Southwest Regional Partnership on Carbon Sequestration

Site Characterization and Outreach Workshops

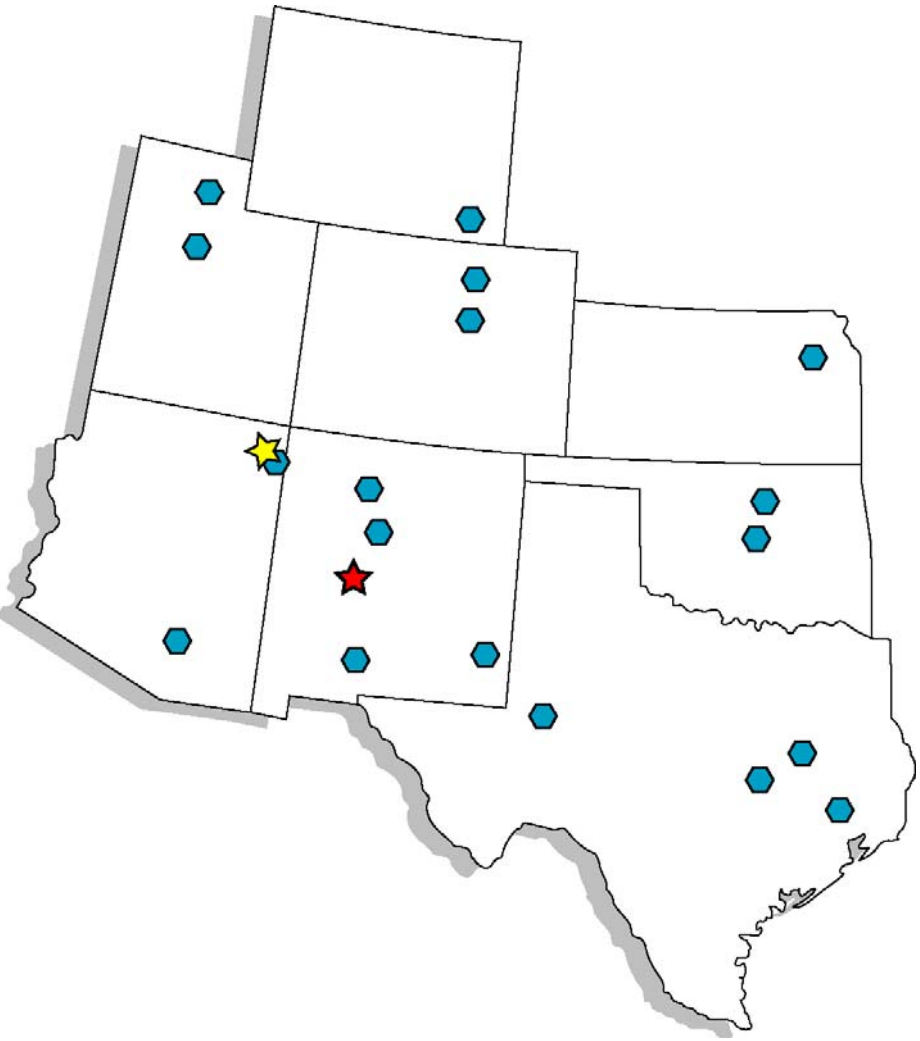
Focus: Utah Test Site

January 22 - 24, 2005

Salt Lake City, Utah

B.J. McPherson

The Southwest Carbon Sequestration Partnership



In all partner states:

- major universities
- geologic survey
- other state agencies
- lead organization: NMT

as well as

- Western Governors Association
- five major utilities
- seven energy companies
- three federal agencies
- the Navajo Nation
- many other critical partners

