



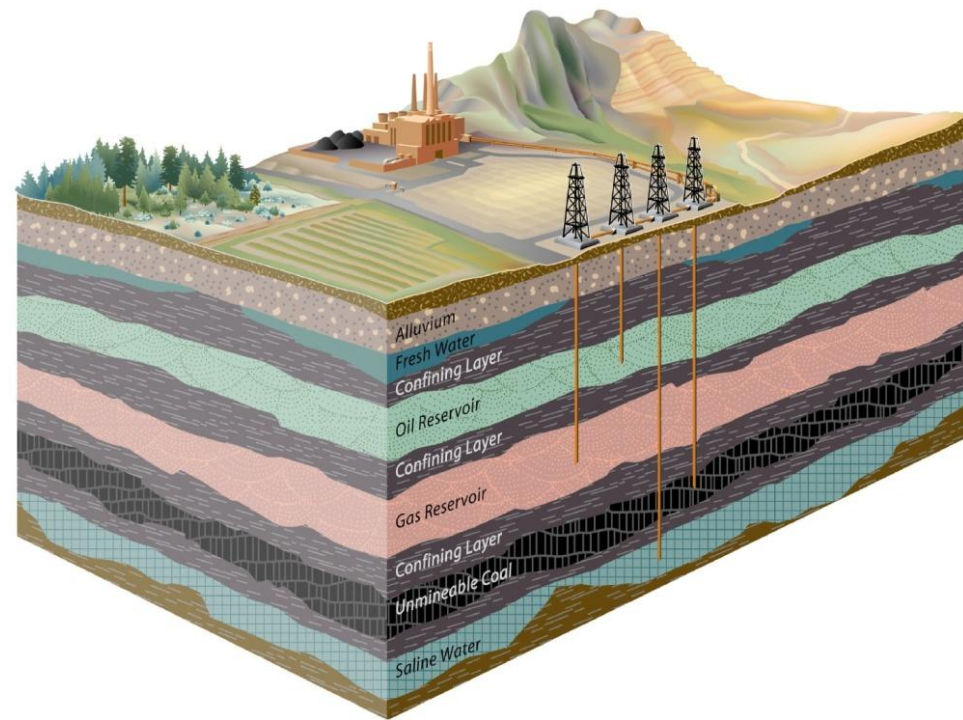
Challenges and Opportunities for CO₂ Capture and Sequestration

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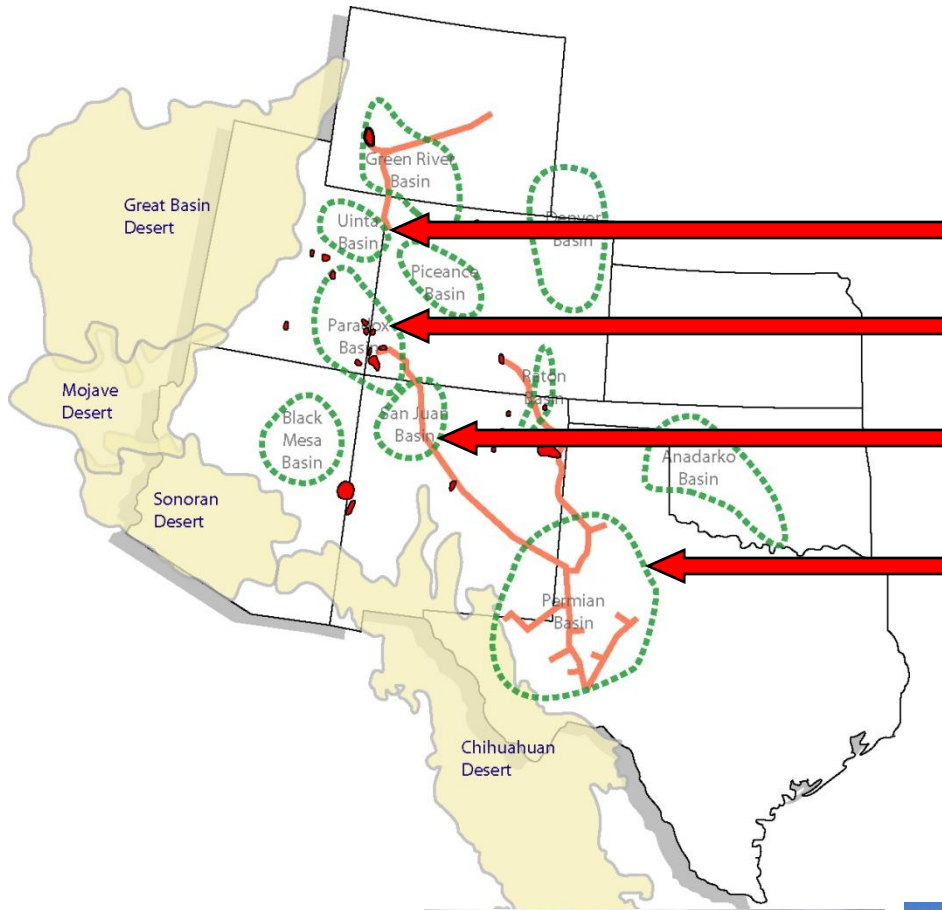
June 25, 2009

