

ROAD TO A GREENER ENERGY FUTURE

# CO<sub>2</sub> STORAGE:

A LEGAL AND REGULATORY  
GUIDE FOR STATES



# OVERVIEW

**THE GEOLOGIC STORAGE OF CO<sub>2</sub> IS AMONG THE MOST IMMEDIATE AND VIABLE STRATEGIES FOR MITIGATING THE RELEASE OF CO<sub>2</sub> INTO THE ATMOSPHERE.**

## WHY STORE CO<sub>2</sub>?

The major components of greenhouse gases are carbon dioxide, methane, nitrous oxide, chlorofluorocarbons and ozone. The “greenhouse” effect results in the capture of radiation from sunlight by preventing radiative heat from reflecting back into space.

Although the greenhouse effect is critical in making our planet warm and habitable, the fact that concentrations of CO<sub>2</sub> are increasing yearly raises concern that it could be a primary factor in global warming.

The interest of states in the geologic storage of CO<sub>2</sub> arises because, in addition to conservation, it is among the most immediate and viable strategies available for mitigating the release of CO<sub>2</sub> into the atmosphere.

Development of model laws and regulations for geologic storage facilitates more states beginning to put in place the critical legal and regulatory infrastructure for CO<sub>2</sub> storage.

## THE TASK FORCE

In December 2002, the IOGCC established a “Geological CO<sub>2</sub> Sequestration Task Force.” Its membership included representatives from IOGCC member states and international affiliate provinces, state and provincial oil and gas agencies, the U.S. Department of En-

ergy (DOE), DOE-sponsored Regional Carbon Sequestration Partnerships, the Association of American State Geologists and independent experts.

Funded by DOE and its National Energy Technology Laboratory (NETL), the Task Force undertook an examination of the technical, policy and regulatory issues related to the safe and effective storage of CO<sub>2</sub> in subsurface geological media (oil and natural gas fields, coal seams and deep saline formations) for both enhanced hydrocarbon recovery and long-term CO<sub>2</sub> storage. This work is referred to as Phase I.

A key conclusion of that report was no other jurisdiction has the experience and expertise of the states and provinces in the regulation of oil and natural gas production and natural gas storage – factors critical to the effective regulation of the geologic storage of carbon dioxide.

Although the Task Force recognized in Phase I that states and provinces might have statutory and regulatory frameworks that could accommodate CO<sub>2</sub> injection and storage, they also recognized that some modification of those frameworks would likely be necessary, particularly for the post-operational phase for which no regulations existed.

To this end, the Task Force, under the sponsorship of DOE/NETL, began work on a second project in 2006

(Phase II) to start development of this detailed guidance document. Composition of the Task Force was much the same as in Phase I, with the addition of representatives from the U.S. Environmental Protection Agency, the U.S. Bureau of Land Management and an

environmental group who attended as observers.

### REPORT COMPONENTS

The most critical components of the full report are a model CO<sub>2</sub> storage

statute, a set of model rules and regulations governing the storage of CO<sub>2</sub> in geologic media and an explanation of those regulatory components. Also included is a report addressing the ownership and right of injection of CO<sub>2</sub> into the subsurface.

## GUIDING PRINCIPLES

Given the breadth and complexity of the regulatory issues addressed in the report, the Task Force relied on several guiding principles in its drafting efforts.

**SEAMLESS** - The statutory and regulatory framework developed needed to be seamless to maximize economic and environmental benefits while providing a “cradle to grave” framework with fully integrated regulatory oversight and clearly identified risk parameters for industry.

**SIMPLE** - The temptation to over-regulate for the exotic needed to be avoided by developing a simple framework that initially addressed only those scenarios most likely to occur. It was recognized that, as necessary, regulations would be amended in the future based on the experience gained in the initial projects.

**FLEXIBLE and RESPONSIVE** - “One size will not fit all.” Proposed projects will have many site-specific variations throughout the states and provinces and therefore it was recognized that any regulatory framework needed to be flexible and responsive to the site variations and developing technologies. Regulatory experience and technology developments are certain to change over time, and each project will only improve the regulatory and technical knowledge base.

