



# The CCP Collaboration Project – Phase 3 Results and Phase 4 Plans

Presented by Nigel Jenvey<sup>1</sup>, CCP Chair

*<sup>1</sup>BP Group Technology*

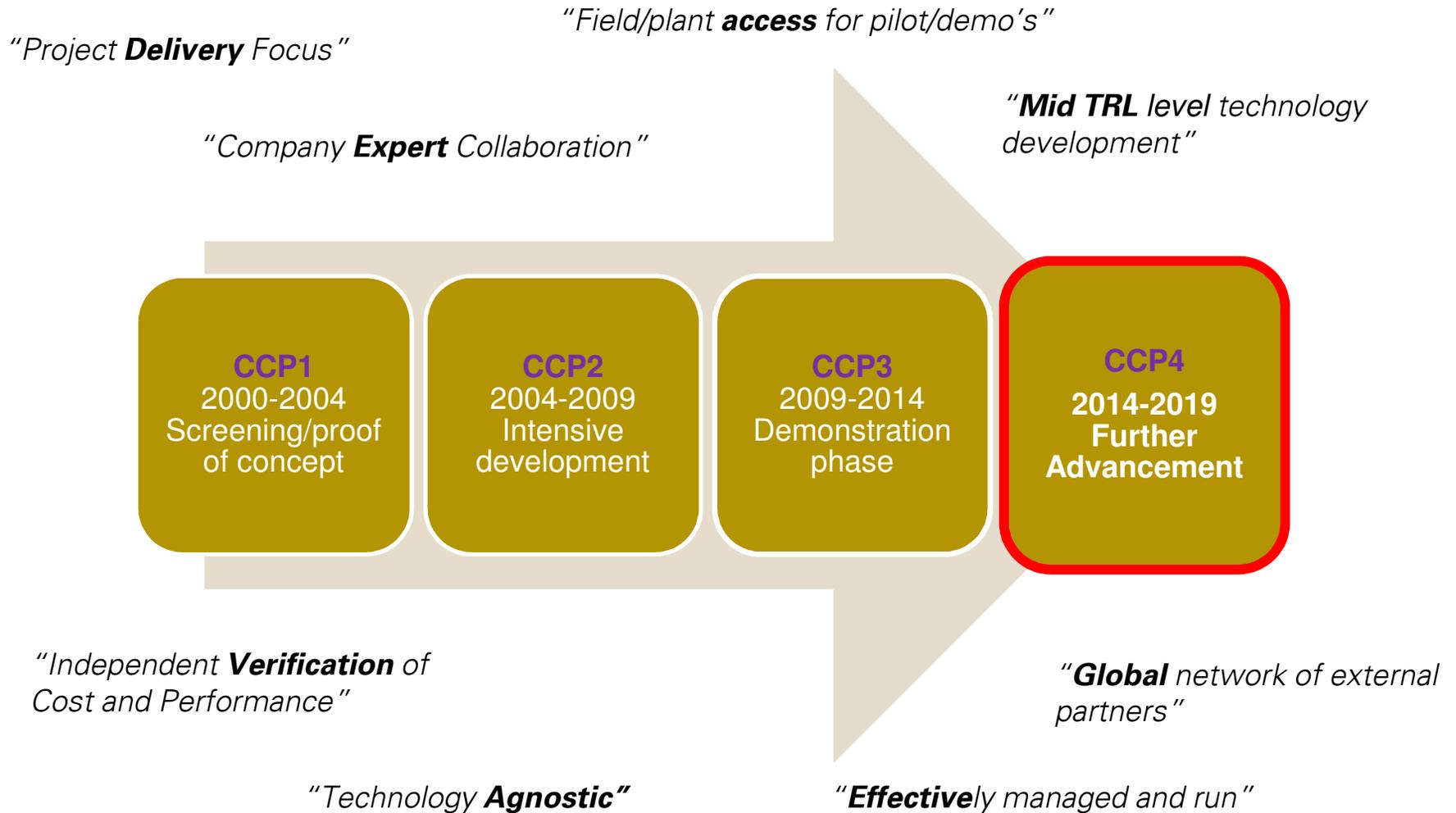
**NorTex CO<sub>2</sub> EOR Symposium Meeting  
5<sup>th</sup> October 2015**



CCS is the only technology that could enable continued large-scale use of fossil fuels in a tightly carbon constrained world



# CCP4 “Advancing CCS technology deployment and knowledge for the oil and gas industry”



CCP4  
participating organizations



# CCP3 Capture Program



**Program Objective:** Move CCS towards commercial deployment by

- Increasing technical and cost knowledge
- Development support for technologies to reduce CO<sub>2</sub> capture costs by 20-30%

