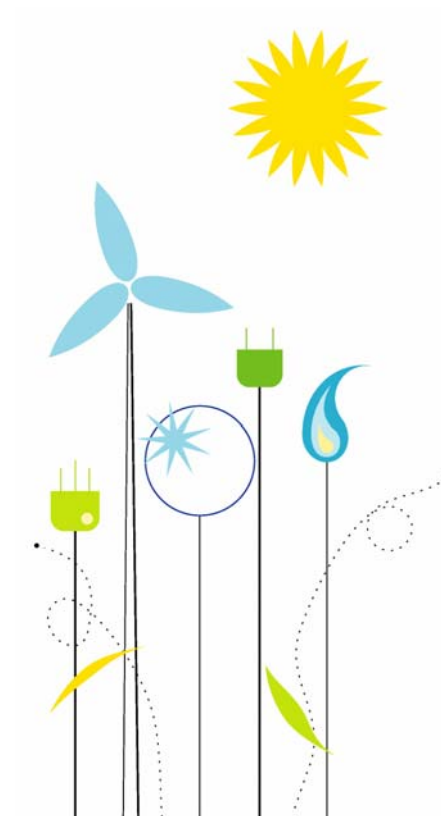


CO₂ Storage at In Salah

Iain Wright, CO₂ Project Manager, BP Alternative Energy

2nd International CCS Symposium

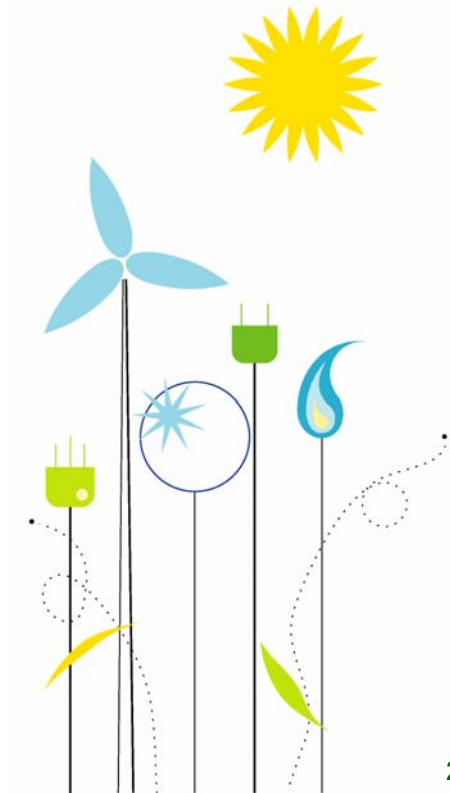
Paris, October 4th 2007





Agenda

- **CCS Technology**
- **Why Demonstrate CO2 Storage at Industrial-Scale?**
- **Objectives of the In Salah CO2 Storage Project**
- **Progress to Date**
- **Lessons Learned**
- **Next Steps**
- **Questions**



