



CO₂ Geological Storage In Salah Algeria Sustainable Development Project



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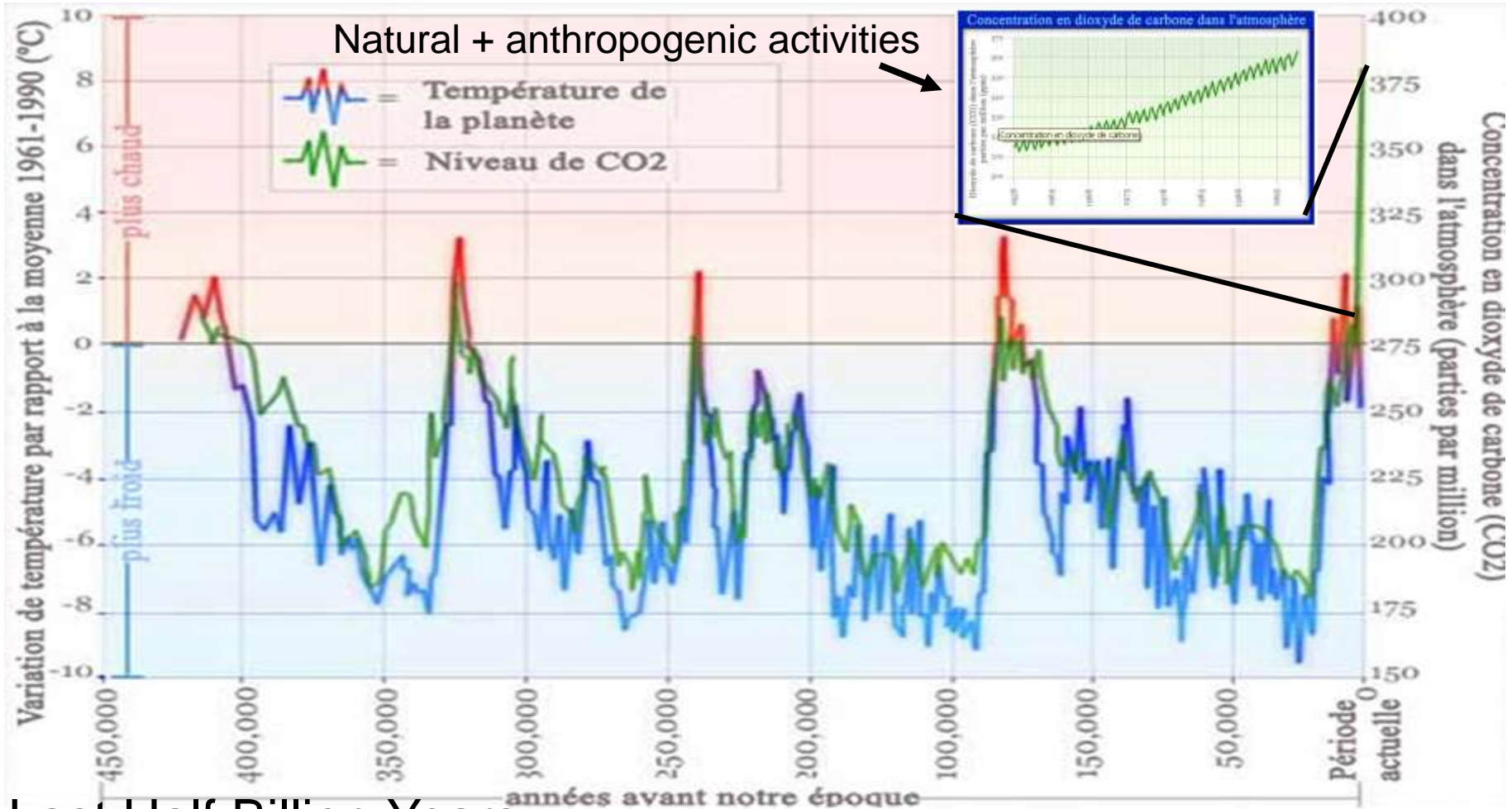


Summary

- ❑ Motivations
- ❑ Why Geological Storage ?
- ❑ CO₂ injection In Salah Gas Project
 - Objectives
 - Main Focus and Challenges
 - Technologies to be used
- ❑ Final Remarks

Motivations : GHG & Earth Climate Evolution

Natural + anthropogenic activities



Last Half Billion Years



GHG & Earth Climate Evolution

Observation :

Period	Previous Cycles	Current Cycle
CO2 Concentration In the Atmosphere	< 300 ppm	> 380 ppm

This situation indicates that the emitted volumes are exceeding the natural recycling capacity of the earth.

Action :