Introduction

Specific Research Interest: CO_2 Sequestration

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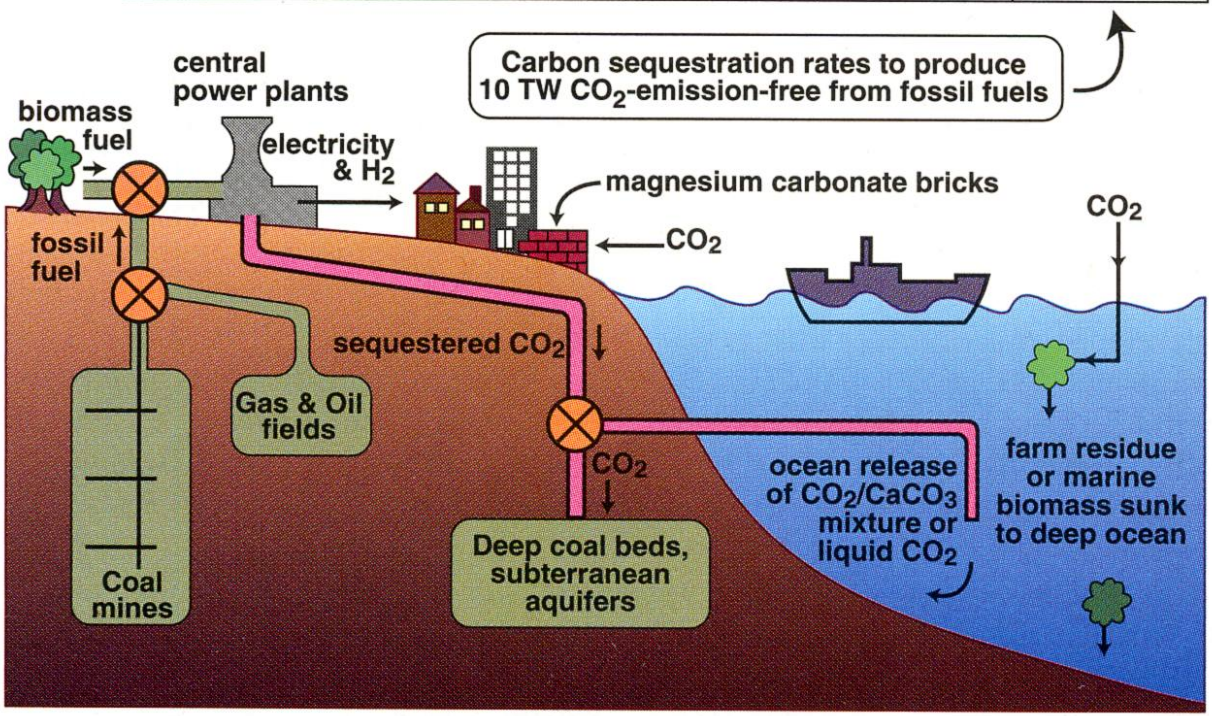
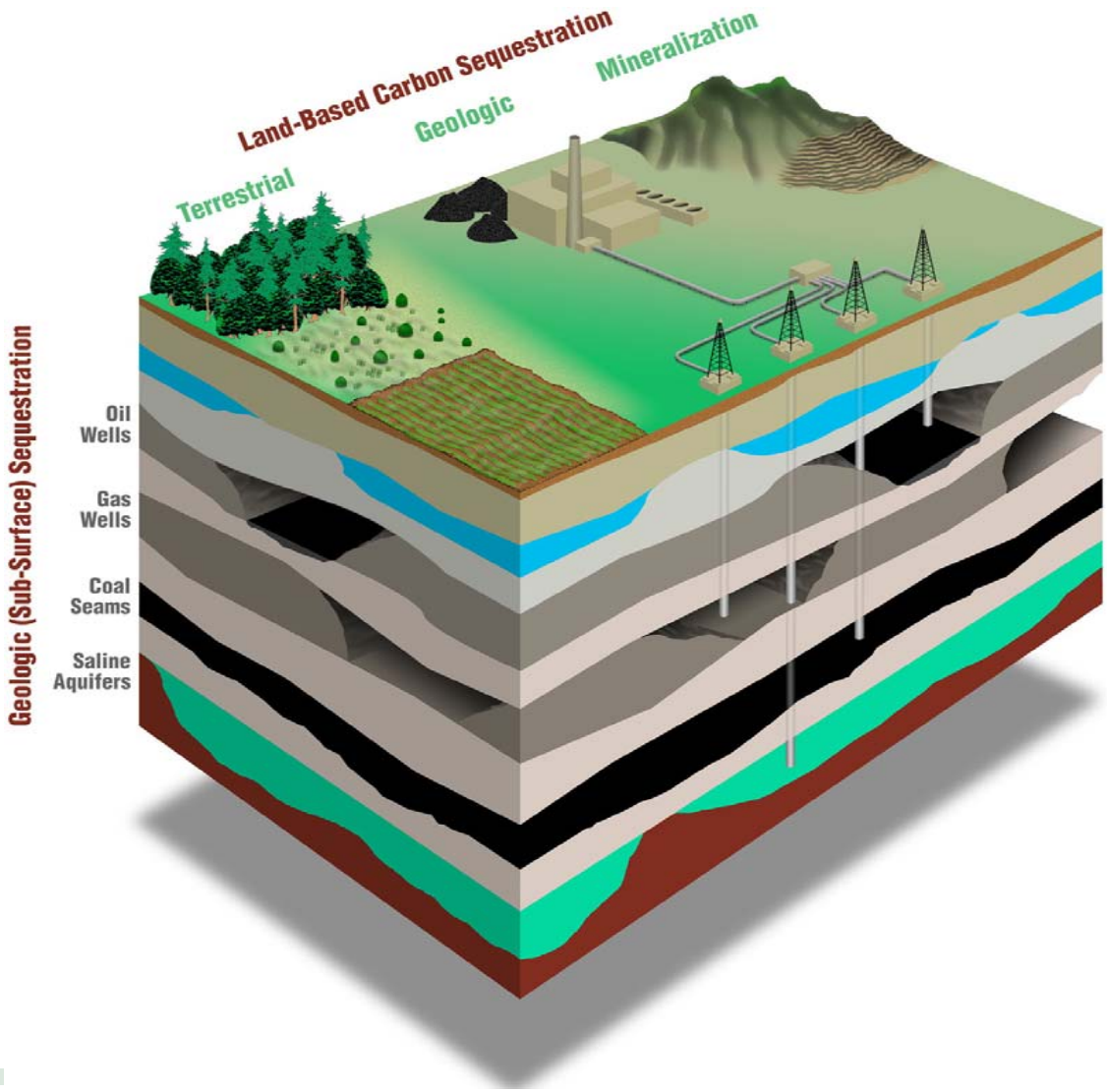
Fossil fuel	Energy content [TW-yr]	Carbon content [GTC]	(E_{fuel}/C) [TW-yr/GtC]	(E/C) [TW-yr/GtC]	Sequestration rate [GtC/yr]
Gas	1200	570	2.1	1.9 - 1.6	5 - 6
Oil	1200	750	1.6	1.4 - 1.2	7 - 8
Coal	4800	3690	1.3	1.2 - 1.0	9 - 10



