

ENVIRONMENTAL LAW

BY MICHAEL B. GERRARD

Carbon Capture, Sequestration Raises Myriad Legal Issues

Carbon capture and sequestration (CCS) is the concept of capturing the carbon dioxide (CO₂) emissions from an air pollution source before they leave the smokestack, and then sequestering these gases, typically in an underground reservoir, so that they cannot escape into the atmosphere.

The largest source of greenhouse gas (GHG) emissions in the United States is coal-fired power plants. Coal is the most abundant energy source in this country. In an era of escalating concern over climate change and impending federal legislation, CCS is seen as a technique to allow the continued use of coal while controlling CO₂ emissions.¹

So far there are no commercial-scale facilities anywhere using CCS at coal-fired power plants. There are only about five commercial-scale CO₂ injection projects now operating in the world for the purpose of carbon sequestration, but they all involve oil or natural gas fields.

In 2003, President George W. Bush proposed a 10-year, \$1 billion project called "FutureGen" to build a coal-fired power plant with CCS. After much competition among the states, a site in Mattoon, Ill., was selected. However, on Jan. 30, 2008, the Department of Energy (DOE) announced



that it was withdrawing its support for the Mattoon plant and moving toward a more decentralized program. On May 6, 2008, DOE said it was awarding \$126.6 million for CCS projects in the San Joaquin Basin in central California, and the Mount Simon Sandstone in Ohio. These were the fifth and sixth awards under the DOE's Regional Carbon Sequestration Partnership.

There is no one-stop approval process for CCS projects. Each project must pass through several regulatory processes, some state and some federal.

This article discusses the environmental laws that apply at each stage of a CCS project in the United States: capture of the CO₂ emissions; transport of the captured gas; sequestration of the gas; and the closure and post-closure phases. It also discusses the liability issues raised by CCS.

Capture

The first step is to capture the CO₂ before it leaves the smokestack. For power plants, the

most prominent technology to accomplish this is integrated gasification combined cycle (IGCC). This technology is still in the early stages of deployment. There are only two electric power plants in the United States today that use IGCC—the Cinergy/Duke Energy Wabash River Station in Indiana and Tampa Electric's Polk Station in Florida. Neither is running on coal alone and, in October 2007, Tampa Electric suspended its plan to build a second IGCC plant, citing continued regulatory uncertainty. Several other IGCC plants are in the permitting or planning stages.

Under the Clean Air Act, air pollution control equipment must meet "best available control technology" (where new source review is applicable) or "lowest achievable emissions rate" (where prevention of significant deterioration rules apply). The EPA has not deemed IGCC to be required under these standards.²

The developers of several coal-fired power plants have struggled to get the necessary approvals for IGCC. In November 2007 the Washington State Energy Facility Site Evaluation Council rejected an application for a 793 megawatt plant with IGCC because new state legislation required applications for power plants generating more than a certain level of GHGs to include a "carbon sequestration plan," and the applicant merely pledged to prepare a plan at some future time when sequestration becomes a proven technology for use by power plants. The council found this did not meet the requirements of the statute.³

On April 14, 2008, the Virginia State Corporation Commission (VSCC) denied a request by Appalachian Power Co. to

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build a coal-fired power plant that would use IGCC. The VSCC found that the record “indicates that there is no proven track record for the development and implementation of large-scale IGCC generation plants,” and that “[w]e cannot ask Virginia ratepayers to bear the enormous risks—and potential huge costs—of these uncertainties.”

Transportation

Though there are no pipelines yet to transport CO₂ captured from power plants to their place of sequestration, there are of course many pipelines for gases and liquid fuels, and the laws governing these may be looked to as models.

Several pipelines carry CO₂ to oil wells to assist in enhanced oil recovery (essentially, forcing the gas into an oil deposit to drive out more oil). For these pipelines, state law determines their siting. A federal agency, the Surface Transportation Board, may review privately set rates for the use of these pipelines if a third party complains.

For oil pipelines, state law determines siting, and the Federal Energy Regulatory Commission (FERC) sets the rates. For natural gas pipelines, FERC determines both siting and rates.