BP CCS Technology Program



Research



Industry / Academic Initiatives



Source-sink matching

CO₂CRC, EU Geocapacity, Coach, US Regional partnerships

Public policy support

CSLF, ECCP, EU-ZEPP, CDM

Assurance framework

CO₂CRC, CSLF, IMCO₂, WRI

3rd Party Demonstrations

Sleipner, Weyburn, CO₂Remove

Technical Demonstrations



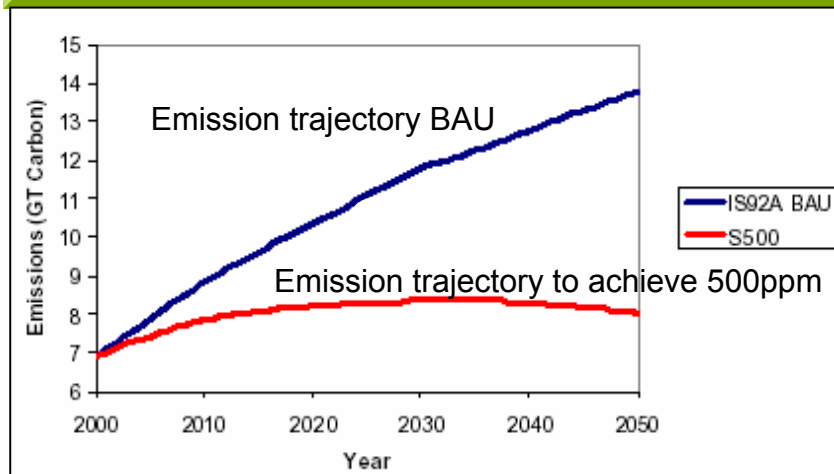
Industrial Scale Projects



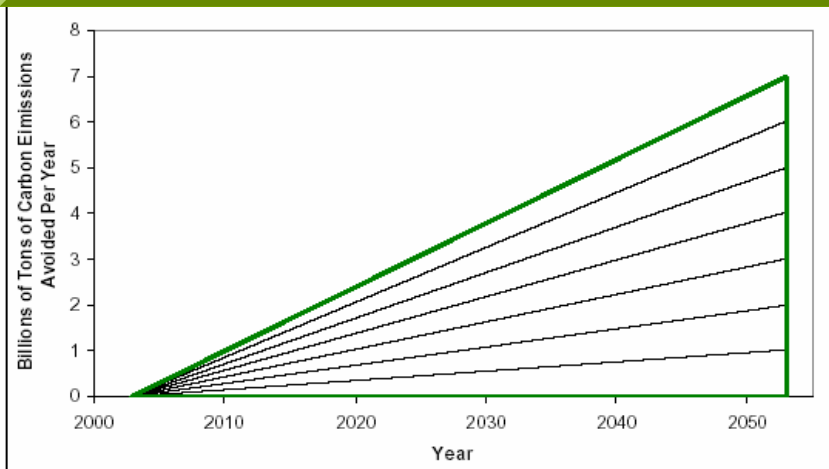


Technology Options for GHG Stabilization

The Stabilisation Wedge



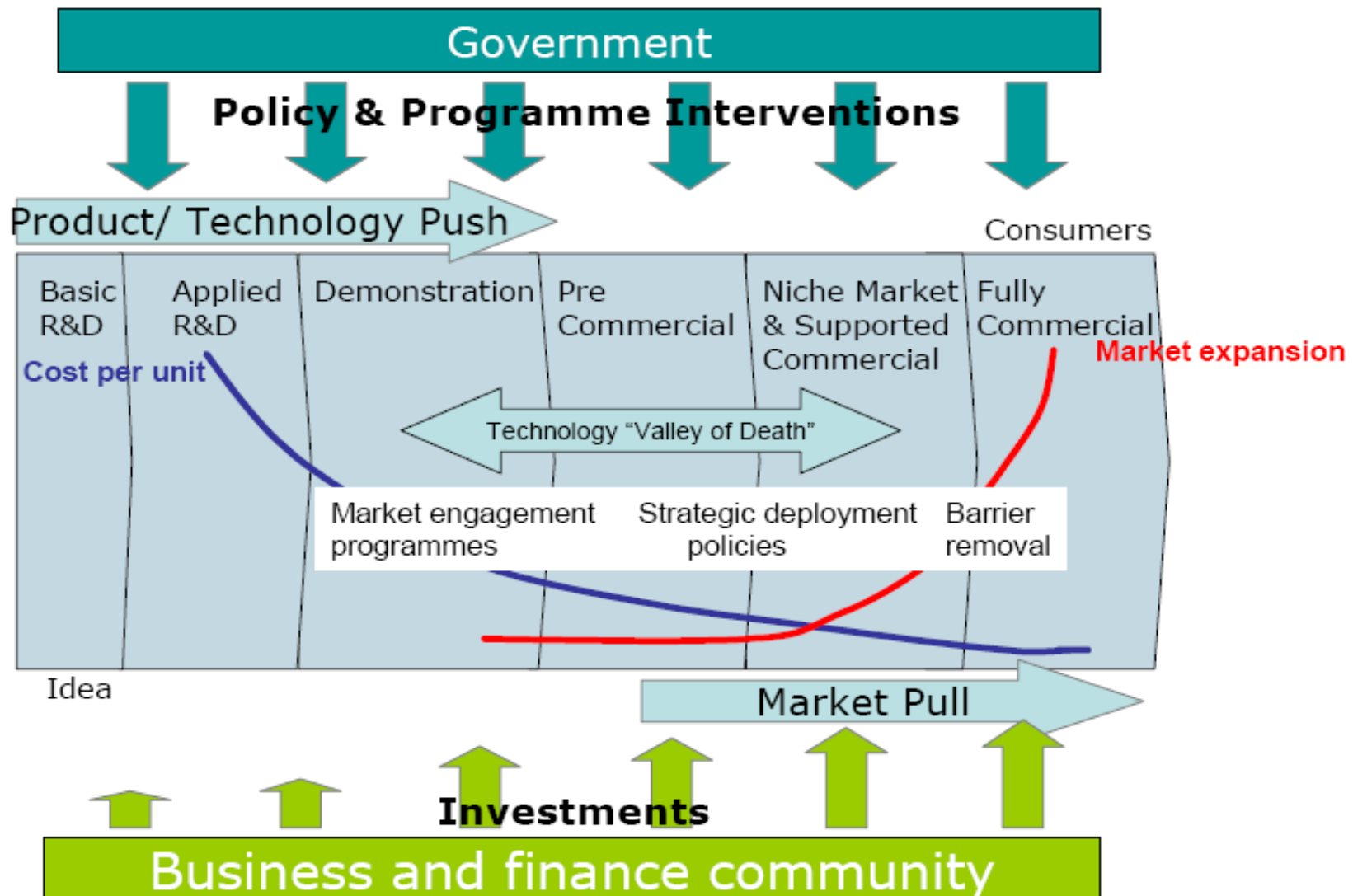
1 GtC Slices of the Stabilisation Wedge



Examples of Lower Carbon Slices	Scale for 1 GtC Reduction by 2050
Increased energy efficiency across the economy	'Emissions/\$GDP' increased
Increased energy efficiency (e.g. vehicles only)	2 billion gasoline/diesel cars achieving 60mpg
Fuel switching natural gas displacing coal for power	1400GW fuelled by gas instead of coal
Solar PV or wind replaces coal for power	1000x scale up PV; 70x scale up for wind
Biofuels to replace petroleum based fuels	200x10 ⁶ ha growing area (equals US agricultural land)
Carbon Capture and Geological Storage	CO ₂ captured from 700 1 GW coal plants; storage = 3,500x In Salah/Sleipner
Carbon Free Hydrogen for Transport	1 billion H ₂ carbon free cars; H ₂ from fossil fuels with CO ₂ capture & storage or from renewables or nuclear
Nuclear displaces coal for power	700 1GW plants (2x current)
Biosequestration in forests and soil	Increase planted area and/or reduce deforestation

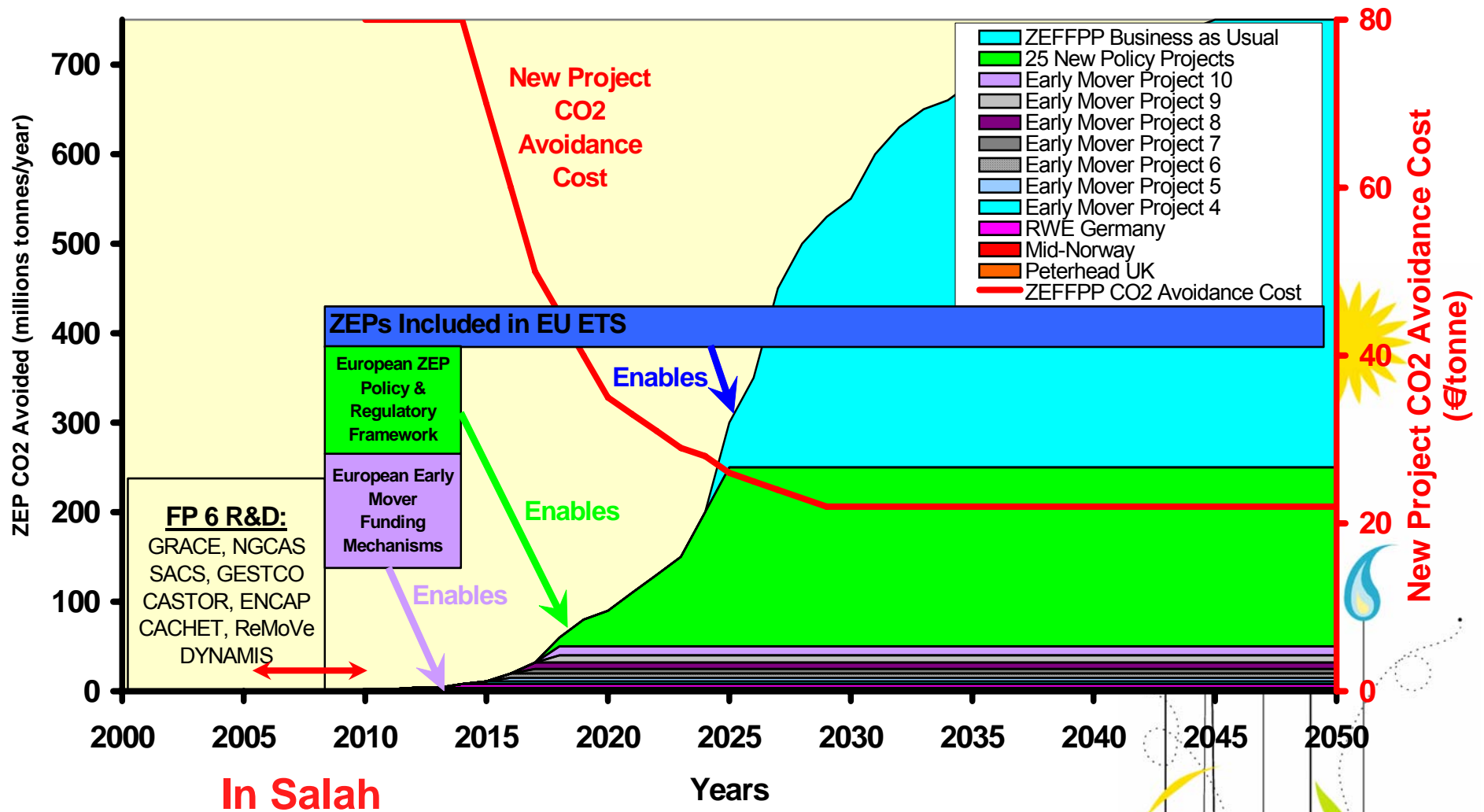


CCS is Now in the Technology “Valley of Death”