## Scenarios

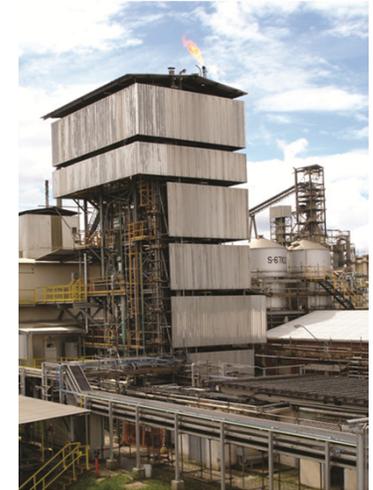
- Refinery: FCC, heaters and boilers (H&Bs), SMR
- Heavy Oil: Once-through steam generators (OTSGs)
- NGCC

## Approach

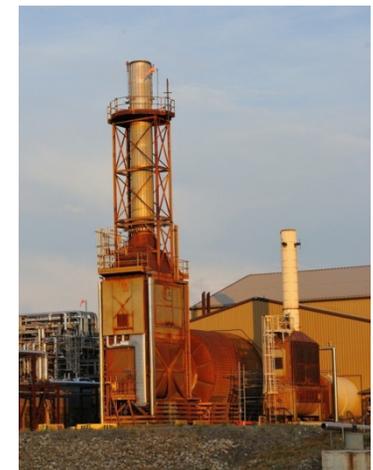
- Perform independent assessment of novel capture technologies
- Support lab, bench and pilot scale studies
- Carry out detailed economic assessment of select technologies

## Results at a Glance

- 21 Technical Studies by Foster Wheeler
- 2 Demonstrations (oxy-fired FCC, oxy-fired OTSG)
- 4 bench/pilot projects (oxy-burner testing, Pd membrane, CLC, enzyme post-C)
- 1 pilot test post-C solvent screening program (EERC)
- 5 preliminary evaluations of novel technologies
- 24 in-house economic evaluations



*Image courtesy of Petrobras*



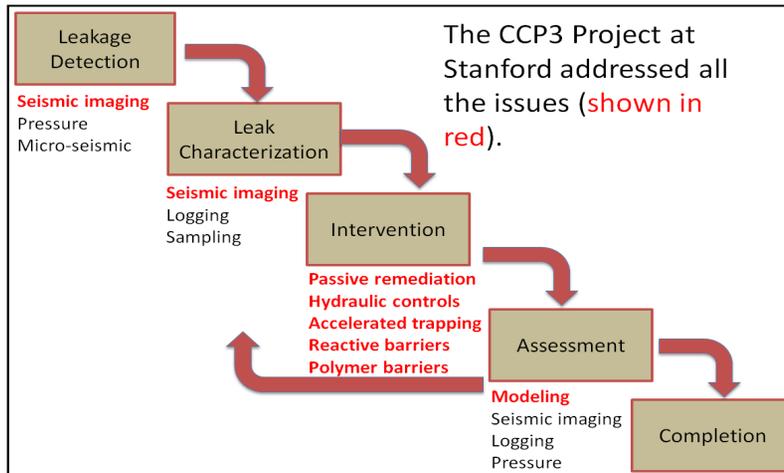
*Image courtesy of Genovus Energy Inc.*



# CCP3 Storage Program



Modeling and simulation topics covered for Stanford / CCP3 Contingencies study



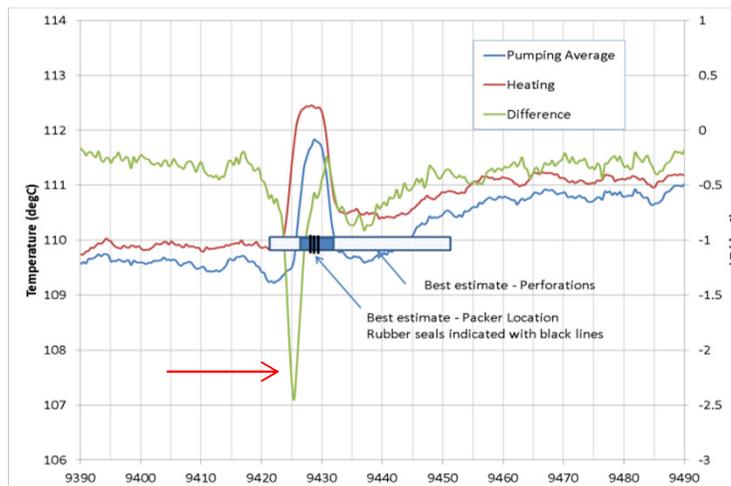
**Program Objective:** Verify Safe and Secure Storage by

- Verifying subsurface processes
- Risk assessment & economic analysis of storage