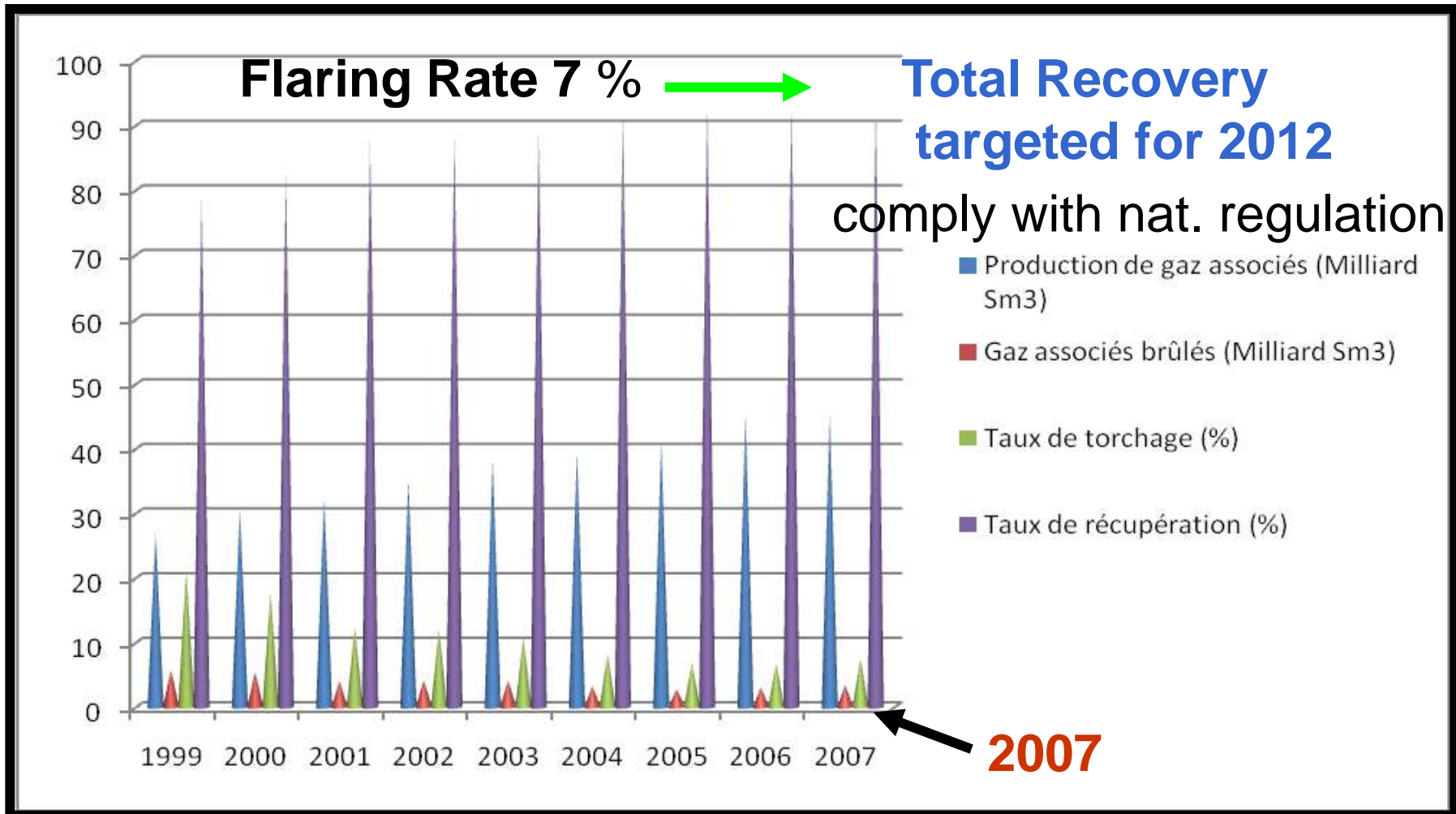
Coordinated measures for greenhouse gas emission limitations are needed.



Possible Mitigation Measures

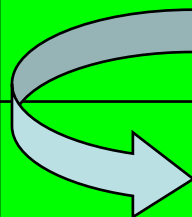
- ☐ **Energy Efficiency Improvement ,**
- ☐ **Renewable Energies Development**
- ☐ **Natural Gas Flaring Elimination**
- ☐ **CO2 Geological Storage**


Gas Flaring Elimination In Algeria



Why CO₂ Geological Storage ?

Carbon Distribution	G tonnes
Fossil Energies	4 000
Sedimentary Rocks (Carbonates)	80 000 000
Organic Material	42 000
Atmosphere	825



CO₂ Geological storage  reinject a certain amount carbon associated to fossil energies in the sedimentary layers, From where these energies are generally produced. This will help to stabilize the carbon quantity in the atmosphere

