Geological CO$_2$ Storage Potential in the ESCWA Region

What will make it happen?

Steve Cawley, Project and Resource Manager, Carbon Solutions, BP Alternative Energy
Framing the CCS Opportunity...

CCS needs...

Capacity and Integrity
- Infrastructure
- Geology

Technology
- Proven at scale
- Driving down costs

Policy and Regulation
- Investor confidence
- Revenue stream

... a Commercial Framework
Regional & National Carbon policy: the early building blocks are there

- The UN FCCC Clean Development Mechanism is a beginning.
- CoP 16 2010 accepted CCS in the CDM
  - Decision 10/CMP.7 adopted Durban 2011
And there is already CCS activity in the region

**Kuwait:**
Investigating pilot project. Workshop with KPC, OPEC & IEA in 2012

**Bahrain:**
CO2 Capture on existing GPIC plant used for Urea and Methanol production. CDM eligible

**Qatar:**
Qatar Petm and the Sci & Tech Park/Imperial College/Shell R&D collaboration focused on improved reservoir simulation

**Saudi Arabia:**
Saudi Aramco Uthmaniya gas plant CO2-EOR test project to begin injection operations in 2014

**Abu Dhabi:**
- ADNOC & Masdar working with ESI, TAPCO and EMAL to conduct FEED on CO2-EOR projects for 2016-18 start-up
- Rumaitha 2009-11 pilot CO2 injection project

Sources: GCCSI; IHS Energy Ltd (Refineries emitting >1MMtCO2/yr)
So, what might the CCS opportunity in a typical country with a growth agenda in this region, look like?

Balancing CO2 Supply & EOR portfolios ... with Long Term need for Storage
Our experience at In Salah has helped us learn at first hand about building a CCS Project from Design to Operate, with Monitoring built-in from Day 1.

CCS today in Algeria.
What could tomorrow look like in your world?
The In Salah CO2 Injection Project – key facts

- Industrial Scale Demonstration of CO2 Geological Storage (Amine Capture)
- Deep Saline Storage Formation at ~2Km; Offset & downdip from Krechba Field GWC
- Storage started August 2004 via 3 Injectors; ended June 2011
- 3.7 MMtCO2Stored to date; NO PRESSURE SUPPORT TO PRODUCTION (not EHR)
- No CCS Policy or Regulation; No commercial benefit to In Salah Gas JV
- Test-bed for CO2 Monitoring Technologies $30mm+ Research Project “in the field”
Monitoring CO2 Injection: different scales & costs

$100/sample

$350k/well

~$300k/yr

$10MM/Survey

Scale and Cost: but each has own merit & value
In Salah Monitoring Technologies: Evaluation

Low Cost
- Microbiology
- Aquifer studies
- Airborne Flux
- Dynamic Modelling
- Water Chemistry
- Annulus Sampling
- Wellhead monitoring
- Wellbore sampling
- Soil Gas
- Geochemistry
- Satellite Imaging
- CO2 work
- 4D gravity
- Tracers
- Geomechanics
- Logging
- Micro-seismic
- Wellhead monitoring
- 4D VSP
- Microbiology
- Aquifer studies
- Airborne Flux
- Dynamic Modelling
- Water Chemistry
- Annulus Sampling
- Wellhead monitoring
- Wellbore sampling
- Soil Gas
- Geochemistry
- Satellite Imaging
- CO2 work
- 4D gravity
- Tracers
- Geomechanics
- Logging
- Micro-seismic
- Wellhead monitoring
- 4D VSP

High Cost
- Cross-well EM
- Surface EM
- Surface flux
- Geomechanics
- Logging
- Micro-seismic
- Wellhead monitoring
- 4D VSP

Consider
- Just Do It
- Key
- To be tested
To finish ...

Skills     Resources

√     √

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UN-ESCWA