**DOABLE** - Given the speed at which this issue is progressing, a regulatory framework that can be rapidly implemented and fielded was necessary. The Task Force recognized that problems will occur; however, it also recognized that most of those problems are issues with which the states/provinces and oil and gas industry have already dealt and will generally be easily solvable. The Task Force channeled its efforts to prevent the regulatory framework development process to be side-tracked by not trying to resolve every conceivable issue from the outset. The development of a regulatory framework will be an ongoing regulatory development process as experience is gained.

**POSITIVE PUBLIC PRESENTATION** - Geologic storage of CO<sub>2</sub> is an integral part of a solution that offers the potential for both economic and environmental benefits. Nothing will be achieved by regarding CO<sub>2</sub> geologic storage as a regulatory protection solution to a waste problem.

# THE MODEL

## RESOURCE MANAGEMENT PHILOSOPHY

Geological storage of CO<sub>2</sub> is one of several viable methodologies for reducing emissions of anthropogenic CO<sub>2</sub> into the atmosphere. Because the production of CO<sub>2</sub> is a consequence of the public's demand for and use of fossil energy, it is arguably in the public interest to actively participate along with industry in efforts to reduce CO<sub>2</sub> emissions through geologic storage.

Given the regulatory complexities of CO<sub>2</sub> storage including environmental protection, ownership and management of the pore space, maximization of storage capacity and long term liability, geologically stored CO<sub>2</sub> should be treated under resource management frameworks as opposed to waste disposal frameworks.

Regulating the storage of CO<sub>2</sub> under a waste management framework sidesteps the public's role in both the creation of CO<sub>2</sub> and the mitigation of its release into the atmosphere and places the burden solely on industry to rid itself of "waste" from which the public must be "protected." Such an approach lacking citizen buy-in with respect to responsibility for the problem as well as the solution could well doom geological storage to failure and diminish significantly the potential of geologic carbon storage to meaningfully mitigate the impact of CO<sub>2</sub> emissions on the global climate.

A resource management framework, as proposed by the Task Force, allows for the integration of these issues into a unified regulatory framework and proposes a "public and private sector partnership" to address the long-term liability, given that the release of CO<sub>2</sub> into the atmosphere is at least partially a societal problem and the mitigation of that release is likewise at least partially a societal responsibility.

## THE REGULATORY MODEL: CRADLE TO GRAVE

### 1. LICENSING INCLUDING AMALGAMATION OF STORAGE RIGHTS

The Task Force concluded that as part of the initial licensing of a storage project the operator must control the reservoir and associated pore space to be used for CO<sub>2</sub> storage in order to allow for orderly development and maximum utilization of the storage reservoir. In the United States, the right to use reservoirs and associated pore space is considered a private property right and must be acquired from the owner. With the exception of federal lands, the acquisition of these storage rights, which are considered property rights, generally are functions of state law. Additionally, as part of the initial licensing of a project an operator must submit for state approval detailed engineering and geological data along with a CO<sub>2</sub> injection plan that includes a description of mechanisms of geologic confinement that would prevent

horizontal or vertical migration of CO<sub>2</sub> beyond the proposed storage reservoir. The operator is also required to submit for state approval a public health and safety and emergency response plan, worker safety plan, corrosion monitoring and prevention plan and a facility and storage reservoir leak detection and monitoring plan.

The rules also include requirements for an operational bond that would be sufficient to cover all operational aspects of the storage facility excluding wells that will be separately bonded.

### 2. THE STORAGE PHASE

During the storage phase the model rules specify the procedures for permitting and operating CO<sub>2</sub> storage project wells to safeguard life, health, property and the environment. The operator must also post individual well bonds sufficient to cover well plugging and abandonment, CO<sub>2</sub> injection and/or subsurface observation well remediation and bond release.

The rules also specify design standards to ensure that injection wells are constructed to prevent the migration of CO<sub>2</sub> into other areas than the intended injection zone. Provisions in the rules also ensure that all project operational standards and plans submitted during the licensing phase are adhered to and the projects and wells are operated in accordance with all approved operating

parameters and procedures. Quarterly and annual reports are required.