Source : Actu-Environnement

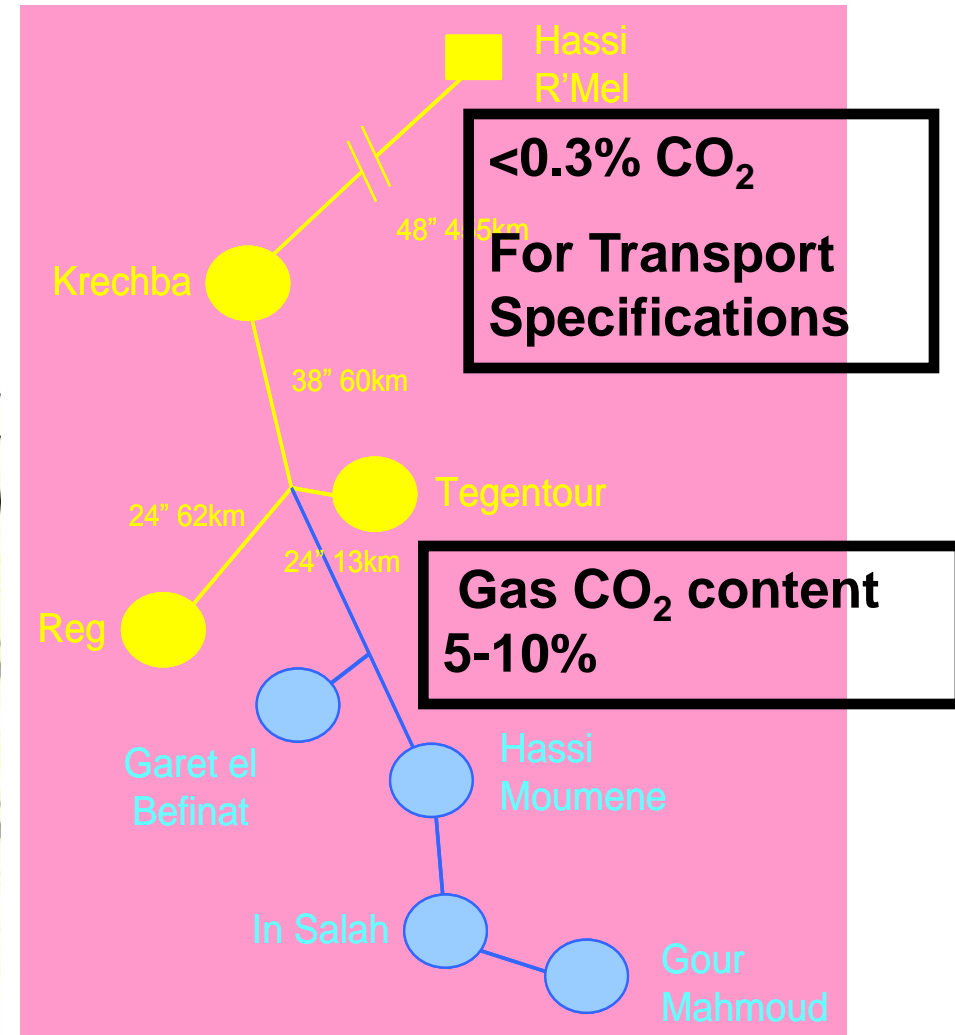
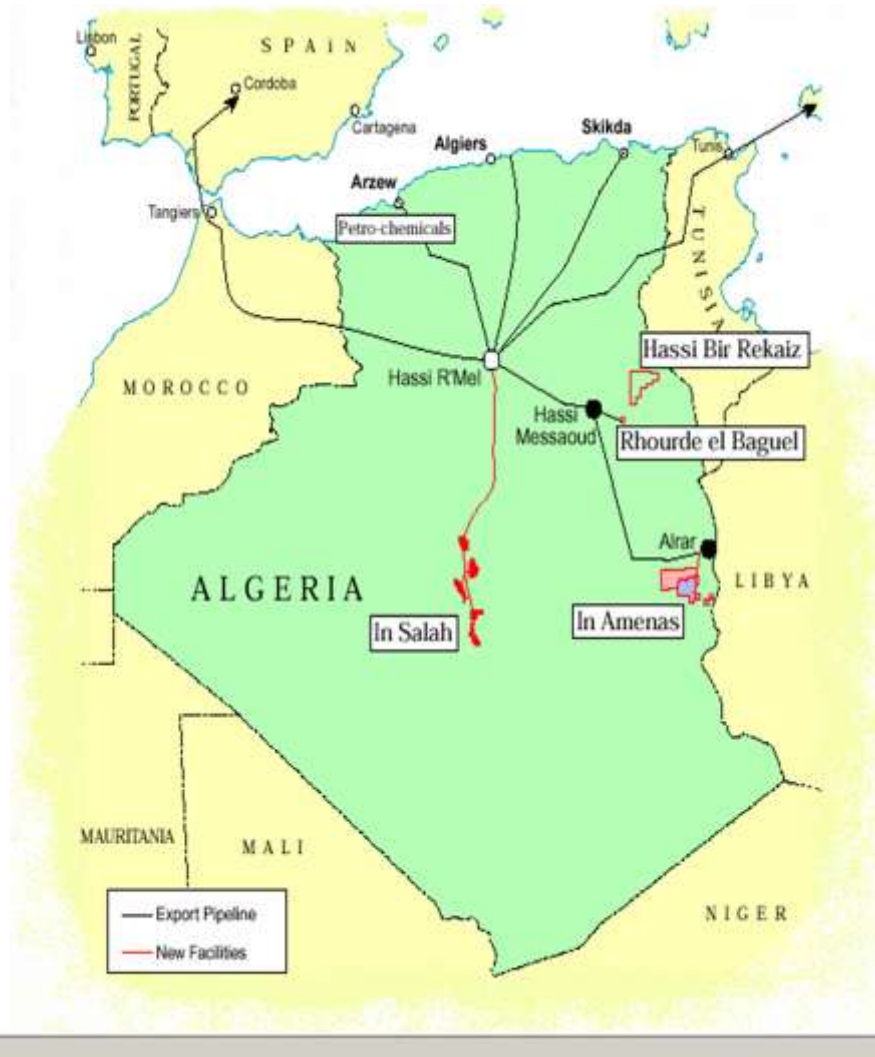


Possible Storage Capacities

Reservoir Type	Storage Potential (Gt)
Saline Aquifers	320 -- 10 000 (used @ In Salah)
Depleted HC Reservoirs	500 -- 2 000
Abandoned Coal Mines	Low