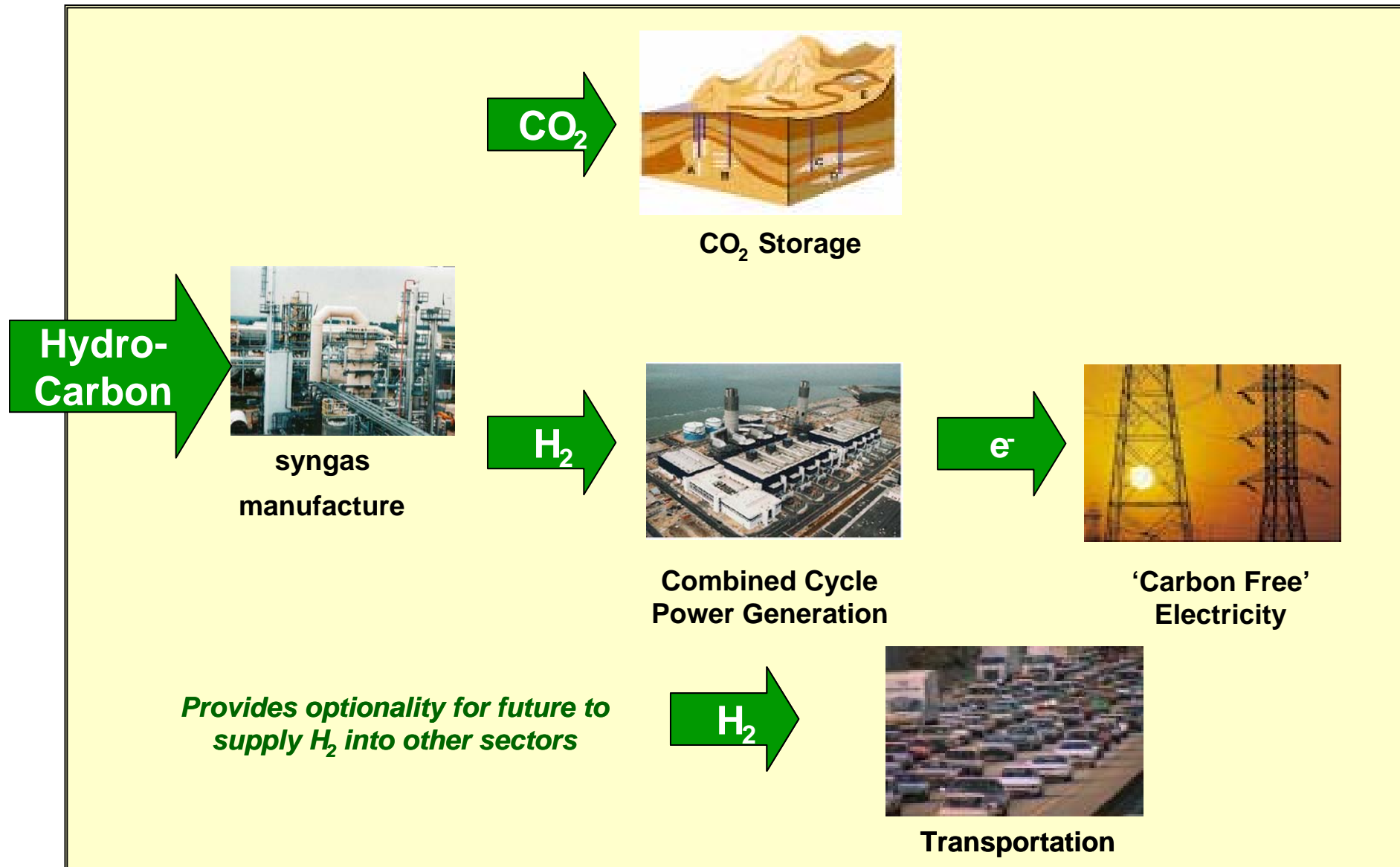




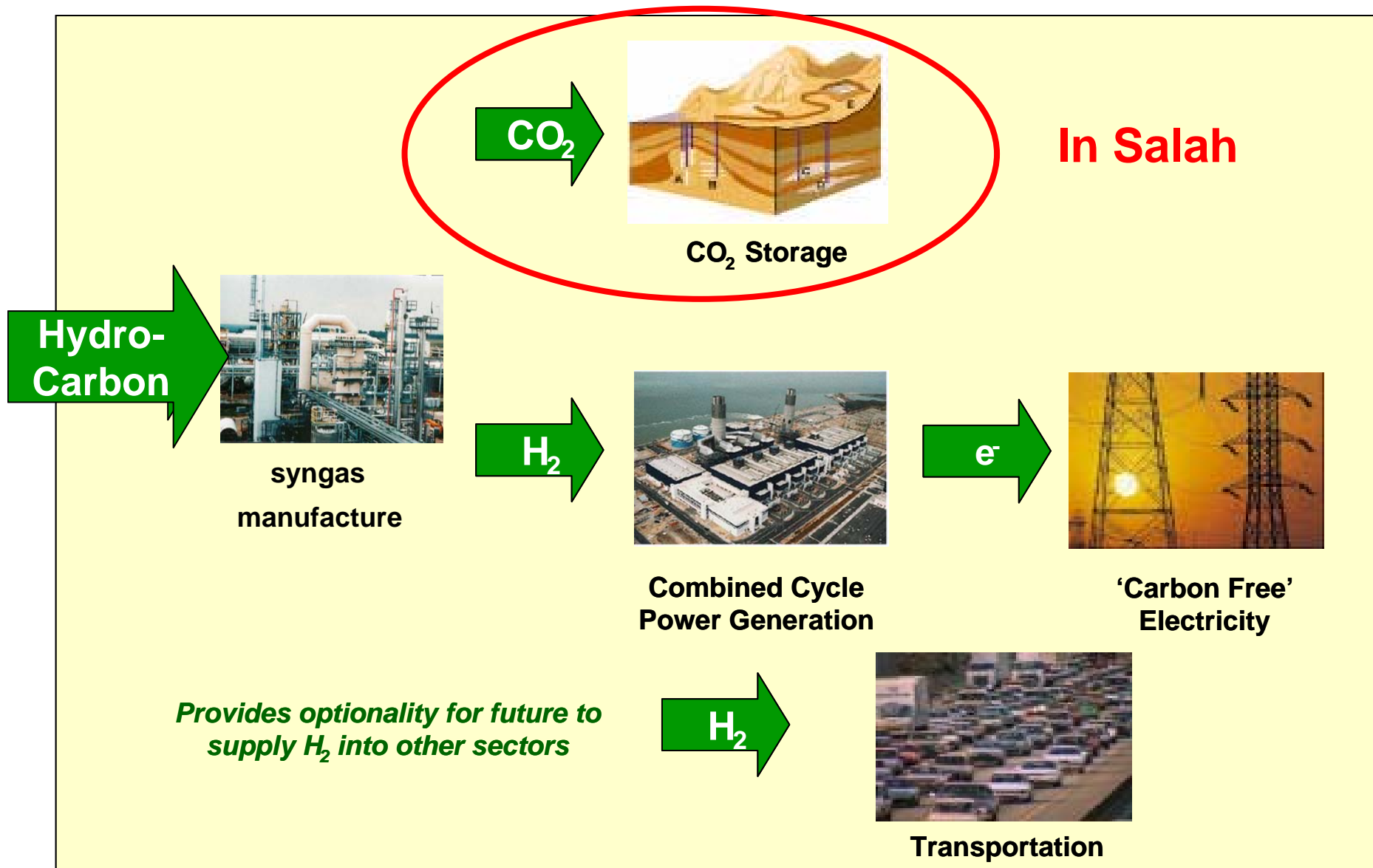
EU ZEP Deployment Roadmap



A Business Model for CCS Deployment



How Does In Salah Contribute?

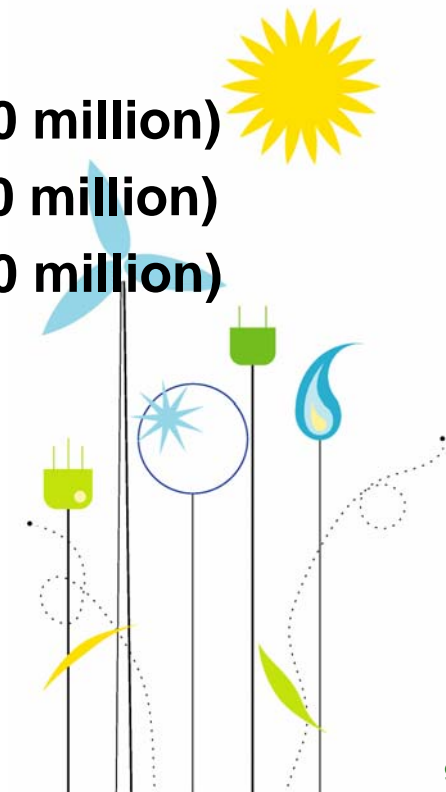


Three Projects at In Salah

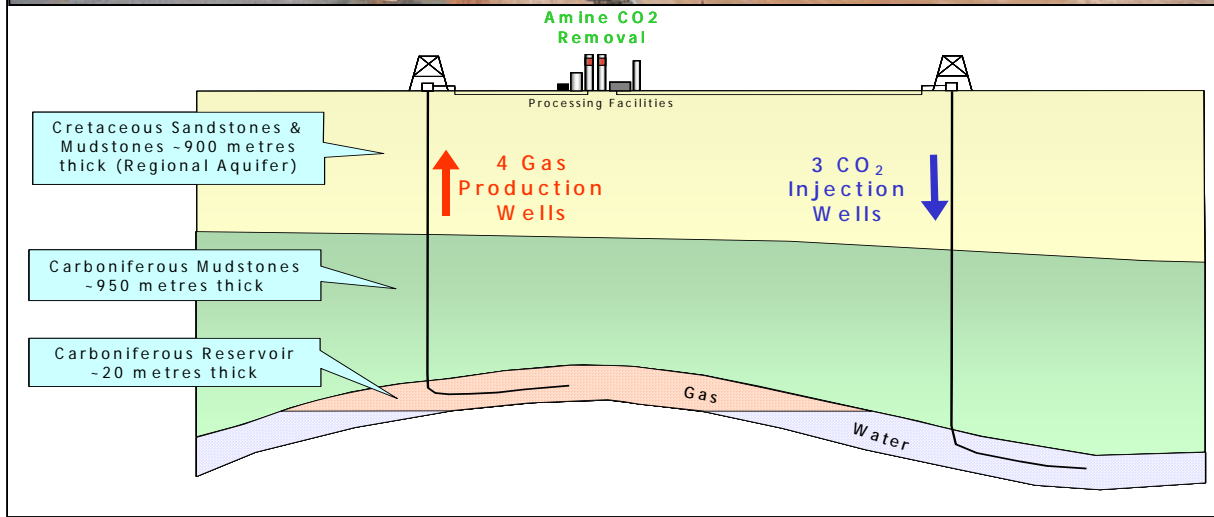
