

CENTER FOR ENERGY STUDIES LOUISIANA STATE UNIVERSITY

NEWSLETTER–FALL 2000

Greenhouse Gases in Louisiana

Fear of sudden, dramatic changes in global climate patterns caused by concentration of carbon dioxide and other “greenhouse gases” in the atmosphere is a major consideration driving both energy and environmental policy. Using a grant from the Energy Section of the Technology Assessment Division of the Louisiana Department of Natural Resources, the Center for Energy Studies (CES) recently completed two reports on Louisiana’s greenhouse gas emissions—an inventory describing emissions from Louisiana’s major sources and a modeling exercise estimating how emissions might change in the next 15 years under four different scenarios.

The inventory is part of a national effort by the U.S. Environmental Protection Agency (EPA) and a prerequisite for participation by the state in further greenhouse gas monitoring and control programs. EPA has prescribed a method for estimating emissions which is applied to state-level data to estimate the state’s greenhouse gas emissions. Table 1, from the inventory, compares the magnitudes and shares of total emissions attributable to major sources in Louisiana and in the nation as a whole.

Table 1. Comparison of the Total U.S. and Louisiana Greenhouse Gas Emissions

Sectors	Louisiana		U.S. Total		Louisiana Emissions as a Share of U.S. Emissions
	Emissions (MMTCE)*	Sectoral Distribution	Emissions (MMTCE)	Sectoral Distribution	
Fossil Fuel Combustion	58.437	98.612%	1,450.300	93.792%	4.03%
Production and Consumption Processes	2.322	3.919%	61.500	3.977%	3.78%
Natural Gas and Oil Systems	2.203	3.717%	35.600	2.302%	6.19%
Coal Mining	0.003	0.005%	18.900	1.222%	0.01%
Municipal Waste Management	1.141	1.925%	65.200	4.217%	1.75%
Domesticated Animals	0.392	0.661%	34.500	2.231%	1.13%
Manure Management	0.042	0.071%	16.600	1.074%	0.25%
Flooded Rice Fields	0.620	1.047%	2.500	0.162%	24.82%
Agricultural Soil Management	0.295	0.497%	68.600	4.436%	0.43%
Forest Management and Land Use Change	-6.211	-10.482%	-208.600	-13.490%	2.98%
Burning of Agricultural Crop Waste	0.001	0.002%	0.300	0.019%	0.44%
Municipal Wastewater	0.007	0.012%	0.900	0.058%	0.82%
Total	59	100.000%	1,546.300	100.000%	3.83%

* Million metric tons of carbon equivalent

Figure 1 compares the inventories of the states that have completed them. The comparisons are made by normalizing the state’s share of emissions with its share of economic production and its share of

