Abu Dhabi Carbon Capture, Usage and Storage Project

ESI CCS Project
and
Rumaitha / Bab CO₂ Projects
Agenda

1. Drivers for CCUS in Abu Dhabi
2. Execution Strategy
3. Project Details of the ESI CCS Project
4. Future Opportunities
Abu Dhabi CCUS: Value Drivers

- Strategic Gas Demand & EOR
- Environmental
- Commitment to Abu Dhabi 30% Clean Energy
- CCS Global & Regional Leadership

CCUS Project
Will enable future CCS Projects

ADNOC

CO₂ injection for EOR

Gas Liberation and Enhanced Oil Recovery (EOR)

- Increased oil Recovery
- + Domestic gas availability

AD Government

CCS Projects

CO₂ capture and transportation projects at $/MT

Regulatory Framework
Considering the power sector in Abu Dhabi alone:

- Growth in hydrocarbon gas demand is expected to be >1 BSCFD over next 10 years
- Gas Supply sources to grow (domestic/imports) to meet the demand including LNG imports

ADNOC support CCUS strategy to enhance oil recovery (EOR) and potentially increase UAE gas availability

Supported by the EAA “CCS Value Proposition Study” which forecasts a potential growth in CO₂ requirements over next 10-15 years, if CO₂ projects prove to be successful.

The ESI CCS Project is a first commercial mover project which will establish the commercial principals for a CO₂ industry and further demonstrate the technical viability of CO₂ operations
CCUS or Low Carbon Power is a key strategy to reduce UAE’s greenhouse gases whilst continuing to meet the country’s growing energy demands.

The ESI CCUS Project will capture ~800,000T of CO₂ per year:
- equivalent CO₂ from a 200MW CCGT1
- equivalent CO₂ from ~170,000 cars
- equivalent CO₂ from ~100,000 houses (US)

The project demonstrates the UAE’s global and regional leadership in the deployment of CCUS and its support for climate change mitigation mechanisms.
ADNOC and Masdar are working together to develop the CO₂ Capture, Transportation & Injection components.

This presentation principally deals with the ESI CCS Project.

Masdar responsible to provide technology & project support for the CO₂ Capture, Compression and Pipeline facilities

- Pilot Injection program successfully implemented in Rumaitha (2009 - 2011).
- ESI Facility & Pipeline FEED completed in 2010.
- ESI CCS Project Management support awarded to Rhead Group in 2012
- ESI CCS Project awarded to Dodsal Engineering & Construction in July 2013 (<USD200 million)
  - 3 months into a 33 month schedule – Ready for Commissioning by Jan 2016
ADNOC through its subsidiary ADCO is responsible to provide technology & project support for the CO$_2$ Injection facilities, and the treatment post production.

- Pilot Injection program successfully implemented in Rumaitha (2009 - 2011)
- Rumaitha / Bab FEED completed in 2013.
- Rumaitha / Bab Injection facilities in EPC Tendering Phase and forecast award by end 2013
ESI CCS Project Technical Overview

CO2 Source (ESI) and Capture

CO2 Compression & Dehydration

CO2 Transportation

CO2 Injection in Rumaitha & Bab fields
DRI & CO2 Absorption Processes

Direct Reduction Plant

CO2 Absorption System

Fe2O3 + 3 H2 ---> 2 Fe + 3 H2O
Fe2O3 + 3 CO ---> 2 Fe + 3 CO2
CO₂ Compression and Dehydration Facility

- Sized for 800,00 TPA CO₂ (98% min purity) = 41.5 MMSCFD
- **LP Compression:**
  - Integ rally geared 5/6 Stage Centrifugal Compressor (0 – 41barg)
- **Mol Sieve dehydration system**
  - Reduce water content to 20lb/MMSCF
- **HP Compression:**
  - Reciprocating 2 Stage Compressor (35 – 238barg)
- **Mass Transfer Custody Transfer Meter (Coriolis Meter)** complete with GC and Moisture Analyzers
- **Utilities:**
  - Electrical transformers/switchgear for 25MW
  - Utilities such as N2, Cooling Water, Instrument Air
  - Control Room for Facility and Pipeline
CO₂ Compression Facility - Location
CO₂ Compression Facility Layout
Pipeline Transmission and Receiving Station

- **Pipeline:**
  - 8” X65 API5L carbon steel buried pipeline designed for 245 barg
  - 2 Block Valve Stations
  - Remote isolation and maintenance blowdown facilities
  - Launching / Receiving facilities for Pipeline Scrapper
  - Telecoms, SCADA, CCTV and leak Detection running over buried fiber optics

- **Rumaitha Metering Station:**
  - Mass Transfer Custody Transfer Meter (Coriolis Meter), complete with GC and Moisture Analyzers
  - CO₂ transferred to ADCO
CO₂ Transmission Pipeline - Location
CO₂ as an EOR agent has been endorsed:
- Success of the ESI CCS Project and Rumaitha / Bab Injection are key to future development.

Changing landscape in Abu Dhabi with potential CO₂ targets for field testing and development:
- CO₂ capture linked to ADNOC field demand and performance;

Whilst preliminary, the EAA CCS Value Proposition study forecast a growing CO₂ demand in the next 25-30 years, based on ADNOC estimations.
Thank You