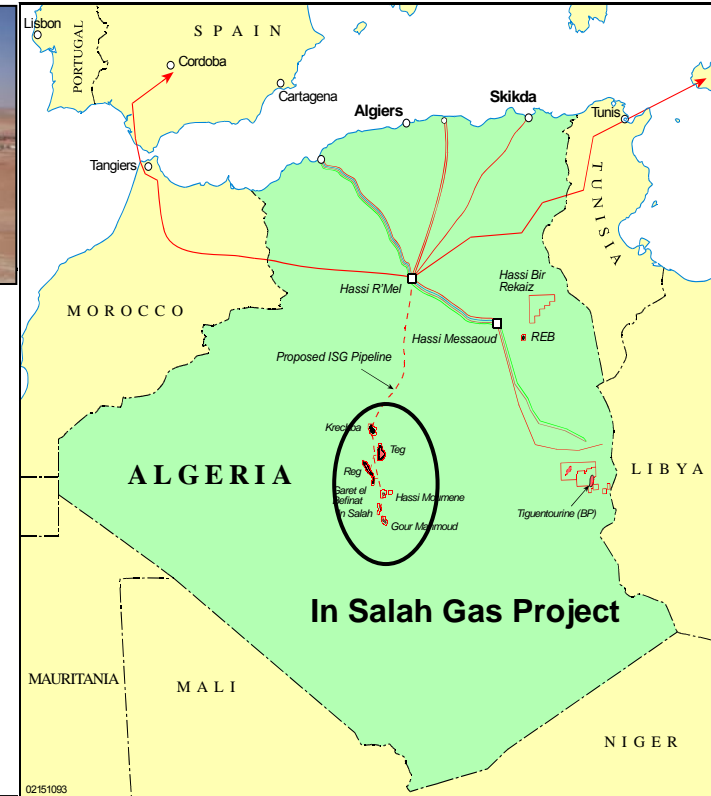


- **Joint Project of BP, Sonatrach and Statoil**
- **In Salah Project(s) Overview**

- **In Salah Gas Development (1bcf/d \$2,000 million)**
- **In Salah CO₂ Storage (1mmtpa \$ 100 million)**
- **In Salah CO₂ Assurance R&D (CSLF & EU \$30 million)**
 - Part of EU FP-6 CO2ReMoVe (\$3mm)