### 3. LONG-TERM MONITORING AND LIABILITY

A major issue was how to deal with long-term monitoring and liability issues. The Task Force proposed a two-stage closure period and post-closure period. The closure period is defined as that period of time when the plugging of the injection well has been completed and continuing for a defined period of time (10 years unless otherwise designated by the state regulatory authority) after injection activities cease and the injection well is plugged. During this closure period, the operator of the storage site would be responsible to maintain an operational bond and individual well bonds. The individual well bonds would be released as the wells are plugged. At the conclusion of the closure period, the operational bond would be

released and the liability for ensuring the site remains a secure storage site during the post-closure period would transfer to a trust fund administered by the state. During the post-closure period, the financial resources necessary for the state or a state-contracted entity to engage in future monitoring, verification and remediation activities would be provided by the trust fund.

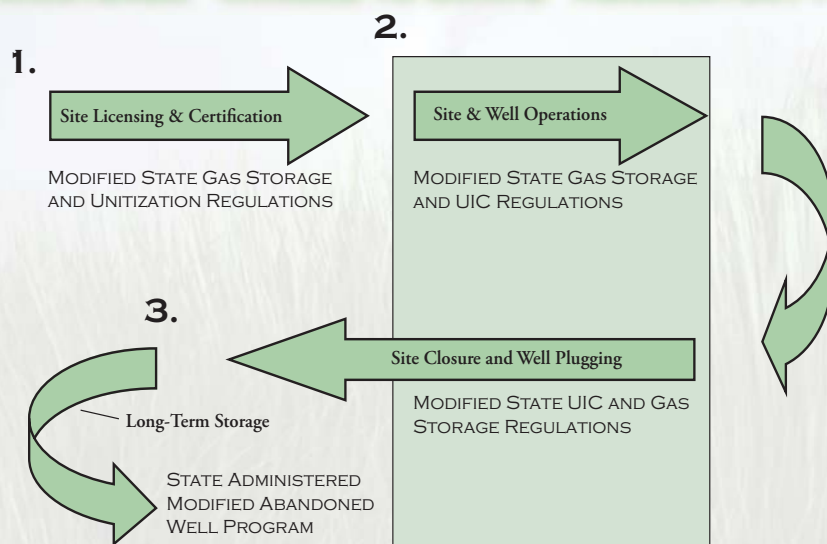
Although other methodologies were reviewed, the most efficient methodology to accomplish these tasks is to utilize existing frameworks developed by the states for addressing abandoned and orphaned oil and gas wells. The Task Force considers the creation of an industry-funded and state-administered trust fund the most effective and responsive “care-taker” program to provide the necessary oversight during the post-closure period. The trust fund would be funded by an injection fee assessed to the site operator and

calculated on a per-ton basis at the point of custody transfer of the CO<sub>2</sub> from the generator to the site operator.

### REGULATORY JURISDICTION

One of the essential first steps in making geologic storage a reality is creation of regulatory infrastructures to govern such storage. In the United States there has been a question as to whether states or the federal government would be the most appropriate regulator. It is the position of the Task Force that it is the states that are best positioned at this time to administer a “cradle to grave” regulatory system, particularly given the ownership issue and the states’ proposed long-term “care-taker” role. The Task Force acknowledges in its proposed framework, however, the relevancy and importance of Underground Injection Control program (UIC) or UIC-like injection well operational standards.

## STATE ADMINISTERED “CRADLE TO GRAVE” REGULATORY FRAMEWORK



# THE TASK FORCE

**Anderson, A. Scott \***

Senior Policy Advisor  
Environmental Defense, Austin

**Bachu, Stefan, Ph.D., P.Eng.**

Senior Advisor  
Alberta Energy and Utilities Board

**Baza, John R.**

Director  
Utah Department of Natural Resources,  
Division of Oil, Gas & Mining

**Bengal, Lawrence E.**

Director  
Oil and Gas Commission of Arkansas

**Bliss, Kevin**

Task Force Coordinator  
IOGCC Washington Representative

**Braxton, Lowell**

Consultant  
Interstate Oil and Gas Compact Commission

**Carr, Timothy R.**

Petroleum Research Section Chief,  
Kansas Geological Survey

**Coddington, Kipp**

Partner  
Alston & Bird Law Firm,  
Washington, DC

**Coombs, Mary Jane**

Research Coordinator  
California Institute for Energy  
& Environment  
University of California  
Office of the President  
West Coast Regional Carbon  
Sequestration Partnership (WESTCARB)

