WESTCARB Annual Business Meeting

WESTCARB Vision and Accomplishments Overview

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WESTCARB Answers Technical and Policy Questions in a Phased Applied R&D Program

- Where are the regional CO_2 sources and how much do they emit?
- Where can CO_2 be stored?
- How much will it cost (and over what time scale)?
- What are the risks? How can they be managed?
- Are existing regulations adequate?
- How can it be monitored?

Phase I characterized regional opportunities (Complete)

Phase II tests promising geologic and terrestrial storage options at pilot scale (To be complete in Fall 2010)

Phase III centers on a commercial-scale geologic storage test (Began in mid-2008, continues for 10 years)

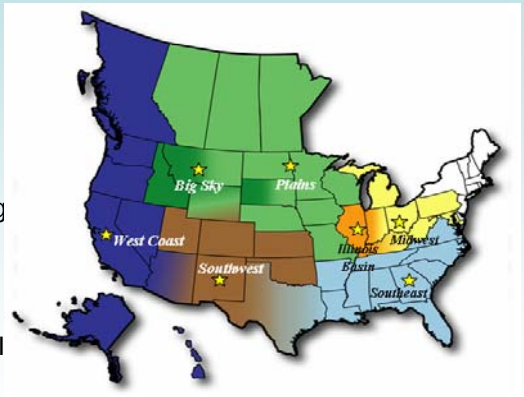
WESTCARB Features Strong and Diverse Partners; Robust Cost Share

- More than 80 organizations comprising:
  - Resource management and environmental protection agencies
  - National laboratories and research institutions
  - Climate project standards organizations and other nonprofits
  - Oil and gas companies; power companies; pipeline companies
  - Colleges and universities
  - Trade associations and policy coordinating bodies
  - Service firms and consultants
- Led by California Energy Commission (CEC)
- Energy Commission/partner Phase II cost share >$10 million; Phase III cost share ~$25 million

WEST COAST REGIONAL CARBON SEQUESTRATION PARTNERSHIP 3

WESTCARB Adds Hawaii to Partnership

- U.S. Department of Energy and California Energy Commission welcome Hawaii to WESTCARB partnership
- Hawaii is characterizing its CO_2 sources and evaluating opportunities for carbon sequestration, particularly terrestrial
- Hawaii also brings Phase III project management support through Hawaii Natural Energy Institute, and valuable insight into public engagement

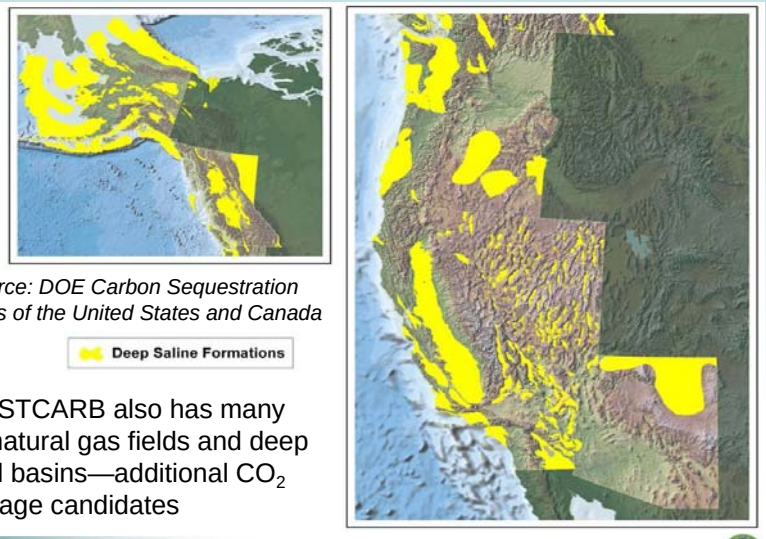


WEST COAST REGIONAL CARBON SEQUESTRATION PARTNERSHIP 4

WESTCARB Accomplishments to Date

- Centralized GIS source and sink database; major point sources and geologic sinks identified and characterized
- Geologic and terrestrial storage estimates made for major sinks
- Terrestrial and geologic marginal cost curves developed
- Terrestrial pilots are successfully under way
- Geologic pilots and the large-volume test are at permit application stage; pilots have identified the importance of non-technical issues, such as land access and indemnification
- Heightened awareness of sequestration among state, community, and industry leaders; results are informing policy
- Wealth of data for the technical and policy communities from comprehensive reports/papers