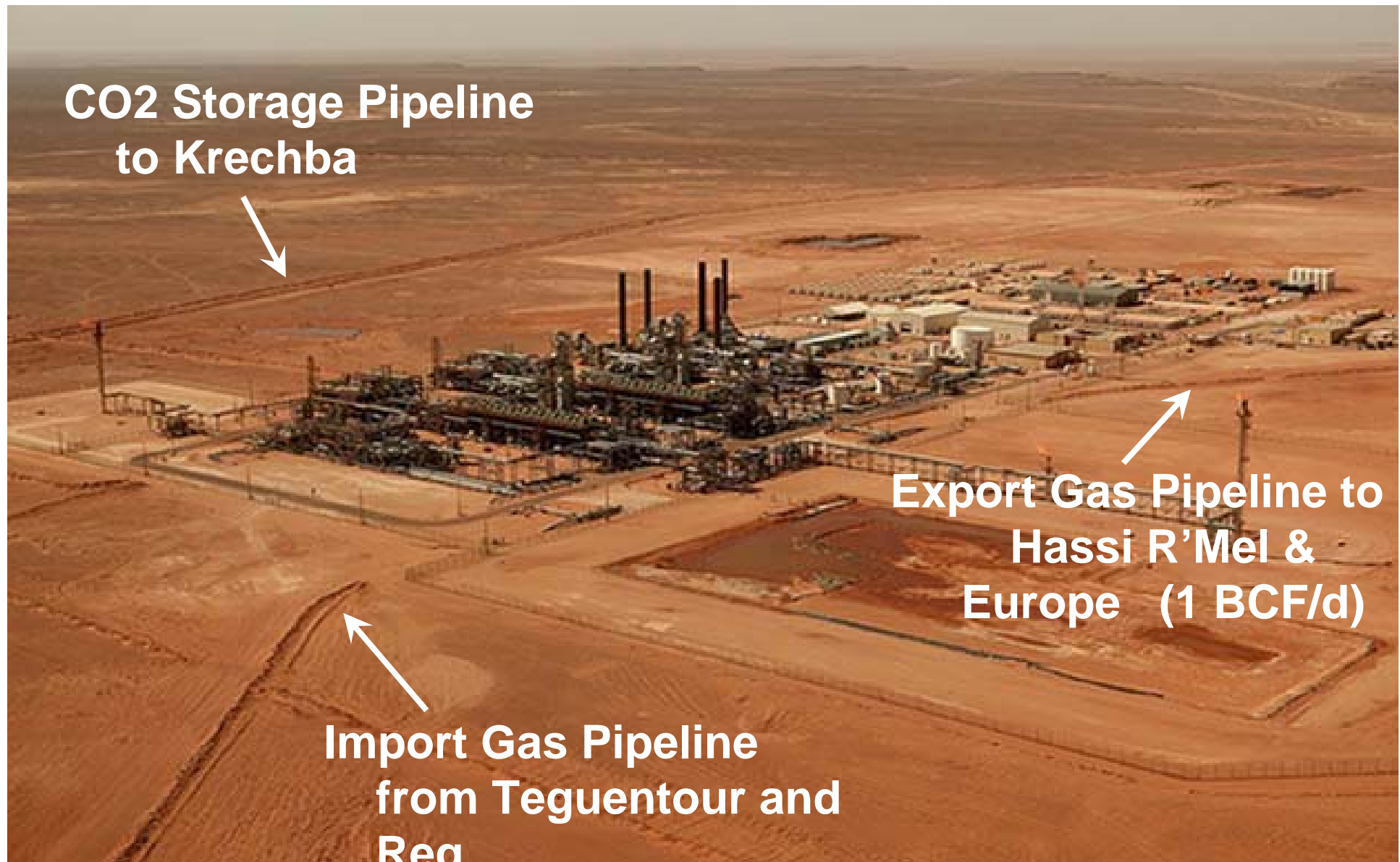
In Salah CO₂ Storage: Project Overview



Climate Change Milestones

- Industrial Scale Demonstration of CO₂ Geological Storage (Conventional Capture)
- Storage Formation is very similar to the North Sea (USA & China)
- Started Storage in August 2004
- 1mmtpa CO₂ Stored (17mm tonnes total)
- \$100mm Incremental Cost for Storage: No commercial benefit
- Test-bed for CO₂ Monitoring Technologies \$30mm Research Project

In Salah Gas Processing Plant



CO2 Storage Pipeline
to Krechba



Export Gas Pipeline to
Hassi R'Mel &
Europe (1 BCF/d)



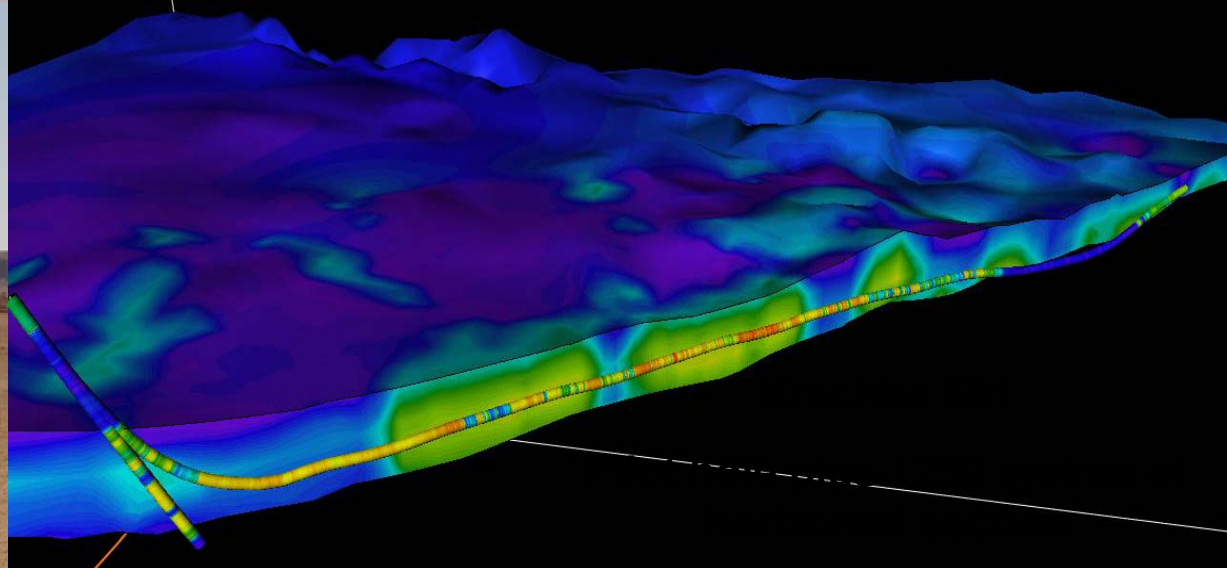
Import Gas Pipeline
from Teguentour and
Reg



