



## ***Geologic Carbon Sequestration: What Should You Know about It?***

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### ***Why Is Geological Carbon Sequestration of Interest?***

Geologic Carbon Sequestration (GCS), also known as Carbon Capture and Sequestration (CCS), may play a large role in reducing emissions from coal-fired power plants and other point sources of carbon dioxide emissions. The Intergovernmental Panel on Climate Change estimates that for well-selected sites, there is a 90% - 99% probability that over 99% of liquefied CO<sub>2</sub> injected into underground wells will remain underground for over 100 years.

In July 2009, the U.S. DOE released a record of decision approving roughly \$1 billion of federal funding under the American Recovery and Reinvestment Act of 2009 for the pilot FutureGen GCS Project to be sited in Mattoon, Illinois. The DOE's record of decision can be accessed at

[http://fossil.energy.gov/programs/powersystems/futuregen/futuregen\\_rod\\_071409.pdf](http://fossil.energy.gov/programs/powersystems/futuregen/futuregen_rod_071409.pdf). The Final EIS on the FutureGen Project can be accessed at

[http://gc.energy.gov/NEPA/nepa\\_documents/EIS/eis0394/index.html](http://gc.energy.gov/NEPA/nepa_documents/EIS/eis0394/index.html).

### ***Possible Disadvantages***

- GCS is very expensive and new infrastructure is necessary. While many components of a GCS project do exist, there is currently no commercial scale GCS project in operation. Retrofitting current coal-fired power plants may be cost prohibitive. New power plants would have to be constructed along with a new series of pipelines for the safe and efficient transport of liquid CO<sub>2</sub>. The necessity for new infrastructure may negate any supposed cost benefits of GCS relative to clean renewable energy technologies.
- Heavy investment into GCS technology could increase the United States' reliance on coal and siphon resources away from clean renewable energy technologies.
- Liquid CO<sub>2</sub> is dangerous. Leakage of greater than 0.01% - 1% per year could negate climate change benefits. At concentrations greater than 30% liquid CO<sub>2</sub> could cause near-immediate human death from asphyxiation and even leakage of small concentrations could contaminate groundwater and cause ecological damage at the surface.
- The GCS process itself requires a substantial amount of energy and water.

### ***Applicable Federal Law, Generally***

- Energy Independence and Security Act of 2007—requires procedures for public review and comment and gives EPA authority under the Safe Drinking Water Act to regulate GCS.
- Safe Drinking Water Act—EPA Proposed Rule; Federal Requirements Under the Underground Injection Control (UIC) Program for Carbon Dioxide (CO<sub>2</sub>) Geologic Sequestration (GS) Wells. 40 CFR Parts 144 and 146. Federal Register, July 25, 2008 (Volume 73, Number 144, pp. 4349–43541)
- National Environmental Policy Act
- Resource Conservation and Recovery Act
- Comprehensive Environmental Response, Compensation, and Liability Act

### ***Suggested Best Practices for State-level Regulation***

A cradle-to-grave regulatory framework governing property rights and tort liability is a necessary prerequisite to the development of commercial scale GCS projects. Several states have or are in the process of designing incentives and regulations governing GCS. Wyoming is the state with the most developed law governing GCS projects. State statutes should be crafted in a similar manner. Certain aspects of Wyoming's statute should be modeled, including:

- Provisions for public notice and comment
- A permit scheme, the provisions of which should include a precise description of the necessary contents of a permit application. As per Wyo. Stat. § 35-11-313 (2009), the permit application should include:
  - Precise geological description and characterization of the injection zone and possible affected area
  - Identification of all drill holes to be used by the GCS project as well as any other drill holes or operating wells within the proximity of the injection zone
  - Environmental impact assessment
  - Plans and procedures for environmental surveillance, leakage detection, prevention, and control
  - Precise description of all facilities involved
  - Proof that proposed injection zone meets the state's minimum construction standards for underground wells
  - Provisions for regular testing of the integrity of all mechanical processes involved
  - A detailed plan for post-closure monitoring, verification, maintenance, and mitigation



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- Proof of notice to surface owners, mineral claimants, mineral owners, lessees and other owners of record of subsurface interests. Notice should include the publication of the permit application in a newspaper of general circulation in each county of the proposed operation at weekly intervals of several consecutive weeks. A copy of the notice should be mailed to all surface owners, mineral claimants, mineral owners, lessees and other owners of record of subsurface interests which are located within one mile of the proposed boundary of the geologic sequestration site.
- Requirement of the site operator to provide immediate verbal notice to the State government in the case of the discovery of any leaked CO<sub>2</sub> or other injected substances and written notice to all surface owners, mineral claimants, mineral owners, lessees and other owners of record of subsurface interests within thirty days of when the leakage is discovered

However, Wyoming's statute also has several shortcomings.

***An Ideal GCS Statute Should Include***

- A requirement for a full environmental impact statement, including consideration of potential environmental and health risks as well as alternatives to GCS, including investments in energy efficiency improvements and clean renewable energy technologies.
- Complete and clear definitions and standards governing the substances to be injected. Wyoming's statute fails to define "carbon dioxide"—Wyo. Stat. § 35-11-103 (2009). There must be a standard governing the concentration of CO<sub>2</sub> that is injected into the ground.
- Strict liability for torts. Wyoming's statute provides that CO<sub>2</sub> and other injected substances are presumed to be owned by the injector and that all burdens and liabilities of such ownership belong to the injector. Wyo. Stat. § 34-1-153 (2009). Because of the potentially disastrous harms that could result from the leakage of injected CO<sub>2</sub>, injectors should assume strict liability for harms resulting from such leakage.
- Provisions limiting the ability of a surface or mineral owner to drill or bore through a GCS site. Wyoming's statutes allow such drilling in certain circumstances. Wyo. Stat. § 30-5-501 (2009). Because of the potentially disastrous harms that could result from the leakage of injected CO<sub>2</sub>, there should be strict provisions to protect the integrity of the pore space into which CO<sub>2</sub> is injected.
- Creation of a Superfund-like scheme to cover the potential costs of cleanup, litigation, and tort remedies in the instance of CO<sub>2</sub> leakage.



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