WESTCARB Region Has Deep Sedimentary Basins—Good Candidates for CO_2 Storage



Source: DOE Carbon Sequestration Atlas of the United States and Canada

Deep Saline Formations

WESTCARB also has many oil/natural gas fields and deep coal basins—additional CO_2 storage candidates

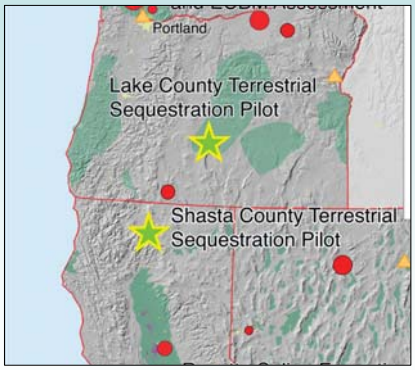
WESTCARB Phase II Geologic Pilots Have Important Similarities and Differences

- Pilots will test two of the Region's most promising, though geologically different, opportunities for geologic storage
- One two-well test; one single-well test. Well depths range from ~4000 – 10,000ft.
- Both involve injection of 2000 tons of commercial-grade CO_2; both will employ various surface-based and downhole methods to monitor the behavior of the CO_2 in the subsurface – results may vary
- Multi-state approach allows comparison of permitting and public engagement experiences

WEST COAST REGIONAL CARBON SEQUESTRATION PARTNERSHIP 7

WESTCARB Terrestrial Pilots in Oregon and California Also Offer Cross-State Comparisons

- Lake County, OR
  - Forest treatment/fire risk reduction/biomass power (as part of an Oregon Solutions Project)
  - Fast-growth afforestation assessment
- Shasta County, CA
  - Forest treatment/fire risk reduction
  - Native-species afforestation
  - Forest conservation management



WEST COAST REGIONAL CARBON SEQUESTRATION PARTNERSHIP 8

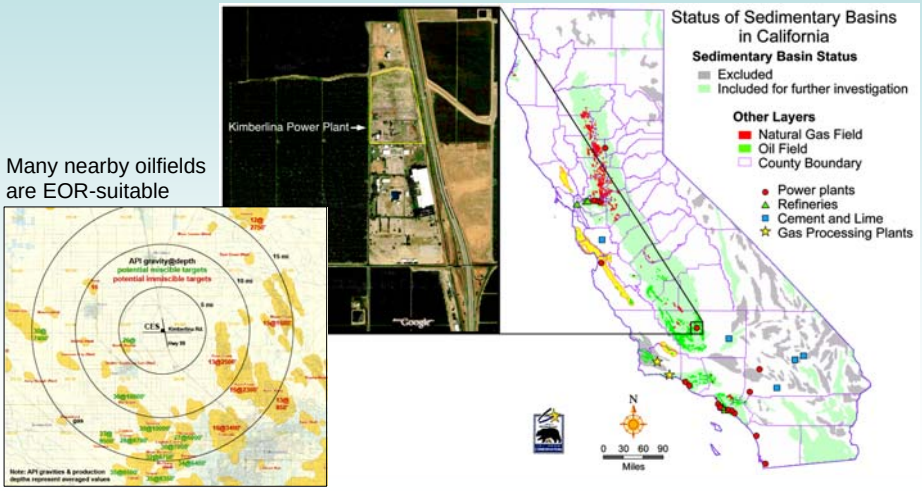
Afforestation Pilots Test Practical Aspects of Project Development