CO2 Storage Project



**50mmscf/d CO2
(1mmtpa)
Compression
Transportation
Injection
Storage**



In Salah Joint Industry R&D Project



Objectives (2004-10)

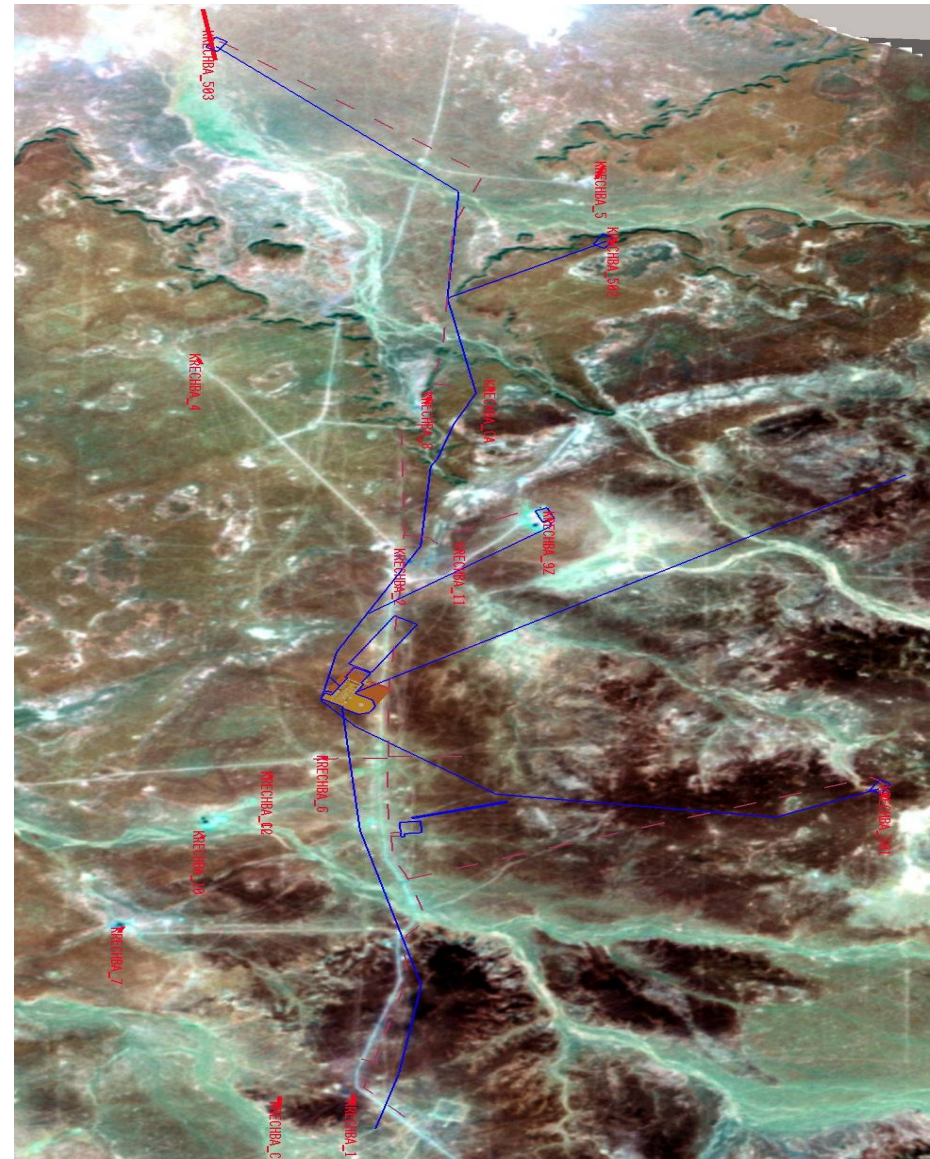
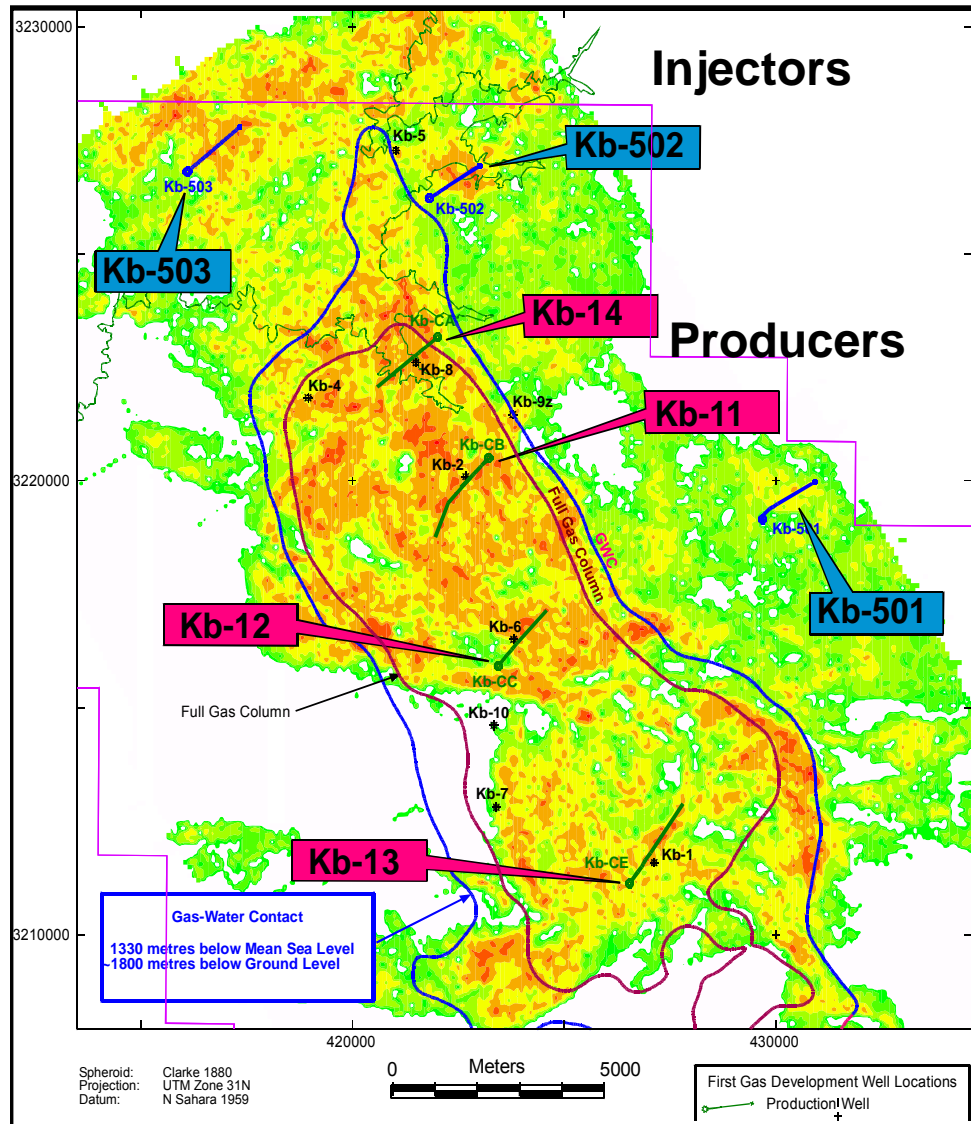
1. Provide assurance that secure geological storage of CO₂ can be cost-effectively verified and that long-term assurance can be provided by short-term monitoring.
2. Demonstrate to stakeholders that industrial-scale geological storage of CO₂ is a viable GHG mitigation option.
3. Set precedents for the regulation and verification of the geological storage of CO₂, allowing eligibility for GHG credits