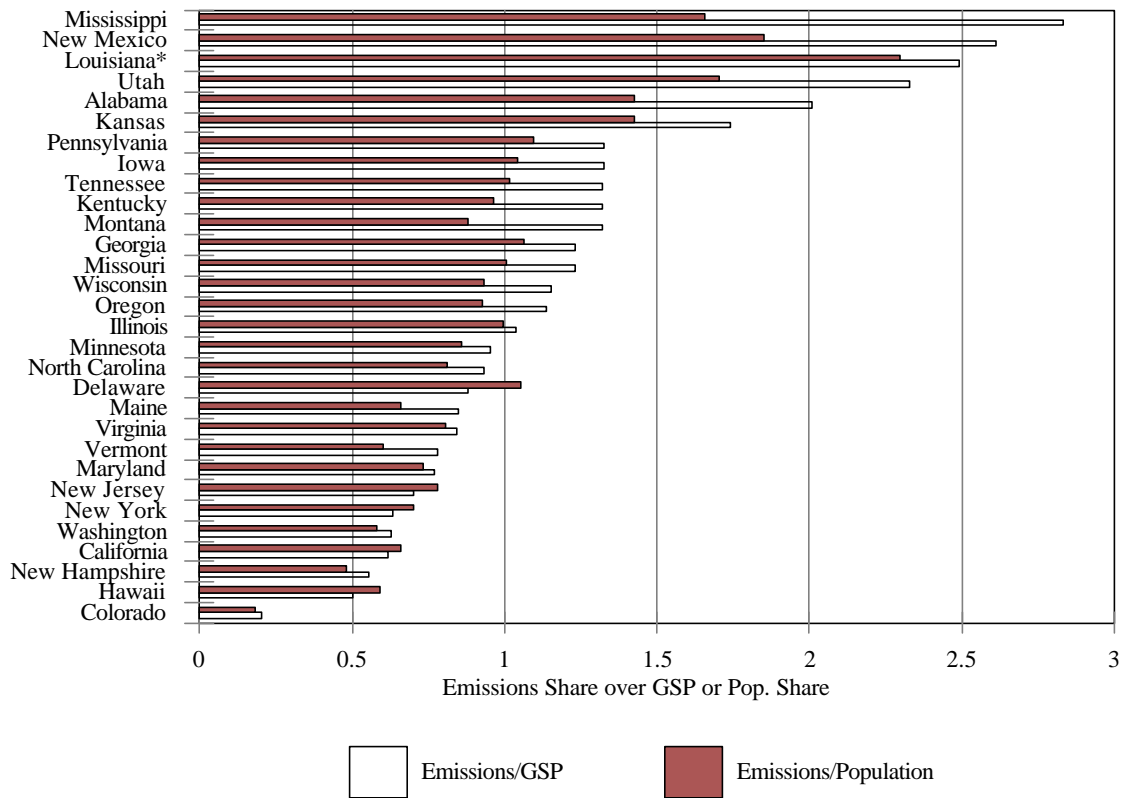


Figure 1: Share of Greenhouse Gas Emissions Standardized by Shares of GDP and Population.

population. If a state’s share of emissions was equal to its share of production, the value shown in the figure would be one, as it would be if its share of national emissions was equal to its share of the nation’s population. Illinois’ scores come very close to one on both measures and other states like Oregon, Minnesota, North Carolina, and Delaware also are quite close to the national norm. At the two ends of the distribution there are states which are responsible for considerably more or less emissions than their respective shares of production and population. Colorado, Hawaii, California, Washington, and New York have significantly lower scores. Mississippi, New Mexico, Louisiana, Utah, and Kansas have higher scores. Louisiana has the highest score based on population and Mississippi the highest based on state production.

In evaluating these data two considerations should be kept in mind. First, not all of the states have completed or undertaken greenhouse gas inventories. Texas, Oklahoma, and Arkansas, which often score close to Louisiana on measures of energy intensity and environmental performance, are among the missing. Second, some states appear to have made significant errors. Colorado, for example, estimates that the increases in the category “Forest Management and Land Use Change,” (see Table 1) which is the principal “sink” or greenhouse-gas-absorbing sector, will offset almost 85 percent of its emissions. This is questionable when compared to a national average of 13 percent and a very small decrease in the neighboring and similar state of Utah. The calculations in Figure 1 are by CES, and we know of no systematic comparisons of inventories by EPA or anyone else.

To model greenhouse gas emissions in the future, CES developed a simple, user-friendly spreadsheet

model to translate expected patterns of growth in major emitting sectors into expected, future emissions. The model was used to compare emissions under four different scenarios.

The first three were based on energy forecasts developed by the U.S. Energy Information Administration (EIA).