Storage

Once at the disposal site, the CO₂ would be pumped below ground into storage reservoirs, typically geological strata from which oil or natural gas had been recovered. Two separate legal issues arise, property rights and regulation.

• **Property rights.** There are four different kinds of properties to be held: the surface area (where the injection pumps are located), the subsurface (the storage reservoir, including the pore space), the stored CO₂ itself, and the groundwater that resides in or near the storage reservoir. Sometimes the same entity may own all four; more often ownership is divided. These issues are matters of state law, and many different permutations are possible.

Ownership is relevant to several questions: Whose permission is needed in order to

undertake the activity? Who is entitled to payments for use of their property? Who is liable if something goes wrong? Who benefits from any carbon emission credits or offsets that may be generated?

The property rights also have numerous attributes. They may be held by title, lease or license. They may be subject to covenants or easements to restrict future use. They may or may not be transferable. They may or may not be subject to acquisition through eminent domain.

A key issue throughout is whether the CO₂ is considered to be a waste or a resource. The normally applicable regulatory requirements are far more onerous if the injection of CO₂ is considered to be disposal of waste rather than storage or use of a resource.

• **Regulation.** As with transportation, there are several activities that are comparable to the sequestration of CO₂; each is subject to its own legal regime. The closest analogy is the injection of CO₂ into underground formations for enhanced oil recovery. Also comparable are the storage of natural gas in geologic reservoirs, and the injection of acid gas into underground formations for disposal.

A Waste or a Resource?

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The U.S. law that (barring new legislation) is likely to govern injection and storage is the Underground Injection Control (UIC) title of the Safe Drinking Water Act.⁴ This law regulates the underground injection of

fluids (including gases), and is designed to protect groundwater supplies. It governs the siting, construction, operation and closure of injection wells. It is primarily implemented by the states, acting under the supervision of the U.S. Environmental Protection Agency (EPA). The UIC program has five classes of wells, each with its own rules. Class V is a miscellaneous category that can be used for a wide variety of activities.

On March 1, 2007, the EPA issued a guidance document, “Using the Class V Experimental Technology Well Classification for Pilot Geologic Sequestration Projects.”⁵ It assumes only pilot projects and small injection volumes. On Oct. 11, 2007, the EPA announced plans to develop regulations under the UIC program for CCS. The EPA’s proposed regulations are expected in July 2008, with the final rule in late 2010 or early 2011.

Not everyone is happy with the idea of federal regulation, however. The Interstate Oil and Gas Compact Commission (whose members include the major oil- and gas-producing states) has published a model legal and regulatory regime for the geologic storage of CO₂. It relies mostly on state regulation, and covers more activities than the UIC program. So far, no states have adopted the commission’s proposal.

The only state to adopt its own CCS regulatory scheme so far is Wyoming. On March 4, 2008, Governor Dave Freudenthal, a Democrat, signed two bills into law. HB89 addresses property rights issues, including ownership of the pore space and HB90 specifies which state agencies will have jurisdiction over injection, storage and exploration.

According to the National Conference of State Legislatures, more than 30 states are considering legislation on aspects of CCS. Already, Colorado, Illinois, Indiana, Kansas, Kentucky, Minnesota, Ohio, Pennsylvania, Texas and Wyoming have some form of incentive, authorization or subsidy system in place. The legislatures, environmental agencies and public utility commissions of numerous states are grappling with methods to encourage the use of CCS.⁶

Measurement, monitoring and verification are important elements of any CCS scheme. It is important to be able to quantify how much CO₂ has been pumped into a reservoir, and how much remains. Accurate measurements are necessary for safe operation of the facility; leak detection; the determination of effective storage models; allocation of liability and credits; and public acceptance. The DOE, under its §1605(b) program for voluntary reporting of GHGs, has issued guidelines on monitoring options.

Closure

Once the reservoir is full (or it is closed for some other reason), procedures must be followed for closure and decommissioning. The well must be sealed and the integrity of the reservoir must be maintained so that the gases do not leak out. As is currently the case with many kinds of waste disposal operations, proposals have been advanced for a federal- or state-administered trust fund to pay for closure and post-closure activities, perhaps to be funded by a fee on storage facility operators.