Krechba Field

Reservoir

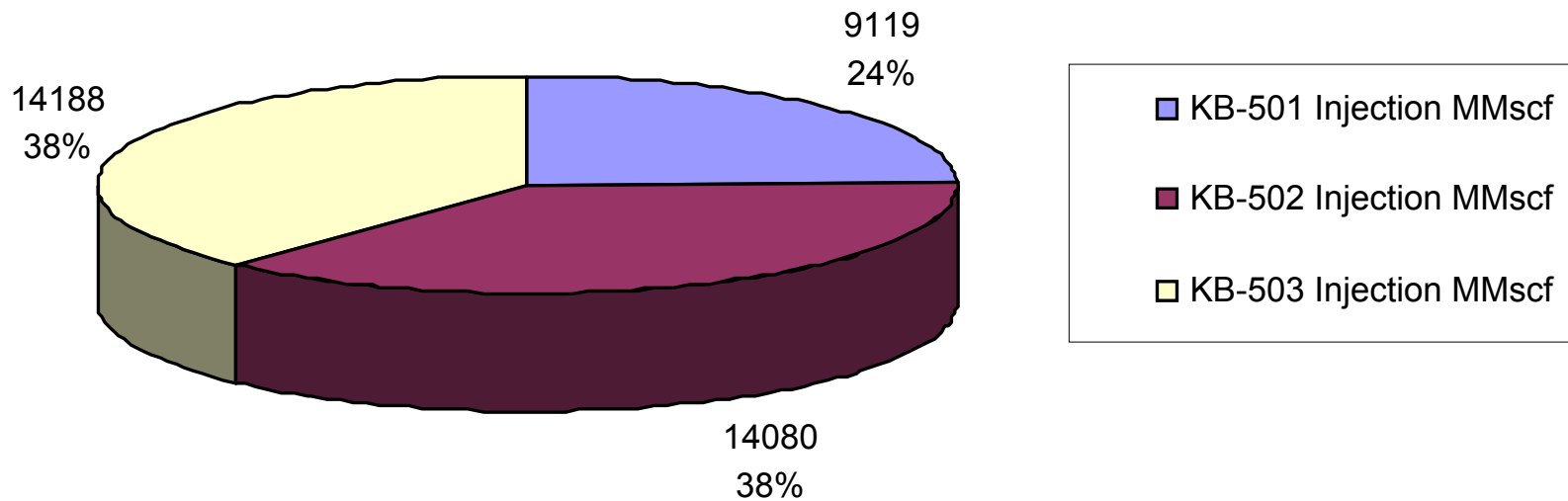
Surface



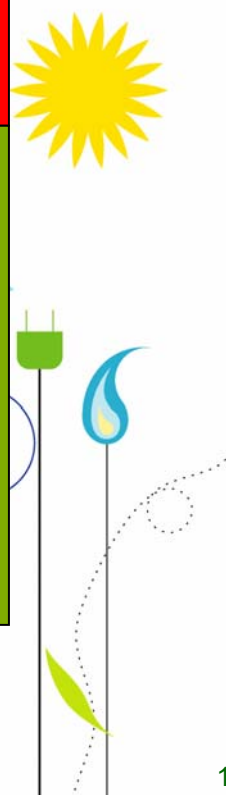
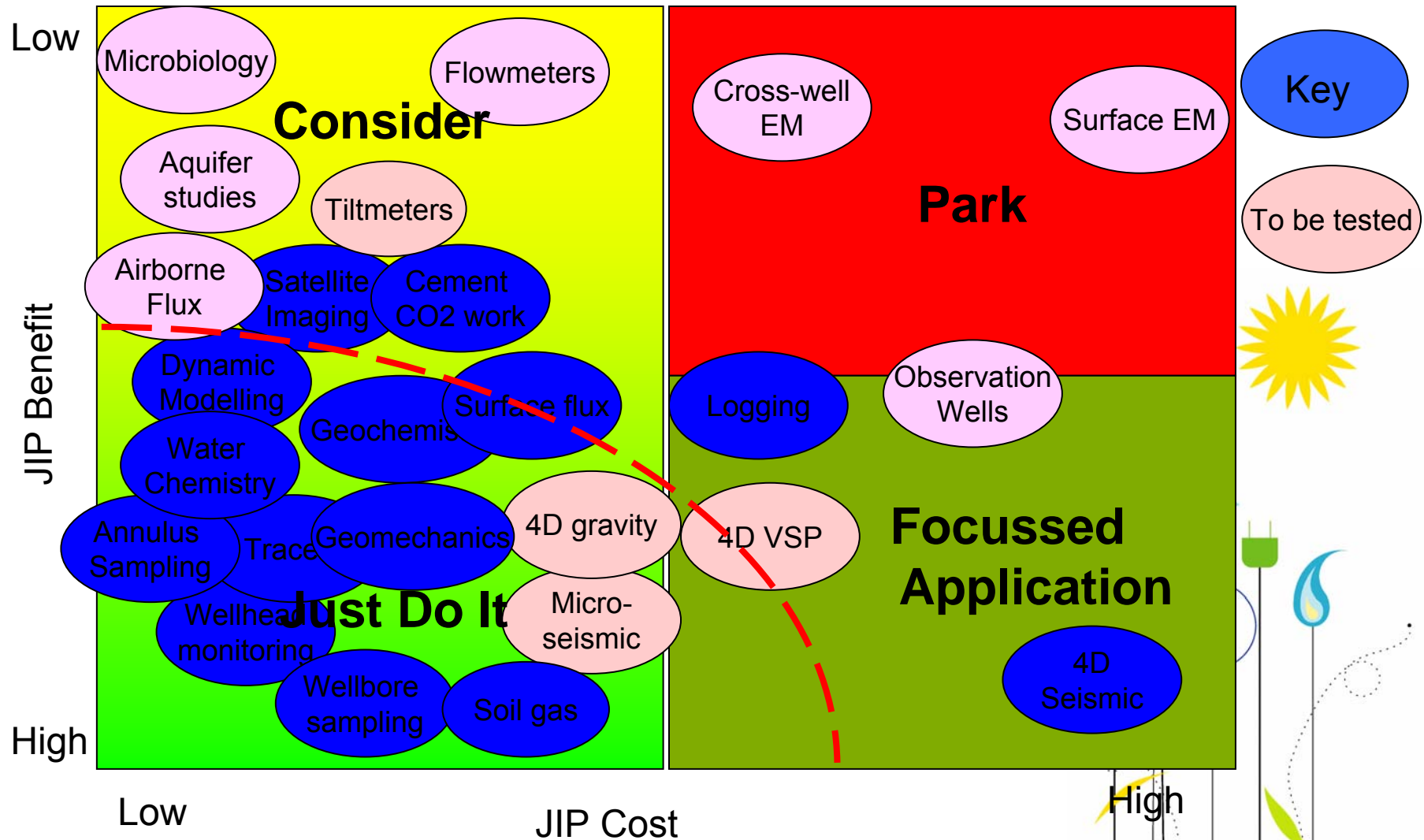
Relative Performance - Injectors