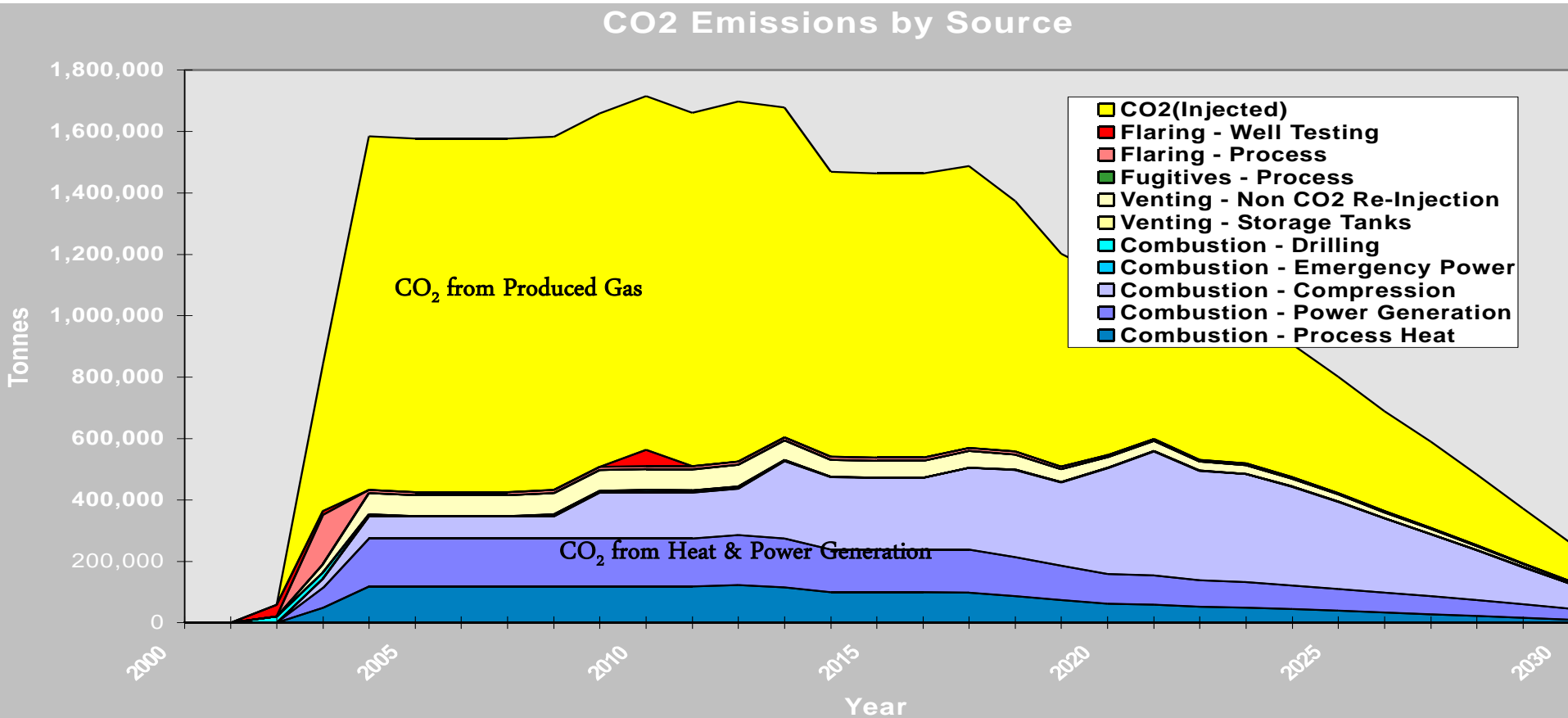


In Salah Gas Project





In Salah: 25-Year CO₂ Profile

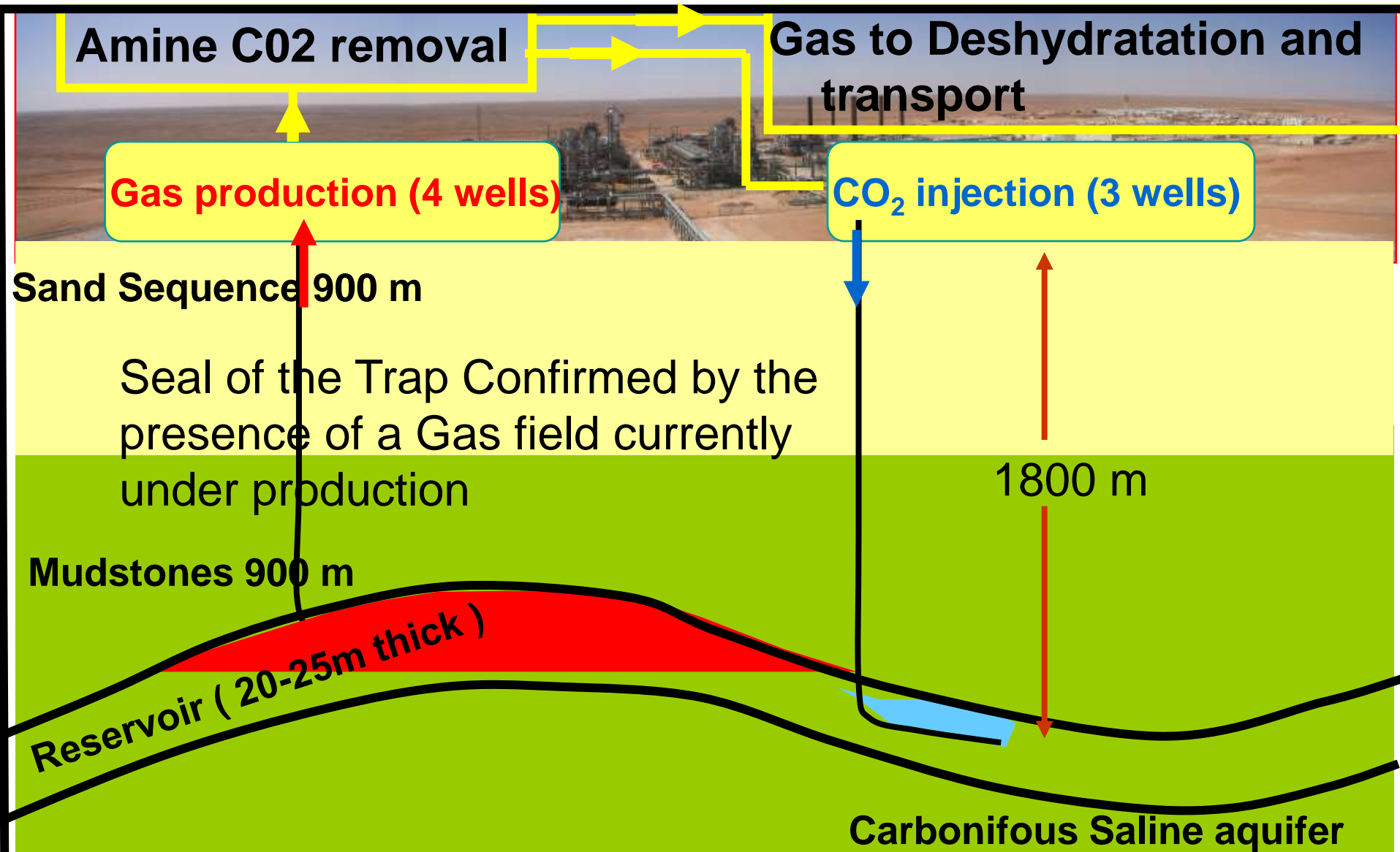


More than 17 Mt of CO₂ will be produced by Decarbonation
The J.V. has decided to reinject safely this important volume