Liability

There are several kinds of liability concerns with respect to CO₂ storage:⁷

1. Release of CO₂ into the atmosphere or shallow subsurface (where it may harm humans, animals or plants, as well as contribute to climate risk);
2. Dissolution of CO₂ in the subsurface, where it may contaminate underground drinking water, interfere with deep subsurface ecosystems, and corrode well materials; and
3. Pressure caused by CO₂, possibly leading to ground heave or induced seismicity; contamination of drinking water by displaced brines; damage to hydrocarbon resources; and subsurface trespass into pore space owned by others.

Numerous issues are raised by the above potentials for liability:

- How long will the liability persist? Is there

a statute of limitations?

- Who is liable: the buyer of property, the seller, the generator of CO₂?
- If leakage occurs from a project that generated GHG trading credits or offsets, are they retroactively lost?
- Should credits or offsets be discounted to account for expected leakage?
- Can liability be escaped through bankruptcy or dissolution?
- Should a post-closure fund be established to cover potential liabilities?
- What is the process for resolution of disputes over liability?
- What is the role of insurance?
- Should there be a government backstop for liability?

Offshore Storage

The above discussion assumed that the CO₂ storage would be under dry land. An entirely different set of laws applies if the storage takes place instead in geological formations under the sea bottom. This activity would primarily be governed by the Convention on the Prevention of Marine Pollution by Dumping Wastes and Other Matter of 1972 (also known as the London Convention), and the London Protocol to the London Convention (1996).

The United States is a party to the London Convention, which prohibits the “dumping” of “industrial waste” in the ocean. It excludes “[t]he disposal of wastes or other matter directly arising from, or related to the...exploitation and associated offshore processing of sea-bed mineral resources.”

The United States is not a party to the London Protocol. In November 2006, the London Protocol was amended to allow the sequestration of CO₂ in subseabed geological formations.

Congressional Action⁸

The Lieberman-Warner climate bill, S.2191, which will be debated by the U.S. Senate beginning on June 2 would allocate a portion of bonus emission allowances on the basis of carbon sequestration, as an incentive

to develop CCS.

The Energy Independence and Security Act of 2007, P.L. 110-140, has numerous provisions on CCS. It authorizes an expansion of the current research and development program for CCS and directs the Department of the Interior to develop a methodology for assessing the national potential for geologic storage of CO₂.

As an indication of how much Congress favors CCS, the Consolidated Appropriations Act for 2008 provides \$120 million for DOE carbon sequestration programs in fiscal year 2008, almost \$41 million more than the administration had requested.⁹



1. See Ken Berlin and Robert M. Sussman, “Global Warming and the Future of Coal: The Path to Carbon Capture and Storage,” Center for American Progress, May 2007.

2. See letter from Stephen D. Page, EPA, to Paul Plath, E3 Consulting, LLC, Dec. 13, 2005, <http://www.epa.gov/region07/programs/artd/air/nr/nrsmemos/igccbact.pdf>.

3. *In the Matter of Energy Northwest, Pacific Mountain Energy Center Power Project*, Order Staying Adjudicative Proceeding (State of Washington Energy Facility Site Evaluation Council, Nov. 27, 2007), <http://www.efsec.wa.gov/FILES/orders/833%20-%20PMEC%20stay%20adjud.pdf>.

4. 42 U.S.C. §300h.

5. http://www.epa.gov/OGWDW/uic/pdfs/guide_uic_carbonsequestration_final-03-07.pdf.

6. Richard Cowart et al., “State Options for Low-Carbon Coal Policy,” Pew Center on Global Climate Change, February 2008.

7. Jeffrey Logan et al., “Building Public Acceptability for Carbon Capture and Sequestration,” WRI Issue Brief No. 2 (October 2007); E.J. Wilson et al., “Regulating the Ultimate Sink: Managing the Risks of Geologic CO₂ Sequestration,” 37 *Env. Sci. & Tech.* 3476 (2003).

8. See generally Peter Folger, “CRS Report for Congress: Carbon Capture and Sequestration (CCS),” Congressional Research Service, Feb. 7, 2008.

9. On the other hand, some environmental groups are very skeptical of CCS. See, e.g., Greenpeace, “False Hope: Why carbon capture and storage won’t save the climate,” May 2008.

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