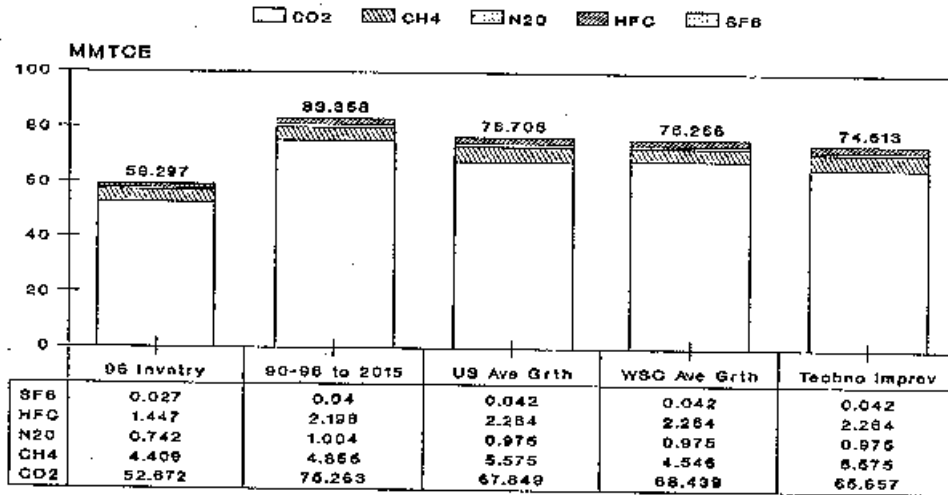
- The first scenario used growth rates from EIA's forecast for the nation as a whole.
- The second used the forecast for the West South Central states (Arkansas, Louisiana, Oklahoma, and Texas).
- The third scenario was based on EIA's forecasts for incorporating improved emission control technology for major sectors of the economy.
- Under the final scenario it was assumed that sources of greenhouse gas emissions would grow at the same rate that they did over the 1990 to 1996 period as calculated or estimated by CES.

Figure 2 depicts the level and composition of emissions in the year 2015 for each of the four scenarios. Two implications of the comparison stand out. The first is humbling if not downright discouraging, but the second is almost a "silver lining."

- Under any of the four scenarios the growth of greenhouse gas emissions is very substantial. The 1996 to 2015 increase ranges from a high of 41 percent in the historic growth scenario to a low of 26 percent in the technology improvement case. Since the international goals call for reducing emissions below 1990 levels, the magnitude of the relative reduction is apparent.
- The "silver lining" comes from the observation that the magnitude of the increase in the scenario based on EIA's forecast for the West South Central states is slightly below the estimate based on EIA's national average case. Further, total emissions in the West South Central case are 12 percent below the estimate for the continuation of the historic trend case. The reasoning behind this apparent anomaly is that the oil and gas industry in the West South Central states is mature, and EIA assumes it will continue to decline, resulting in a regular reduction in methane emissions. As a consequence, methane emissions are 23 percent lower than the level forecast in the national average case. While this vision may not apply to the federal offshore, it does fit much of the industry under Louisiana's jurisdiction. The policy implication is that goals or requirements implicitly or explicitly based on current circumstances or trends may unfairly penalize states in which major emission producing sectors can reasonably be expected to decline. This may be doubly significant since James Hansen, whom many regard as the guru of global warming, recently released a paper that argued that the focus of the global warming effort should be shifted from CO₂ to the non-CO₂ greenhouse gases.¹

¹See James Hansen, et al, *Global warming in the twenty-first century: An alternative scenario*, PNAS [Proceedings of the National Academy of Science] Early Edition, www.pnas.org, June 16, 2000.

Figure II - Emissions in 1996 compared to forecasts based on alternative growth rate assumptions.



Note: 1990-98 calculated, US Ave., WSC Ave, and Technology Improvement from EIA

Staff Changes

David Dismukes and Keith Long left the CES for the private sector. David is now the Senior Economist directing a new Houston office of the Los Angeles-based consulting firm EconOne. Keith is pursuing several private-sector ventures. Both brought unique perspectives and attitudes to their work at the Center, and both have been missed.

New Additions are:

- **Don Goddard** was hired as an Associate Professor-Research after the coordinator of the PTTC program position was up-graded to faculty status. Don is a petroleum geologist. For the past four years he has been a petroleum consultant to international companies interested in Venezuela's upstream activities. As Assistant Professor-Research at LSU's Basin Research Institute (1991-1996), his research involved the characterization of Tertiary reservoirs in Central Louisiana, and he participated on projects in basin analysis of the Gulf Coast Region. Dr. Goddard began his career in 1965 with Gulf Oil Co. (Mene Grande) in Eastern Venezuela, and has over twenty-three years of petroleum industry experience, both in exploration geophysics and production geology. He has a B.S. degree in geology from Florida State University, M.Sc. and Ph.D. degrees in marine geology and geophysics from the University of London (UCL), and a geological engineering degree from the Universidad Central de Venezuela
- **Mark Kaiser** is an engineer with broad experience in energy, energy-related analysis, and