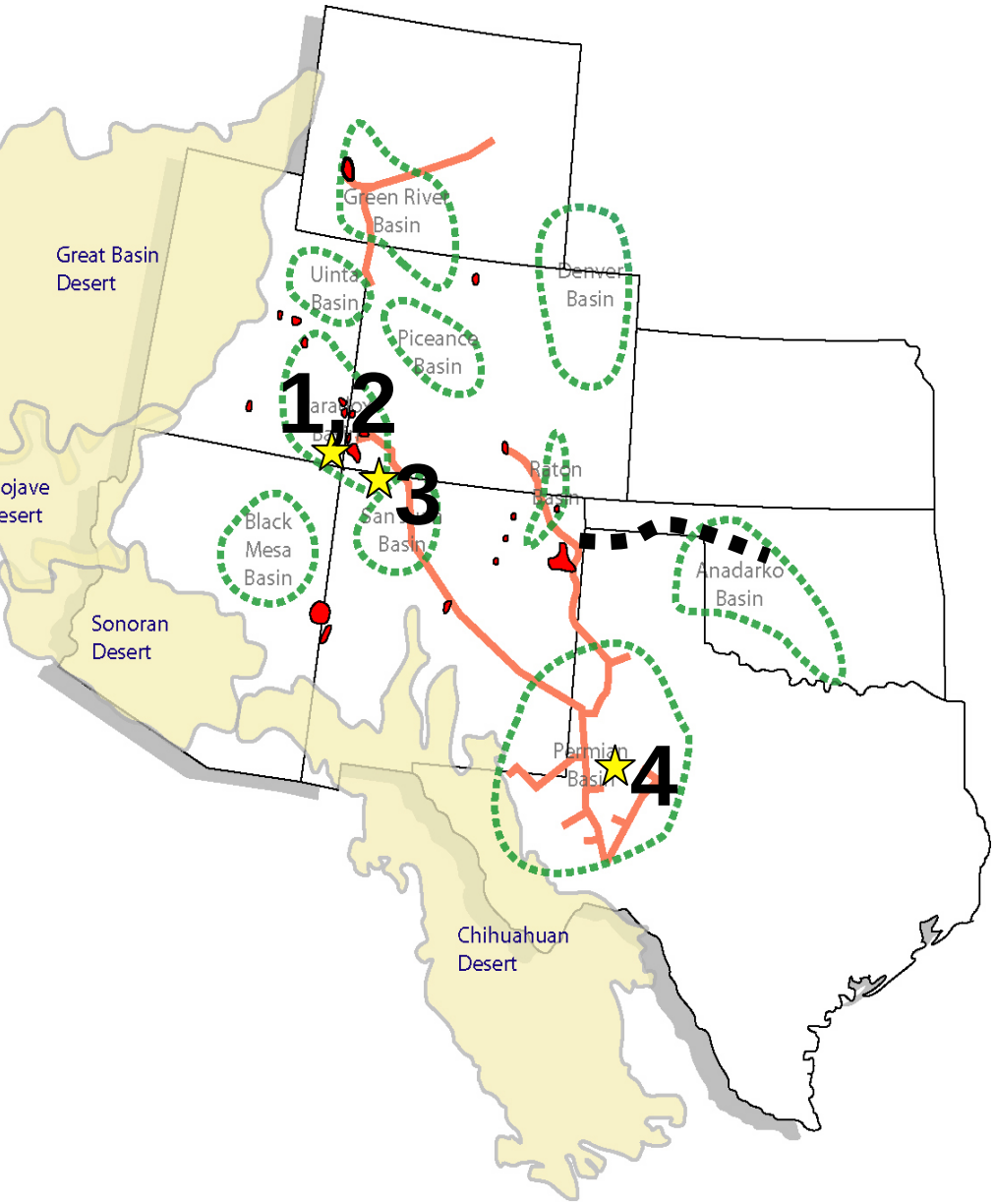
From the November 1st, 2002 issue of Science: Hoffert et al., "Advanced Technology Paths to Global Climate Stability: Energy for a Greenhouse Planet"