- Validate WESTCARB "Phase I" estimate of potential
  - Baseline carbon stocks
  - Carbon accumulation potential
  - Costs (site prep, planting, maintenance, MMV, registration/reporting)
- Explore conditions of landowner participation
  - What type of landowners? Under what conditions?
- On-the-ground experience in site preparation requirements, planting, and maintenance
- "Road-test" forestry project protocols and potential credit market acceptance

WESTCARB Phase III – A Commercial-Scale CCS Test

- Inject 1 million tons of CO_2 over 4 years, midway through a 10-year project
  - Access one of the best geologic targets in California
  - Use results to refine capacity estimates and "qualify" a major Central Valley saline formation for commercial use
- Co-locate project with advanced, commercial "sequestration friendly" oxy-combustion technology – Clean Energy Systems
  - Technology development supported by DOE and CEC
  - Planned as first commercial-scale facility of its type in U.S.
- Demonstrate commercial-scale injection site characterization, operations, maintenance, and monitoring
- Conduct research to improve technologies for reservoir modeling/simulation and engineering, risk assessment, and measurement/monitoring
- ***Establish in the public mind—via direct proof—that emission-free fossil power is possible and geologic sequestration is safe***

Project Is Representative of Major California Sequestration/EOR Potential; Provides Underpinnings for Commercialization

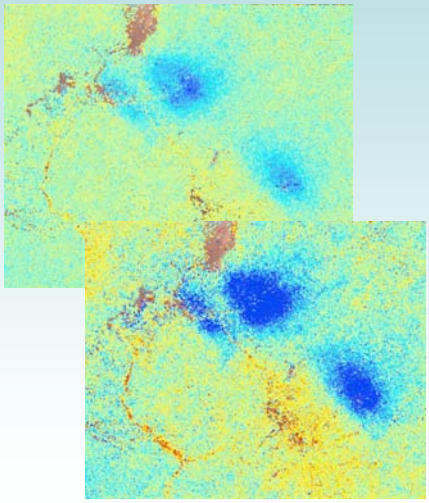


(J. Johnson, LLNL)

Source: California Geological Survey

Research-Stage MMV Methods Will Be Explored

- Each WESTCARB field test will apply existing monitoring and modeling techniques ***and*** field-test promising new or emerging methods
- Publication of results will help stakeholders establish workable, cost-effective measurement and monitoring protocols to assure public safety and satisfy policy and market requirements for carbon storage verification

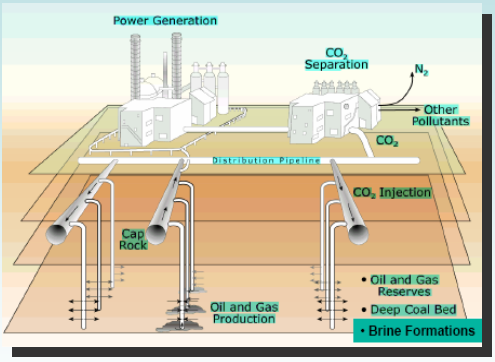


Time-lapse PSInSAR data showing surface displacement due to CO_2 injection at In Salah

Source: D. Vasco, LBNL

WESTCARB Is More Than a Research Project Consortium

- Serves as resource for commercial partners pursuing independent projects
- Provides technical information to policymakers
- Engages the public through outreach and educational materials and activities



WESTCARB Results Inform Recent Policy Decisions

- California
  - AB 1925 report to Legislature on accelerating CCS
  - AB 32 framework for mandatory GHG emissions reductions
- Oregon
  - House bill 3543 GHG emissions reductions (forest sequestration)
- Washington
  - Senate bill 6001 mandatory GHG emissions reductions
- Nevada
  - Senate bill 422 GHG emissions reporting
- Hawaii
  - HB 226/Act 234 mandatory GHG emissions reduction