of CO₂ , instead of flaring it in the atmosphere.

CO₂ Storage Concept



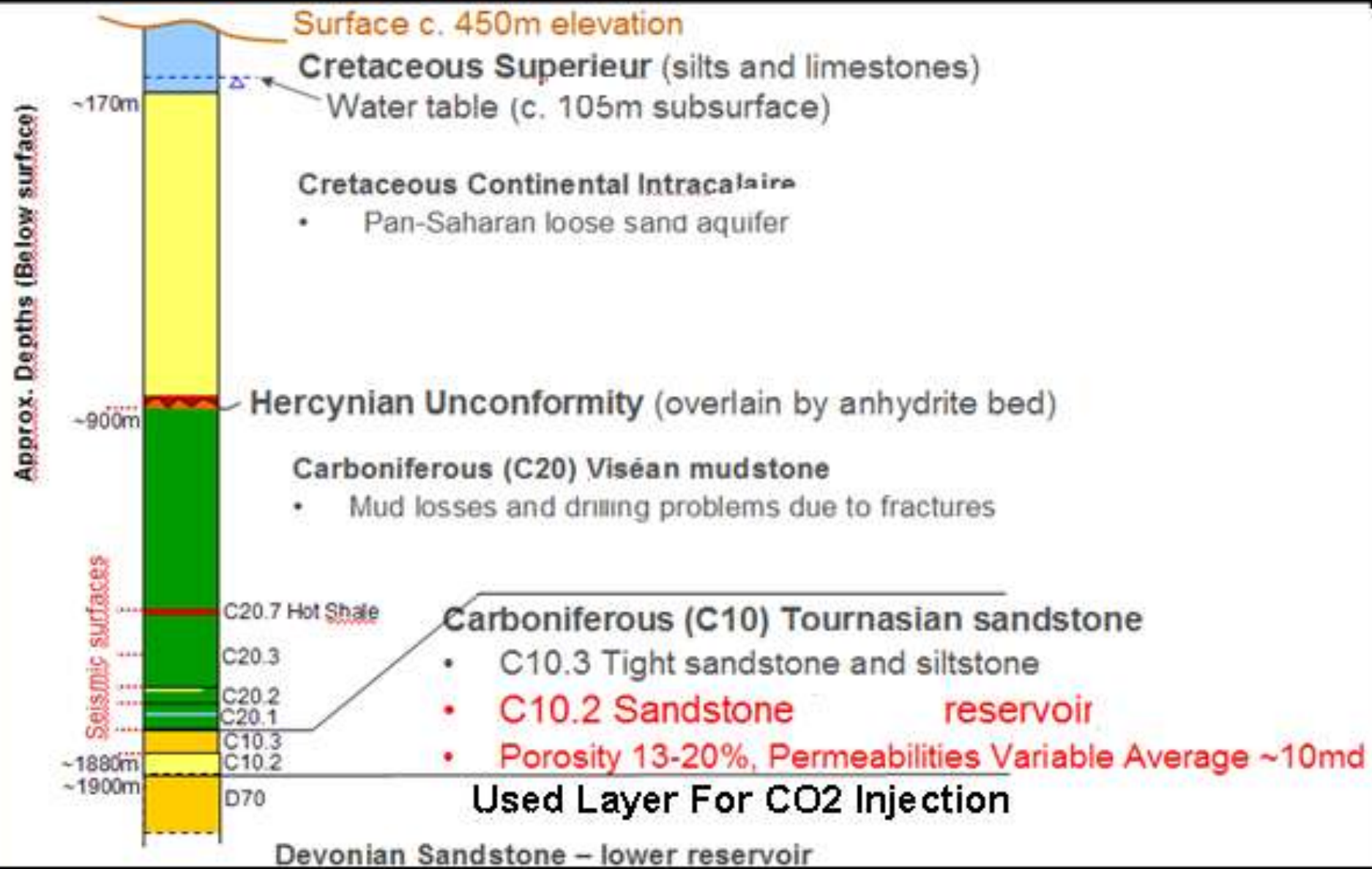
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Krechba Stratigraphic Summary