Headwaters Clean Carbon Services LLC

- JV between University of Utah and Headwaters
 - U of U has expertise in CO₂ sequestration and has strong relationship with U.S. DOE.
 - Headwaters has proven record of successful project execution and has strong relationships with U.S. coal-fired power plants.
- Providing full range of CO₂ sequestration services
- Long-term goal is to develop, build and operate regional CO₂ storage centers –first one in Utah



CO₂ Sequestration Tests

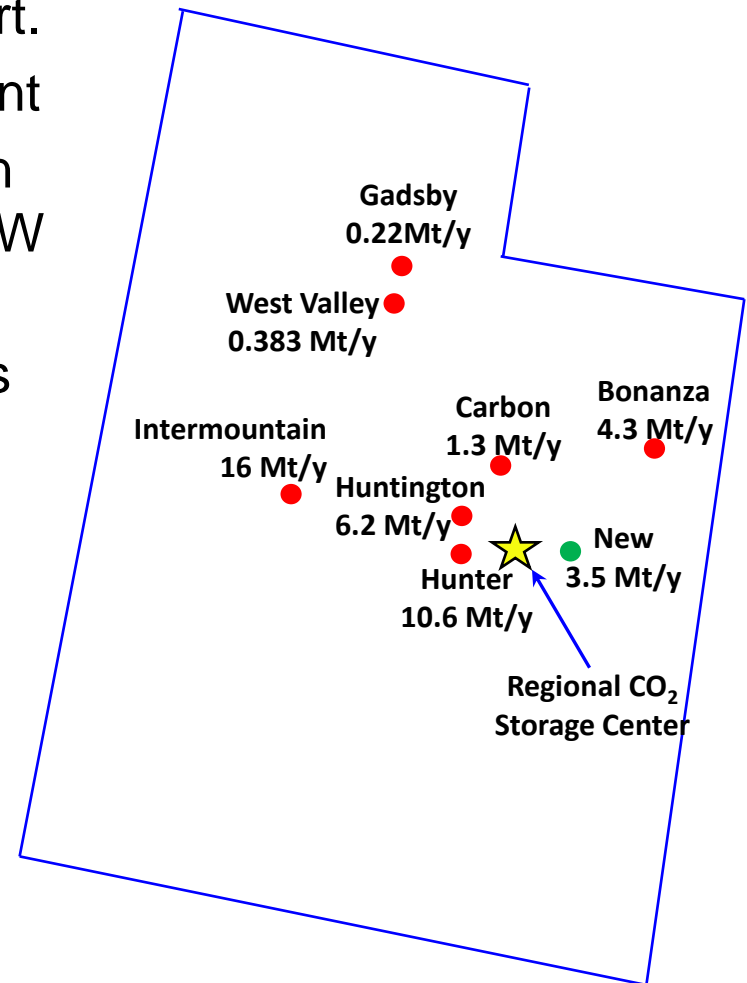


Basin, Location	Type	CO ₂ Injection	Start Date
Uinta Basin, UT	Deep Saline	1 million t/y	2010-11
Paradox Basin, UT	EOR + Seq.	150,000 t/y	August 2007
San Juan Basin, NM	ECBM + Seq.	75,000 t/y	July 2008
Permian Basin, TX	EOR + Seq.	350,000 t/y	October 2008



Utah Regional CO₂ Storage Center

- Strong local and state political support.
- Potential new 500-600MW power plant
- Deep saline aquifer can store 1 billion tons of CO₂ (emissions from 5x600MW power plants for 50 years)
- Three existing coal-fired power plants located nearby could tie into the regional CO₂ storage center.
- Sparsely populated area. No private land to deal with. State (SITLA) and Federal (BLM) land ownership.
- Sufficient coal and water available
- Close proximity to the California market (A.B. 32)



Challenges

- Legislation Needed
 - Sufficient incentive for CO₂ capture and storage
 - Reasonable access to surface and pore space rights
 - Reasonable permitting and monitoring regulations
 - Federal sinking fund for long-term liability
- Public Acceptance Needed
 - Willing to accept CO₂ causes global warming and ocean acidification
 - Willing to pay higher prices for electricity and fuel
 - Willing to allow local CO₂ geologic sequestration

Challenges (continued)

- Large-Scale Demonstration of CCS
 - Scale-up of CO₂ capture (performance and cost)
 - Scale-up of CO₂ geologic storage (safety, liability and sustainability)
- Integrating CCS into New Coal-Fired Power Plants