## Approach

- Support lab, bench and pilot scale studies
- Carry out detailed desk-top studies and economic assessment

Successful diagnosis of pressure bleed off issue – i.e., DTS showed fluid influx above packer due to off depth perforations, not the MBM assembly (B Freifeld, LBNL & R Trautz, EPRI)



## Results at a glance

- The Field Trialing effort laid out in 2009 was ambitious but accomplished with the exception of a microseismic trial.
- CCP3 began the first systematic approach to contingencies, ranging from modeling/ simulation to experiments and a detailed bench/field test design.
- Subsurface processes studies involving experiments revealed phenomena that may be worth further investigation:

CCP3 participating organizations



# CCP3 Policy & Incentives Program

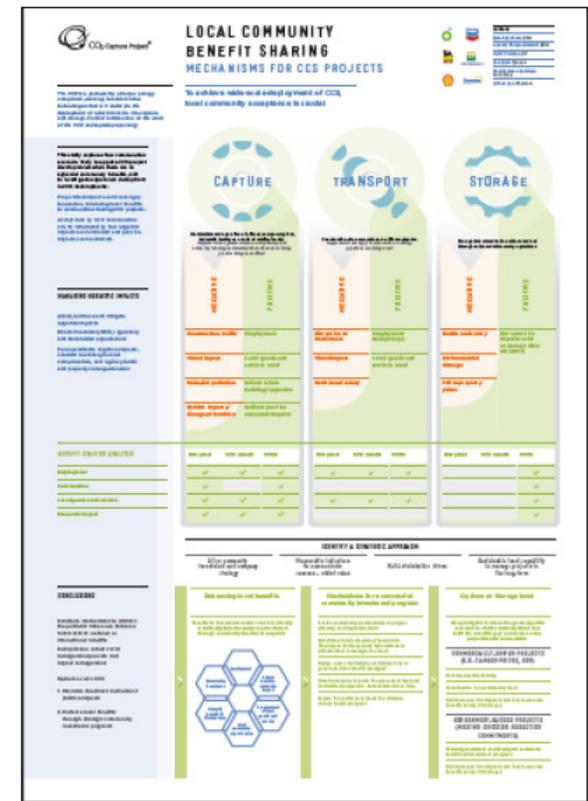
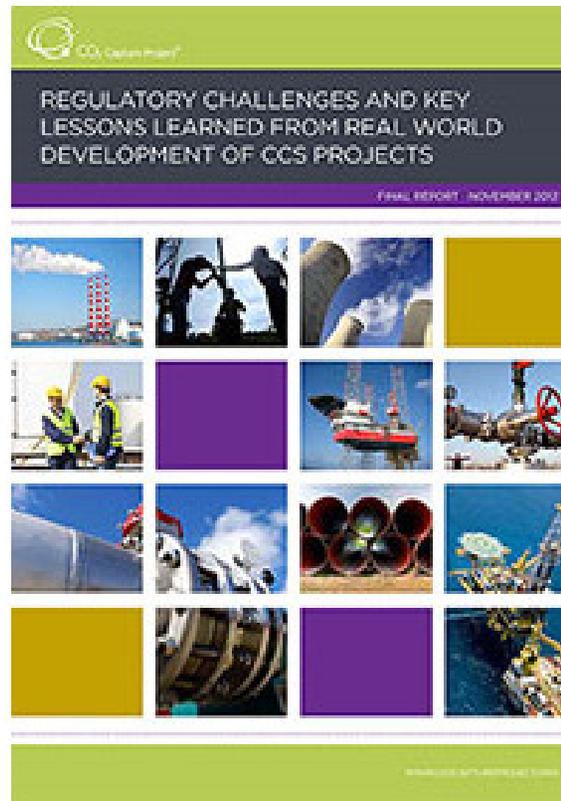