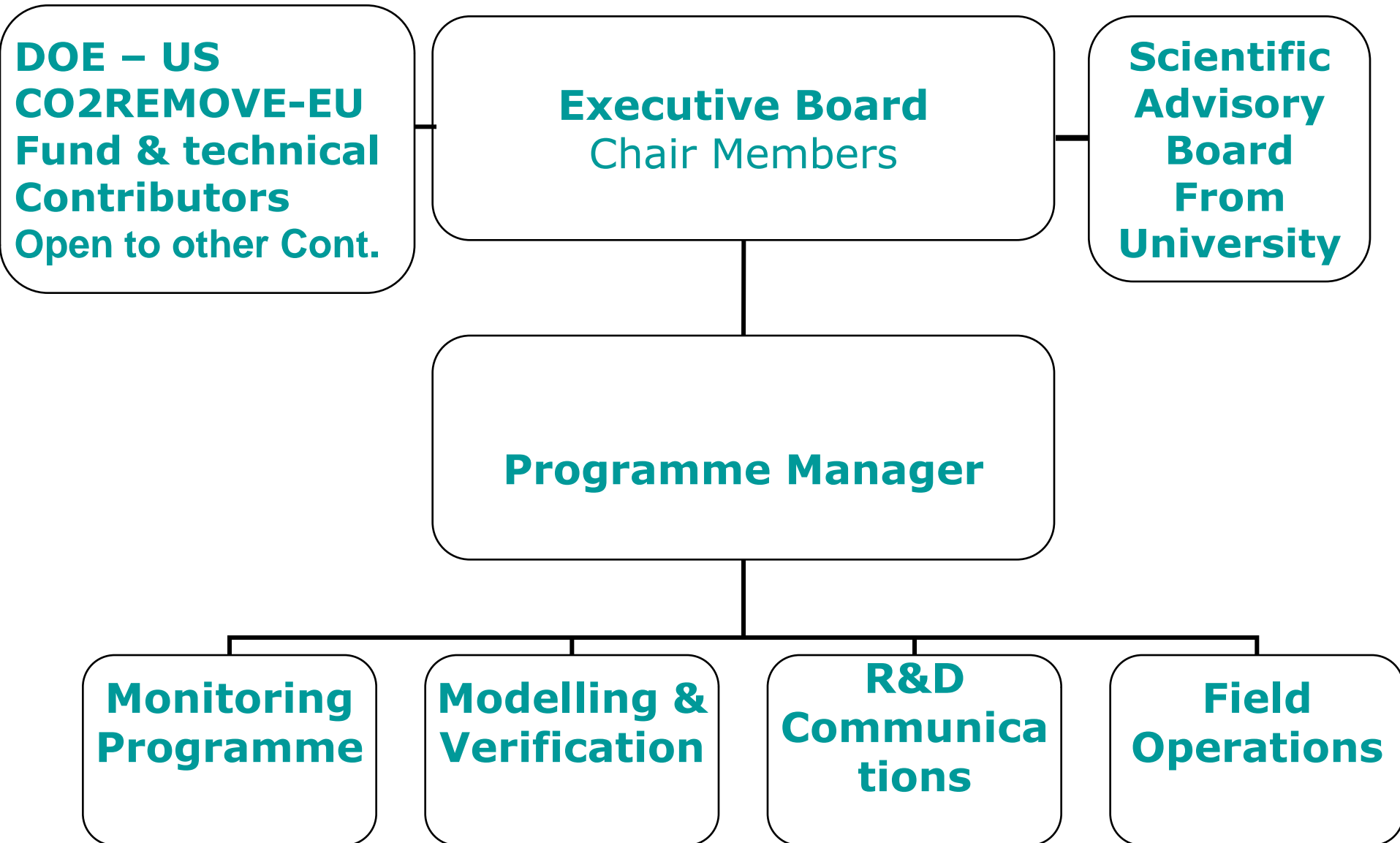
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Joint Industry Project



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Objectives

- ❑ Provide assurance that secure CO₂ geological storage can be cost-effectively verified and that long-term assurance can be provided by short-term monitoring.
- ❑ Demonstrate that industrial-scale of CO₂ geological storage is a viable GHG mitigation option.
- ❑ Contribute for the regulation and verification of the CO₂ geological storage, allowing eligibility for Carbon Credits