Southwest Carbon Project Themes

- Geologic systems
  - Potentially large volume
- Terrestrial systems
  - Rapid implementation
- Mineralization
  - still not mature technology
  - potentially very large volume
  - safety / risks known
  - expensive



Project Portfolio



Four of over 100 geologic options were selected as the most promising opportunities for evaluation, including

(1) combined enhanced oil recovery and

(2) deep brine reservoir sequestration testing, Paradox Basin, Utah

(Aug 2007 to Jan 2008)

Goals of Workshops

For Site Characterization Workshop:

(1) Bring together:

- **Site Characterization Group**
- **MMV Group**
- **Geo-Sequestration Modeling Group**
- **Risk Assessment Group**

(2) discuss common data needs, and identify needs unique to each group

(3) Develop strategy and data-collection plan that will optimize characterization of the Aneth test site for all groups

(4) Identify specific tasks and schedule for the plan

(5) Assign tasks and roles to most appropriate individuals

Goals of Workshops

For the Outreach Workshop

(1) Bring together:

- **Project scientists and engineers**
- **Critical stakeholders**

(2) Discuss the overall project

(3) Discuss how the SWP's work may impact stakeholders

(4) Overview of systems thinking and model development

(5) Review systems model and receive stakeholder input

(6) Provide networking opportunities for stakeholders

Some Project Goals

(1) **Estimate storage capacity of target reservoirs and regional reservoirs**
(2) **Predict reservoir behavior/response (e.g., reactive transport and effects on permeability and injectivity)**
(3) **Predict likely flow pathways within reservoir**
(4) **Design and optimize monitoring technologies**
(5) **Identify areas/features that have higher probability for CO2 to leave intended reservoir (e.g., thin zones of seal and how these zones might respond to high pressure injection)**
(6) **Perform uncertainty/error analysis (e.g., how confident are we in our predicted results?)**

Workshop Outcome: Project Needs

(1) maps - geologic and otherwise
(2) stratigraphy (via well-logs and otherwise)
(3) structure, state-of-stress
(4) fluid pressures
(5) subsurface temperatures
(6) experimental hydrologic and mechanical data
- elastic parameters (static and dynamic) to calibrate seismic and poroelastic analyses
- rock strength
- porosity, permeability, multiphase parameters
- water and rock composition

(7) chemical kinetic reaction parameters
(8) other physical/chemical rock response data
(9) field observations (e.g., gas fluxes)
(10) sound conceptual model (geologic/hydrologic)

Summary and Current Status

- **Some of these necessary data are being collected (e.g., those already available in literature and in UGS archives and other sources)**
- **Other data being collected by the MMV group**
- **Much more detailed data are still needed - and we are mapping out:**
  - **what we have**
  - **what we know**
  - **what we don't know**
- **Initial reservoir models are done (albeit crude)**
- **The modeling group is working on detailed 3-D grids of each area**