**Program Objective:** Inform the development of legal and policy frameworks through by

- Technical and economic insights
- Project experience of regulatory processes

## Results at a Glance

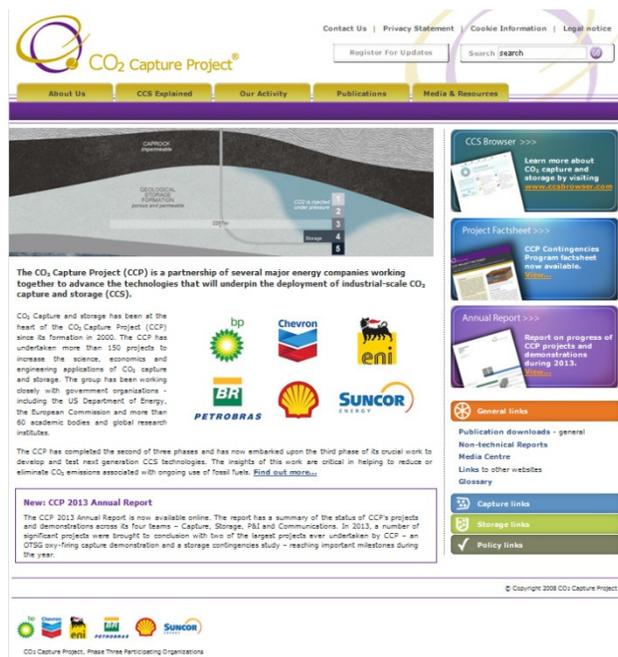
- Local community benefit sharing Study, 2011 - Local community benefit sharing can help to address the potential imbalance between **local costs** vs. **national or international benefits** associated with some major developments
- Regulatory Study, 2012 – Update of regulatory issues facing CCS projects, documented **lessons learned** and found that **pathways for approval do exist**



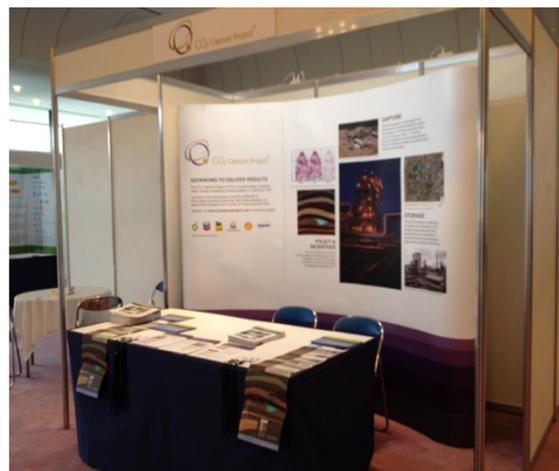
# CCP3 Communications



**Knowledge Sharing**  
[www.co2captureproject.org](http://www.co2captureproject.org)

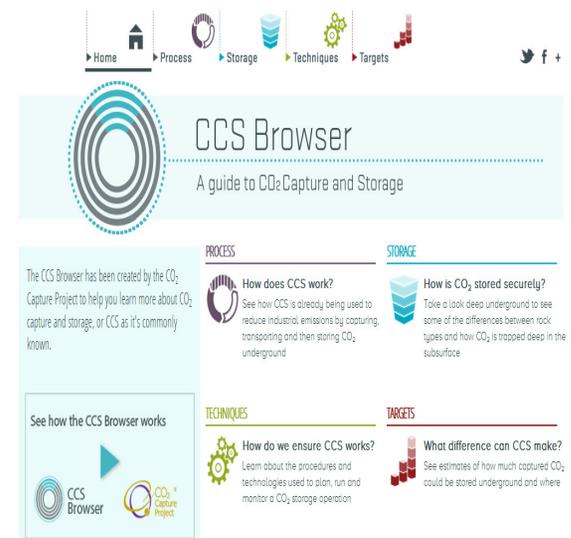


**Conferences**



- UNFCCC (Side events)
  - COP 16/17/18/19 in MX, ZA, QA, PL
- GHGT (Sponsor/Exhibitor/Presenter)
  - GHGT10/11/12 in USA, JP, NL
- CCUS Conference (Partner/Exhibitor/Presenter)
  - March 2009-2014 in Pittsburgh, PA
- CSLF (Recognized Project/Exhibitor/Presenter)
  - 4-7<sup>th</sup> November 2013 in Washington, DC
- CO2 Conference Week (Sponsor/Presenter)
  - December 2012-2014 in Midland, TX

**Public engagement**  
[www.ccsbrowser.com](http://www.ccsbrowser.com)



# CCP4 Draft Framework



## Tactical Demonstration (short-medium term)

Capture: Incremental Improvement Technologies, NG Treating  
SMV: Pilot/Demo scale of scientific fundamentals, Utilization  
P&I: Regional Incentives & Global Regulations  
Comms: Industry Knowledge Sharing

## Strategic Deployment (medium-long term)

Capture: Breakthrough Technologies, NG Power/Cogen  
SMV: Basin Scale Development and Operation  
P&I: FOAK to NOAK Pathway  
Comms: External Stakeholder Engagement

Advancing CCS

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# CCP Conclusions



- Post combustion capture technologies have seen some recent improvements, but what does the future look like versus alternatives, and will this achieve the end goal?
- There are some promising technology solutions to dramatically reduce capture costs & cost effectively verify safe/secure storage at scale, so R&D needs to continue
- CCP looks to build on its experience & expertise, welcome new partners and collaborate with others to ensure success



# Questions?



CCP is the oil and gas industry's answer to find & develop cost effective and sustainable CCS technologies

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