 - Long Lead Time
 - Permitting
 - Funding
- Retrofitting CCS into Existing Coal-Fired Power Plants
 - High capital cost of CO₂ capture
 - Limited remaining life of existing facility
 - Limited space for CO₂ capture equipment
 - De-rating of power plant capacity
 - Downtime for retrofitting (generation opportunity loss)
 - Limited access to feasible geologic sinks

Opportunities

- **American Recovery and Reinvestment Act of 2009**
 - \$1 billion Fossil Energy R&D Program
 - \$0.8 billion Clean Coal Power Initiative Round III
 - \$1.52 billion Industrial CCS
 - \$50 million CO₂ Site Characterization
 - \$20 million CO₂ Sequestration Training
 - \$10 million Program Direction Funding

Opportunities (continued)

Carbon Dioxide Sequestration Credit

Carbon dioxide captured after October 3, 2008, from an industrial source may be eligible for a credit. A credit of \$20 per metric ton is allowed for qualified carbon dioxide that is captured at a qualified facility and disposed of in secure geological storage or \$10 per metric ton to qualified carbon dioxide that is captured at a qualified facility and used as a tertiary injectant in a qualified enhanced oil or natural gas recovery project. Only carbon dioxide captured and disposed of or used within the United States or a U.S. possession is taken into account when figuring the credit. For more information, see [Form 8933, Carbon Dioxide Sequestration Credit](#).

Source: <http://www.irs.gov/formspubs/article/0,,id=207298,00.html>

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Opportunities (continued)

- **H.R. 2454 Waxman-Markey Climate Bill (American Clean Energy Security Act of 2009)**
 - 2% of emission permits given to electric utilities between 2014-17, and 5% thereafter, to cover cost of CCS
 - \$60 billion investment allocated for CCS 2012-25.
 - Early electric utility CCS movers rewarded with bonus emission permits for 10 years

HEADWATERS



CLEAN CARBON SERVICES