**Cooney, David Jr.**

Environmental Affairs Attorney  
Railroad Commission of Texas

**Curtiss, David K.**

Manager of International Strategy  
and Development / Senior Advisor to  
the Director

Energy & Geoscience Institute  
University of Utah

Southwest Regional Partnership  
on Carbon Sequestration

**Drahovzal, James A, Ph.D.**

Geologist and Section Head  
Kentucky Geological Survey  
Midwest Regional Carbon Sequestration  
Partnership (MRCSP)

**Esposito, Dr. Patrick**

Chief Executive Officer  
Augusta Systems  
Southeast Regional Carbon Sequestration  
Partnership (SECARB)

**Fesmire, Mark E., PE**

Director  
New Mexico Oil Conservation Division  
NM Energy, Minerals and Natural Resources  
Department

**Finley, Robert J.**

Director  
Energy and Earth Resources Center  
Illinois State Geological Survey  
Midwest Geological Sequestration  
Consortium (MGSC)

**Harju, John**

Associate Director for Research  
Energy & Environmental Research  
Center, University of North Dakota  
Plains CO<sub>2</sub> Reduction (PCOR) Partnership

**Hansen, Christine**

Executive Director, Retired  
Interstate Oil & Gas Compact Commission

**Helms, Lynn**

Director  
Department of Mineral Resource  
North Dakota Industrial Commission

**Lawrence, Rob \***

Senior Policy Advisor-Energy Issues  
U.S. Environmental Protection Agency  
Region 6 Office,  
Dallas, Texas

**Mankin, Charles**

Director/State Geologist  
Oklahoma Geological Survey

**Melzer, Stephen**

Consulting Engineer  
Melzer Consulting

**O'Dowd, William \***

Project Manager  
National Energy Technology Laboratory

**Patchen, Douglas G.**

Chief Geologist  
West Virginia Geological Survey

**Perkowski, Joseph C.**

Manager  
Energy Initiatives  
Idaho National Laboratory  
Big Sky Carbon Sequestration Partnership

**Rogers, Marvin**

Legal Counsel  
State Oil and Gas Board of Alabama

**Salzman, Stephen D. \***

Deputy Division Chief, Fluid Minerals  
Bureau of Land Management  
Headquarters, Washington, DC

**Smith, Mike**

Attorney at Law  
Dunlap, Coddington & Rogers Law Firm  
Oklahoma

**Stettner, Michael D.**

Sr. Oil and Gas Engineer  
California Division of Oil & Gas and  
Geothermal Resources

**Taylor, Cammy**

Petroleum Land Manager  
Division of Oil and Gas  
Alaska Department of Natural Resources

**Tew, Berry H. (Nick)**

State Geologist/Oil & Gas Supervisor  
Geological Survey of Alabama  
State Oil and Gas Board of Alabama

**Williams, Michael L.**

Chairman  
Texas Railroad Commission

*\* Observer*

**SPECIAL THANKS**

The IOGCC gratefully acknowledges the support of the U.S. Department of Energy, the National Energy Technology Laboratory, the New Mexico Institute of Mining and Technology as well as the critical support of the states and provinces and other entities that so generously contributed their employees' time to the production of this document.

**THE IOGCC TASK FORCE FULL REPORT CAN BE  
FOUND ON THE CD-ROM BELOW.**



Printed December 2007

P.O. Box 53127  
Oklahoma City, OK 73152  
405-525-3556  
[www.iogcc.state.ok.us](http://www.iogcc.state.ok.us)

This material is based upon work supported by the Department of Energy award number DEFC26-05NT42591.

DISCLAIMER

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.



INTERSTATE  
**Oil & Gas**  
COMPACT COMMISSION