Injectors performance to end August 2007: 37.4 bscf

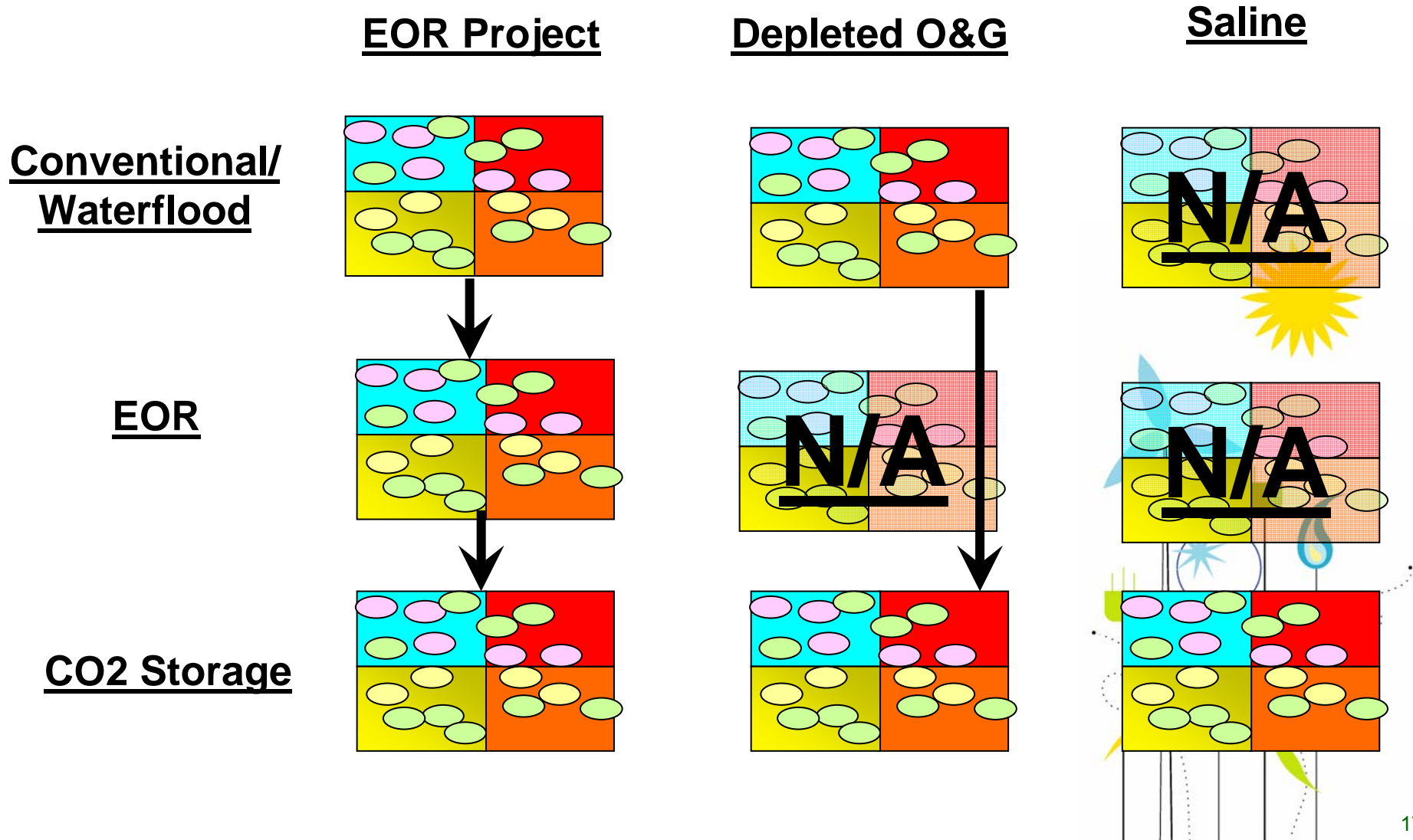


Monitoring Technology: Lessons Learned





Monitoring: Oil & Gas vs Saline Formations



Forward Plan: Next 12 Months



- **4Q 2007**

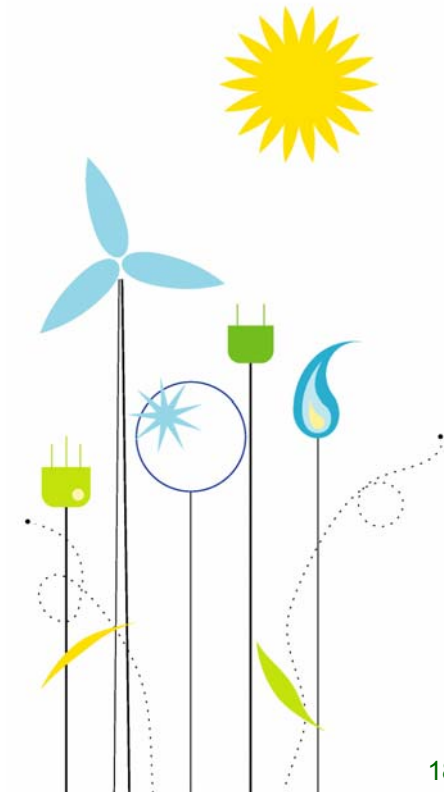
- Soil gas depth testing, lineament analysis, microseismic testing, tiltmeters, surface flux monitoring, hydrogeology, microbiology, gravity test

- **Early 2008**

- Full soil gas survey, microseismic array, gravity survey
- Shallow observation well(s)
- Further data acquisition from new production wells
- Hydrogeology/microbiology

- **Early to mid 2008**

- 3D seismic survey
- surface flux
- gravity measurements
- logging





Summary

- **BP is Taking Big Steps Towards CCS Deployment**
- **What's required:**
 - **Regulatory Framework: Is it Legal?**
 - **Policy Framework: Will Investors be Paid?**
 - **How to deal with: Long-term Liability?**
- **In Salah helps to develop answers**
- **BP is ready to invest in CCS projects in locations where the three key questions are answered.**



Thank You. Questions?



Useful Links:

- Check your carbon footprint at: www.bp.com
- Princeton Wedges: www.princeton.edu/cmi
- CCS Technology: www.co2captureproject.org
- EU CCS Roadmap: www.zero-emissionplatform.org
- Iain's email: wrightiw@bp.com

