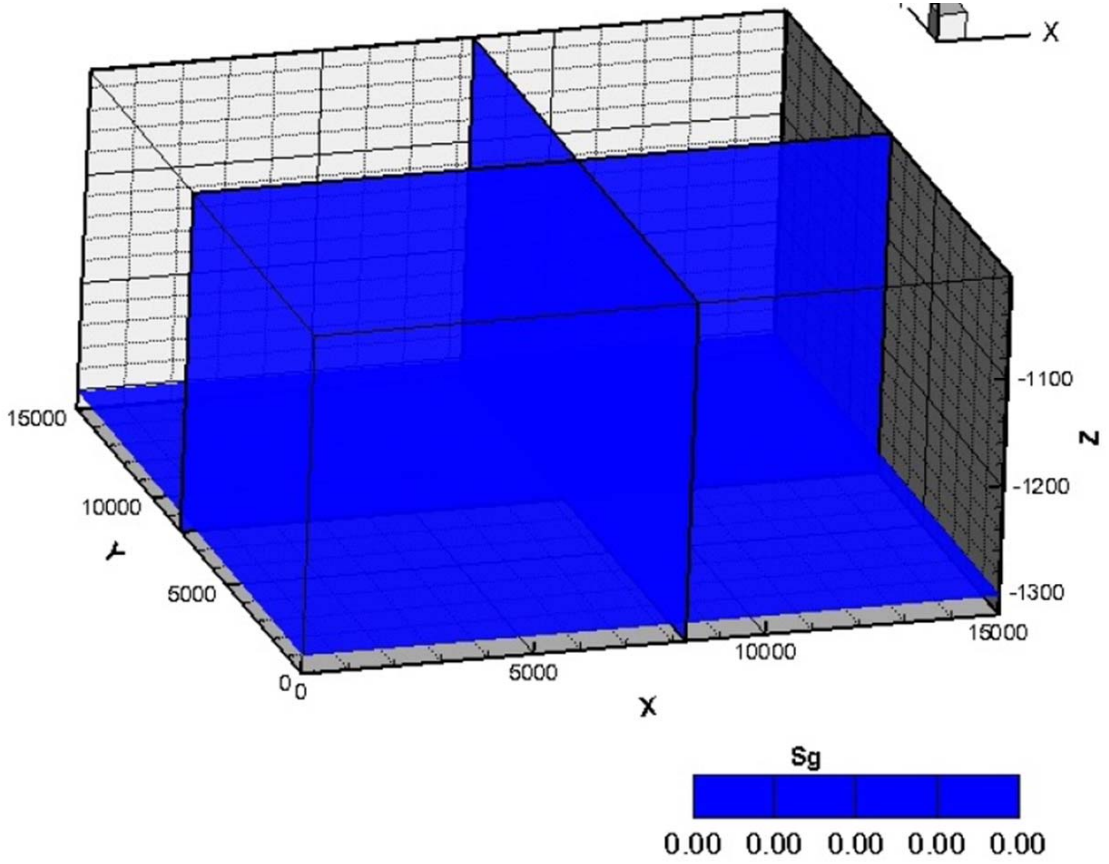
Monitoring, Verifying and Accounting - Proposed

- Atmospheric Monitoring
  - CO2 Detection
- Near-Surface Monitoring
  - Geochemical Analysis, Advanced Water Quality Analysis, Tracers (leak detection), Remote Sensing (surface deformation)
- Subsurface Monitoring
  - Water Quality Analysis, Caprock Integrity, Wireline Logging, Physical Testing (MI of well), Seismic Profiling,

CO2 saturation after 1 year of CO2 injection at IW2 at 300,000 tons per year



CO2 saturation after 1 year of wastewater injection at IW2.



Questions?