Main Focus and Challenges



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To reach Objectives



Data Acquisitions and Studies
have been Identified

The Aim : 1: Refine Reservoir Model

2: Characterize the overburden,
Seal across the field

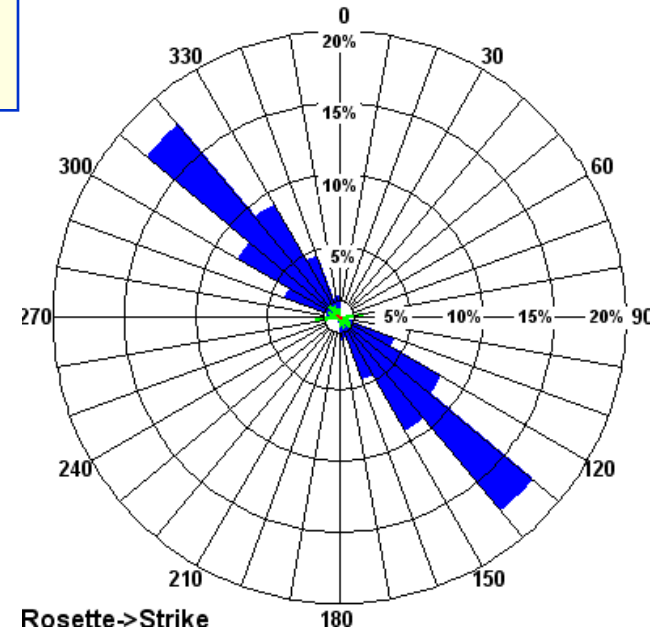
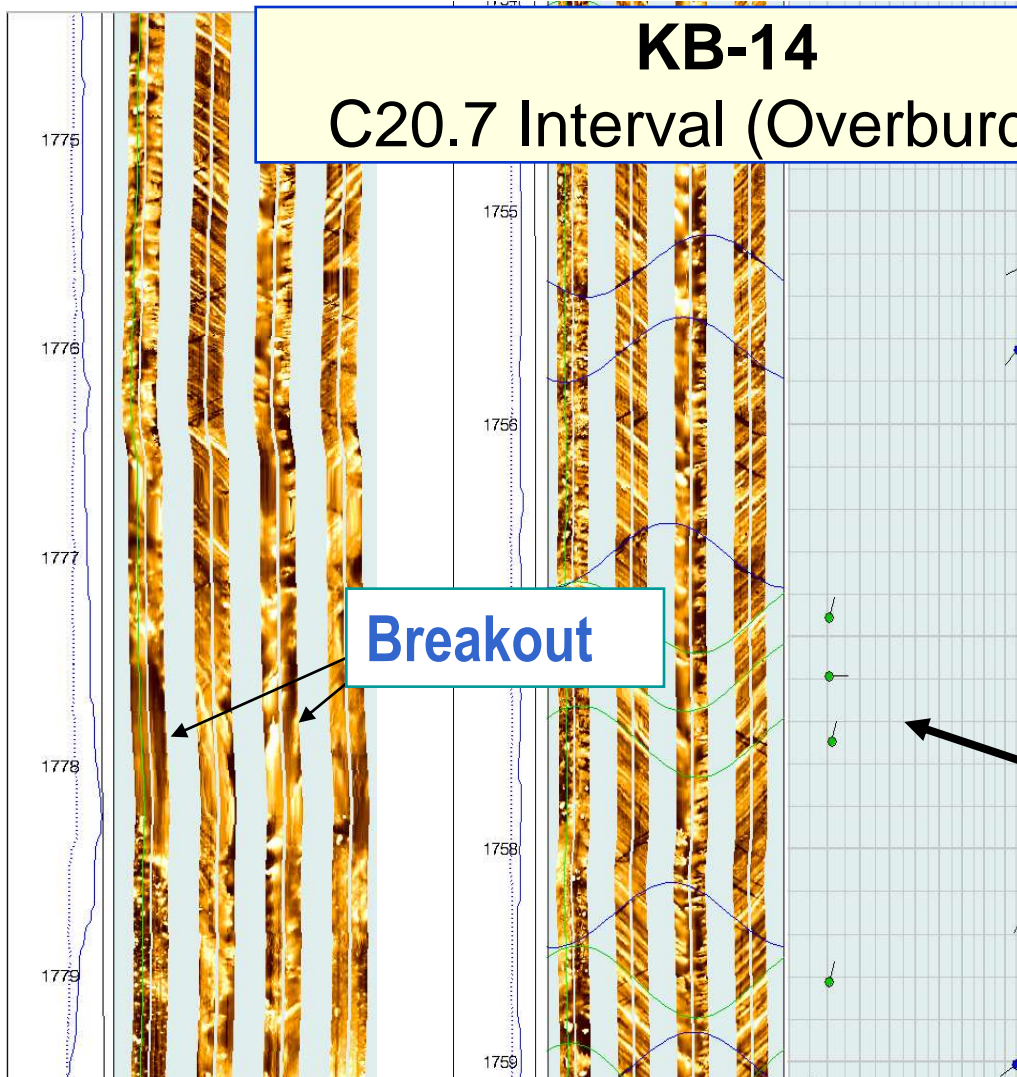
3: Confirm Well Integrity, Monitoring
Well Head, Cement, Casing



Completed Operations

- ☐ Risk Management Analysis
- ☐ Surface Facilities
- ☐ 3D Seismic Interpretation
- ☐ Reservoir Modeling
- ☐ Drilling 3 Horizontal Injector Wells
- ☐ Geomechanical / Geochemical Studies (on progress)
- ☐ Aquifer and Soil CO₂ Baselines Determination
- ☐ Radar Satellite Images , Acquisition and Analysis