quantitative methods. He has previously taught at Auburn University, The American University of Armenia, and most recently, Wichita State University. Mark was also a Fulbright Scholar at the International Executive Development Center in Slovenia in 1999, and in his relatively short career has over 70 academic publications in scientific, energy, and engineering journals on an array of topics. His research has been supported by NSF, Eurasia, USAID, as well as local industry, and he has consulted frequently. Mark received a B.S. in agricultural engineering, and an M.S. and Ph.D. in industrial engineering (1991), all from Purdue University. He will begin work at the Center in January 2001 as an Associate Professor-Research.

Offshore Platforms

The Center's long-term forecast of offshore platforms in the Gulf of Mexico reported on in an earlier newsletter, has generated interest among offshore analysts, the trade press, and, best of all, its sponsor—the Minerals Management Service (MMS). As a consequence, the Center will be working with the Resource Evaluation Division of the MMS's New Orleans office on modeling the offshore platform installation and removal processes. The project is supported financially by the joint MMS-LSU Coastal Marine Institute.

A short article by Allan Pulsipher on policies to guide the disposition of decommissioned offshore platforms was published in the Summer 2000 issue of the *Oxford Energy Forum* as part of a special three-sided debate on the subject. A longer article, "Onshore Disposition of Offshore Oil and Gas Platforms: Western Politics and International Standards," co-authored by Pulsipher and William Daniel, is in press and will soon appear in the journal *Ocean and Coastal Management*.

Social and Economic Consequences of Offshore Oil and Gas Activity

Two substantial projects for the Minerals Management Service organized by David Dismukes, *Cost Profiles and Cost Functions for Gulf of Mexico Oil and Gas Development Phases for Input Output Modeling*, and *An Economic Impact Analysis of OCS Activities on Coastal Louisiana*, are still in the final report writing stage, but data and analyses from them are being used for MMS planning and impact analysis.

A more generic look at the same basic issue, but from a different theoretical perspective, organized by Wumi Iledare, is now getting underway. Wumi and Williams Olatubi, a post-doctoral researcher at CES, are going to apply some powerful econometric techniques to trace the effects of changes in crude oil prices on both oil and gas activity and regional and state-level economic performance in the region adjacent to the Gulf of Mexico OCS region. The project is supported by the Minerals Management Service.

Distributed Energy Resources Initiative (DERI)

Overcoming technical, informational, and regulatory barriers to better use of decentralized, small electricity generating possibilities, like small turbines and fuel cells, located at or near their principal point of consumption is the objective of the Center's DER Initiative. In an effort to "practice what it preaches," LSU has a request for bids now active which will result in a 10 Megawatt cogenerating plant that will supply a considerable portion of the University's electricity load. Further, the request calls for the new facility to be so clean and air-quality friendly that it will emit no more than 15ppm of nitrous oxides and 20ppm of carbon monoxide. That is "so clean" it could be located in such dirty-air pools as Los Angeles or Houston. Moreover, the facility will be wired for noninvasive monitoring and research by faculty and students in the Colleges of Engineering and Basic Science. Pre-bid analysis indicates this can be done while lowering the University's electric bill.

This "win-win" result has required creative cooperation between the University's operational/"business" side and its research/education side. Professor Sumanta Acharya of Mechanical Engineering and Joe Kelley and Peter Davidson of the Office of Facility Services have played lead roles in bringing this about as has Ritchie Priddy, DERI's manager at CES. It is hoped that the new turbine will attract other funding for DER technology as well as funding for research on the regulatory and business issues associated with DER.

The Center is co-sponsoring a follow up to its "DER in the Oil Patch" workshop of last spring with a workshop titled "DER, Is the Window Closing?" to be held in Houston on Friday the 13th of October. The workshop is co-sponsored by the University of Houston's Energy Institute and EconOne. Last spring's workshop was a major story in *Megawatt Daily*. Workshop presentations are available on the DERI section of the CES website at www.deri.lsu.edu.

