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Addressing long-term stewardship of carbon storage

By Frederick R. Eames

Carbon capture and storage (CCS) technology is crucial to greenhouse gas emission curbs. All expectations are that carbon sequestration can be conducted safely. The world has safely contained naturally occurring gases for millions of years without the added benefit of engineered safety measures. Nonetheless, research shows that addressing long-term stewardship responsibilities will be an important prerequisite in the financing — particularly equity financing — of CCS projects. Recent actions by Congress demonstrate a willingness on the part of the federal government to develop policy solutions addressing long-term stewardship.

Congress is making progress toward a policy solution on liability for long-term stewardship of sequestered carbon dioxide. In particular, 2009 saw several significant advances, including the Senate Energy and Natural Resources Committee's passage of Chairman Jeff Bingaman's (DN. M.) American Clean Energy Leadership Act of 2009. That bill included provisions authorizing the U.S. Department of Energy (DOE) to enter into cooperative agreements for as many as 10 demonstration projects. Agreement recipients would pay a per-ton sequestration fee into a DOE-administered trust fund, from which DOE would indemnify recipients for liability arising after the site received a "certificate of closure" from the site regulator (either the U.S. Environmental Protection Agency or the state equivalent).

From the perspective of industry, the bill has some flaws. Indemnity under the bill is contingent upon making showings many years in the future, but project funding depends on resolving liability uncertainties up front. This, it could be argued, puts the horse

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decades behind the cart. Furthermore, some observers view 10 projects as too few. Policymakers agree that CCS deployment must be much quicker than building 10 projects now and waiting decades to see whether the experiment bears repeating.

Perceived flaws aside, the Bingaman bill is a bellwether proposal. It made possible additional progress, including introduction of the more comprehensive Casey-Enzi bill (S. 1502) last summer. That bill offers full indemnity to all projects after closure — not just a few selected by the DOE. Like the Bingaman bill, Casey-Enzi authorizes a per-ton sequestration fee to be collected into a DOE-administered fund to cover long-term stewardship liabilities. It is attracting significant attention and may spur similar new proposals.

Both the House and Senate climate change bills considered long-term stewardship, although neither did much to resolve it. Each would appoint a task force to examine "potential models for Federal, State, or private sector assumption of liabilities and financial responsibilities with respect to closed geologic sequestration sites." H.R. 2454, § 113.

Why Government Involvement?

Skeptics argue that, because risks are expected to be low after a certificate of closure has been issued, government risk-management assistance isn't necessary. They also question whether government should have any responsibility in managing long-term sequestration risks.

However, proponents argue that long-term stewardship for geologic sequestration sites presents a classic case for government risk-management intervention. Cap-and-trade legislation likely will necessitate storing carbon dioxide underground. Sequestration is indispensable to serving the governmental goal of emission reductions. And there is no private market to address the long-term stewardship risk.

A few entities eventually may be willing to manage long-term risks for commercial-scale CCS deployment, particularly after the country and the world gain additional experience. But to date, public expressions of willingness to do so are in short supply. Commercial-scale sequestration is a field largely without an established risk profile. Several physical mechanisms — including mixing carbon dioxide into compounds that will mineralize over time, and capillary action immobilizing injectate in the granular pore space of the injection strata — will increasingly trap the carbon dioxide and reduce the risk of mishap. However, the pace and effectiveness of these mechanisms is a site-specific matter.

Perhaps the government risk-management role can be calibrated up-front to diminish over time, or the role could be revisited periodically to assess whether a private market is available. Many prefer the market to government intervention. But again, at present, there is no market for the long-term risk.

The federal government has intervened in the economy on numerous occasions to manage risks. Examples often cited include the National Flood Insurance Program, the Terrorism Risk Insurance Act (TRIA), and the nuclear liability management structure created by the Price- Anderson Act. As models for CCS, however, none of these is particularly useful. For example, the flood insurance program is criticized as encouraging building or rebuilding in risky locations, a claim buttressed by the program's insolvency, whereas sequestration sites will be chosen for low risk. TRIA addresses risks that are difficult to manage because they are unknowable in nature, severity, frequency and location.

Carbon dioxide, on the other hand, is not a foreign enemy constantly seeking to outpace our defenses. We may lack experience to fully characterize sequestration risks, but we know where the carbon dioxide will be and can predict what may happen if it escapes. The mention of Price-Anderson causes many to wince because risks from nuclear material do not equate to those from carbon dioxide, which is ubiquitous and essential to life. A more important distinction is that Price-Anderson addresses risks during operation, while the discussion of a government role in sequestration risk management largely focuses on the long term, after operators have discharged their site responsibility.

There are myriad examples of government limitations on liability or assistance to the private sector in risk management, including with regard to flame-retardant pajamas, small-engine aircraft, asbestos and retirement income security through the Social Security Trust Fund. But a reasonable model for sequestration is the Oil Pollution Act of 1990, which set a per-barrel fee on imported oil to be paid into a trust fund to cover future spill liabilities.

Should the government employ a trust fund approach to manage long-term carbon dioxide sequestration costs, it is not necessary that the fund be maintained by the government. In fact, funds could be accrued by those with an obligation to pay and managed privately in accordance with federal rules to safeguard the funds.

What About Existing Facilities?

Another arrow in the skeptics' quiver is the existence of carbon injection projects in the United States and worldwide. If they can operate without a government program in place, so can others, goes the argument. However, proponents argue that the current examples either dispel the contention or are distinguishable. The United States' experience with carbon sequestration is largely through carbon dioxide injection for enhanced oil recovery. In this process, the geologic formation will not remain pressurized as expected with sequestration facilities. Carbon dioxide temporarily pressurizes the formation to induce oil flow, but the oil and much of the carbon dioxide are pumped out.

A major U.S. facility for which sequestration is proposed is the FutureGen project. Texas and Illinois competed fiercely to attract the facility, which was eventually located in Mattoon, Ill. As part of the competition, each state offered to accept liability for the facility, which proponents had listed as a concern in proceeding.

Norway's government is thoroughly involved in risk management for the Sleipner project, which is one of the world's largest and best-known CCS projects. Although the operator, Statoil ASA, is a public company, it is two-thirds owned by the Norwegian state, and the government has agreed to accept long-term liability upon the facility's closure.

In summer 2009, the Australian government announced that it and the government of Western Australia state would jointly accept long-term liability arising from the Gorgon facility, a project to sequester carbon dioxide under Barrow Island in connection with a major liquefied natural gas facility.

In short, major examples point to a government risk-management role for the long-term stewardship period for sequestration facilities.

In summary, Congress is coming to recognize both the indispensability of policies to promote CCS and the scale on which the policies must be applied in a country that gets half its electricity from coal. The debate likely will progress further before Congress will be ready to enact measures to help manage long-term stewardship risks from sequestration. But the rationale and examples are clear for addressing this barrier to CCS deployment, and congressional interest is unmistakably growing. And by that proponents of government involvement should be encouraged.

Frederick R. Eames is a partner in the energy regulation, markets and infrastructure practice in the Washington office of Richmond, Virginia-based Hunton & Williams. He represents the CCS Alliance, which develops and promotes CCS technology. He can be reached at feames@hunton.com.