Borehole Log Images

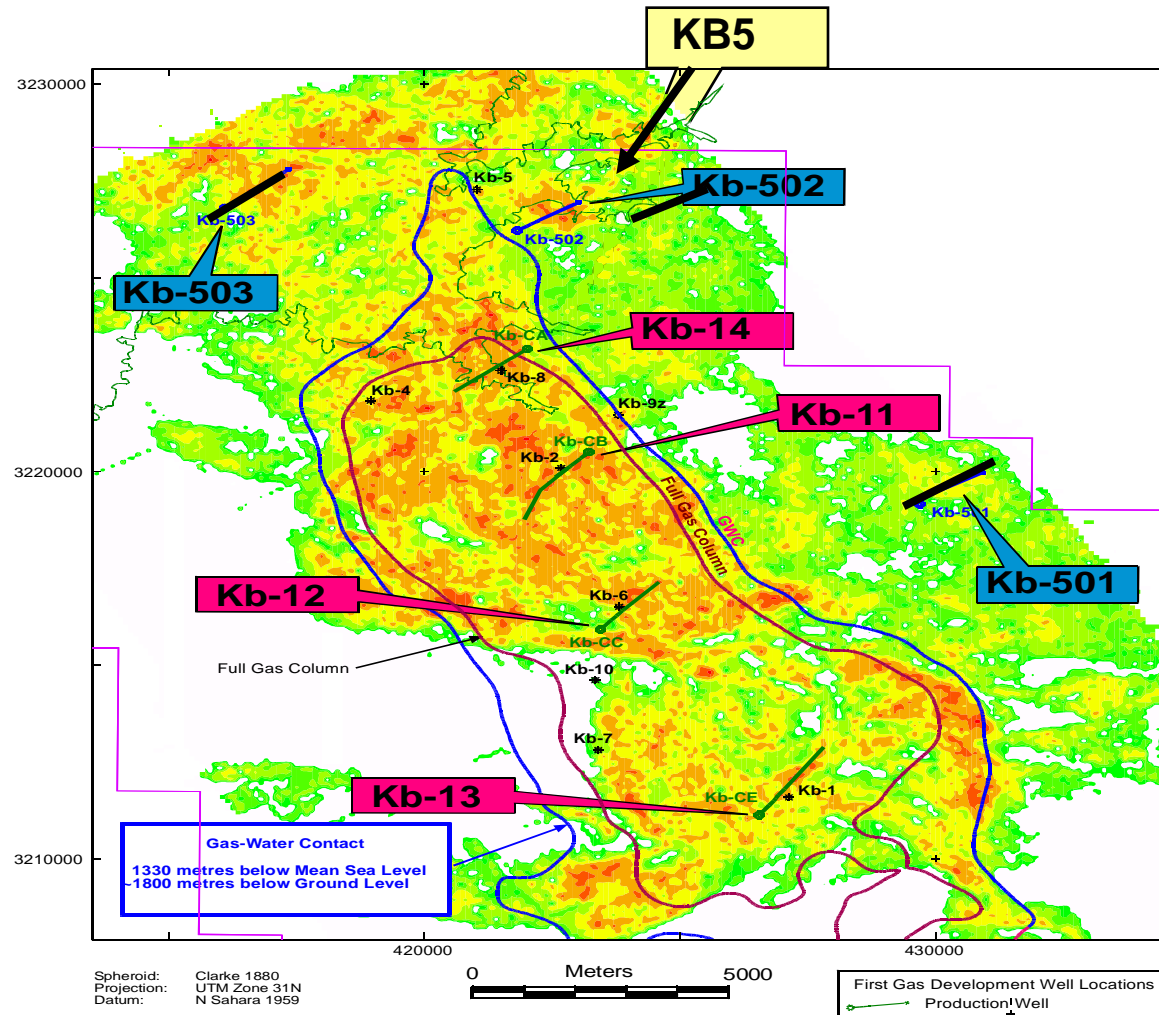


Dominant NW-SE Direction
Bedding (structural analysis)

Nat. Fractures Characterization
Density, Orientation, Conductivity
n situ Stress Determination



Krechba Well Locations



Radar Satellite Images



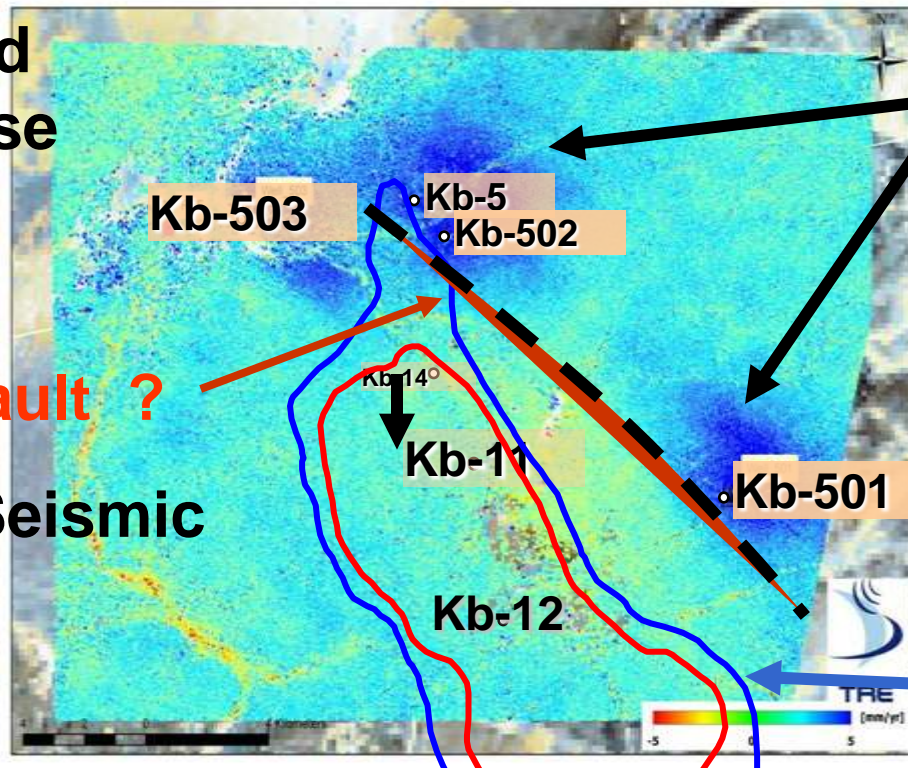
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Processed
Time Lapse
Images

Relative Uplift
Up to 5mm

Sealed Fault ?

Seen on Seismic



GWC

useful information
will be used
to update
the permeability
distribution model.



Short Term Programme

- ☐ 3D Seismic (wide azimuth) for Reservoir & Overburden characterization
- ☐ Micro-seismic for Fractures Detection
- ☐ Drilling 4 Shallow Wells for Aquifer Monitoring
- ☐ Tiltmeter Measurements for Satellite Image Calibration
- ☐ CO₂ Soil Monitoring
- ☐ Testing New CO₂ Resistant Cements
- ☐ Micro-Biology Study



Final Remarks

- ❑ Regarding the high injection capacity in a short term, Geological Storage offers an interesting but technically challenging alternative for GHG mitigation.
- ❑ Industrial-scale Demonstration Projects (like In Salah) are required to gain confidence in the technique, understand the costs and develop policies required for widespread CCS deployment.
- ❑ With Its success, the world will continue to rely on fossil fuels for most of its energy needs for the for-seeable future.



JIP (Joint Industry Project)

Thank You For Your Attention