A quote from Ritchie Priddy in the *Wall Street Journal* led to an extensive interview with *EVWorld*, an internet magazine. A transcript is available on the website. Ritchie also spoke at the 2000 GlobeEx Global Energy Exposition in Las Vegas.

PTTC Workshop: Developments in Well Stimulation and Slim-hole Technology

Don Goddard and Bob Baumann have scheduled a PTTC workshop for 5 December 2000 at the Lafayette Petroleum Club. The workshop will start at 8:30 am and end by 3:30 pm. The speakers that will be participating in the workshop are Jerry Griffith (GRIFCO), Dan Pepe (Geotec Thermal Generators), Tom Williams (Mauer Engineering), and Gerry Kuecher (Baker Atlas).

The program will include the following topics:

- **Reeled through tubing fishing and cleanout operations**
Using case studies, the discussions will focus on how reeled equipment was successfully applied in deep wells, resulting in improved production.
- **Well stimulation with near wellbore gas fractionation**
This technology produces thermo-chemical treatment of oil and gas wells by restoring and increasing output capacities. It is used for treating fluid sensitive, stratified reservoirs with

- high wellbore damage.
- **Slim-Hole Drilling and Completion**
Recent advances and a worldwide review of slim-hole technology will be discussed; systems application, tools, rigs, bits, and motors will be presented. Information developed under the Mauer Engineering DEA 67 Joint Industry Research Project (JIP) also will be discussed.

Contact Don Goddard at 225/578 4538 for reservations. There is a nominal workshop fee of \$50.

Seismic Permit Database

The Basin Research Energy Section of the Louisiana Geological Survey has completed and posted on the PTTC website a database describing the characteristics of seismic permits issued in Louisiana during the 1993 to June 30, 2000 period. The database gives information on the location covered by the permit, to whom the permit was issued and other data to assist individuals seeking such information. The database will be combined with geographic information system (GIS) technology to provide a specific, detailed identification of the area covered by the permit. The database is now available on the PTTC website, and the GIS application will be accessible in the near future. For more information visit the PTTC website or contact Clayton Breland at 225-578-8328 or at clayton@lgs.bri.lsu.edu.

Technology for Better Education

Bob Bradley and Brad Hansen (of the Louisiana Geological Survey) have created a CD-ROM, *Black Gold Beneath the Bayous*, aimed at earth science teachers. It covers historical geology, earth's age, formation of hydrocarbons, exploration and drilling techniques, oil in Louisiana, and energy conservation. *Black Gold Beneath the Bayous* is available to all Louisiana teachers who attend a short presentation about its use. Bradley and Hansen are seeking funding to create a version of the CD-ROM for middle and high school use with state-of-the-art animation and interaction.

Bob is also working with the Louisiana Museum of Natural Science to create a similar CD-ROM for teachers called *Environmental Education—A Louisiana View*. The Louisiana Department of Environmental Quality is funding the project. In addition to environmental education topics, the CD-ROM will present teaching content, classroom activities, additional resources, and then link all of these to existing LEAP Strands and Louisiana Science Education Standards.

In his spare time, Bob works under a contract with the U.S. Department of Energy Clean Cities program to conduct Grant Writing Proposal Training. He has conducted workshops in Seattle; Dallas; Golden, Colorado; El Paso; Chicago; and Atlanta. In the works is a training session at the University of Utah which will be "video and audio streamed" across the Internet.

Louisiana Oil Centennial

On September 21, 1901, the Jennings Oil No. 1 Well in the Evangeline Field was "brought in." It

produced the first oil discovered in commercial quantities in Louisiana. To commemorate the one hundredth birthday of the State's oil industry, the Louisiana Legislature has created the Louisiana Oil Centennial Commission. Its job is to coordinate and promote the celebration. Bob Baumann has been appointed to serve on the Commission by Governor Foster.

www.enrg.lsu.edu



Louisiana State University
Center for Energy Studies
1 East Fraternity Circle
Baton Rouge, Louisiana 70803-0301

Non-Profit Org.
U.S. Postage
PAID
Permit No. 733
Baton Rouge, LA
