Economic Importance of Domestic Oil and Natural Gas Production to the United States and Gulf Coast Region

By
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Before the
COMMITTEE ON NATURAL RESOURCES
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Oversight hearing on the
"Outer Continental Shelf Oil and Gas Strategy and Implications of the Deepwater Horizon Rig Explosion"

Mr. Chairman and members of the Committee on Natural Resources, I am Michelle Michot Foss, Chief Energy Economist and Head of the Center for Energy Economics, based in the Bureau of Economic Geology, Jackson School of Geosciences at The University of Texas. I am pleased and honored to be selected as a witness for the Committee. However, I had not expected that, in my career, I would be called upon to present evidence of the economic value and importance of domestic oil and natural gas production to the United States and the Gulf Coast in such a manner. These are extraordinary circumstances and an extraordinary time.

As a Louisiana native with deep roots in Acadiana, and as a resident of Houston, Texas, let me first say on behalf of myself and my research team, our UT community, our industry and government supporters and colleagues and my family and friends in Lafayette and south Louisiana: our hearts go to the families of those lost in the Deepwater Horizon tragedy. This should be foremost in everyone's minds. As well, our hearts and minds should be focused on all of those whose lives and livelihoods are affected by this event and it is from that perspective that I present my testimony.

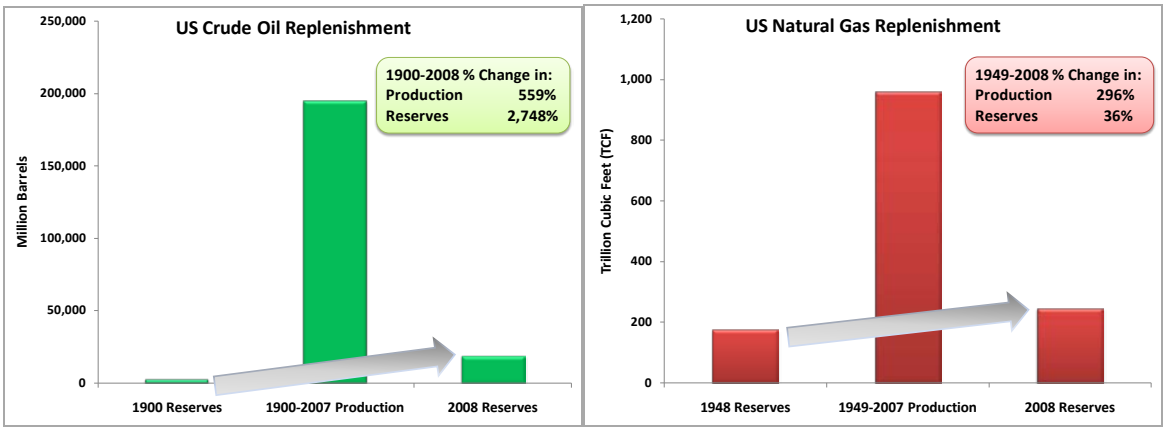
On April 29, 2004 I presented testimony before the House Subcommittee on Energy and Air Quality on *Ultradeep Water Research and Development: What Are the Benefits?* I know that there are astounding and almost immeasurable benefits associated with the discovery and utilization of oil and natural gas resources in our deep water provinces in the US and around the world. There are astounding and almost immeasurable benefits associated with oil and gas production from all of our onshore basins. These benefits are hugely difficult to replace—thus the intensity of debate in our country and worldwide about how we will best meet our energy needs into the future. The size, scope, diversity, inventiveness, determination and diligence of our oil and gas enterprises, from smallest to largest, and the men and women who work in them are attributes that other countries strive to emulate. We know this from direct experience. Finally, to meet and move beyond this current challenge will require thoughtful, careful, sincere stewardship from all facets of

industry, government and civic leadership. That is where the American people need to concentrate our efforts.

The charter for these oversight hearings is broad. Domestic oil and gas production plays a vital role in our economy, ranging from domestic energy and economic security to myriad, rich scientific benefits. Future sustainability of the industry must be assured. I present four key points for the Committee's consideration.

1. We have large resource endowments, but our reserves must be replenished.

Of critical importance is replenishment, the ability to convert resources to proven reserves and replace the oil and gas that we consume each year. Using publicly available data from the US Energy Information Administration (USEIA), the productivity of America's vast oil and gas industry base is easily demonstrated. Since the beginning of last century, Americans consumed 197 billion barrels of domestically produced crude oil even as the industry continued to find and add reserves, resulting in a 2008 reserve base that was orders of magnitude larger than known proved reserves in 1900. In similar fashion, our known, proven stocks of natural gas have increased as domestic production and consumption surged following World War II. With recent successes in our continental shale gas basins, drilling in the Gulf of Mexico deep shelf and deep water plays we expect proved natural gas reserves to remain robust. Overall, on a barrel of oil equivalent basis, the US remains the largest producer and reserve holder in the world. Looking further ahead to energy frontiers, the same methane hydrate crystals that impeded containment of oil from the Macondo well drilled by Deepwater Horizon could offer a potential, clean fossil fuel source well beyond any time horizon we can imagine.



2. Domestic reserve replenishment is linked to economic benefits.

Replenishment of US reserves of crude oil and natural gas generates economic benefits as domestic exploration and production proceeds. Availability, conversion

and delivery of these energy resources provide competitively priced energy supplies fostering economic development and income growth.

Prior to the Deepwater Horizon incident, the National Association of Regulatory Utility Commissioners (NARUC), acting as an umbrella organization for many collaborating organizations and companies released a major review, *Analysis of the Social, Economic and Environmental Effects of Maintaining Oil and Gas Exploration and Production Moratoria on and Beneath Federal Lands*. The analysis for the NARUC committee was undertaken by SAIC and the Gas Technology Institute using the USEIA's National Energy Modeling System (NEMS). I and many others served as external advisors for the moratoria study effort. The final report is available via www.naruc.org.

This study effort focused on questions regarding federal lands that are subject to various restrictions or for which policies are not formulated to provide access for drilling. **However, importantly for these hearings, the data in this new study can provide insights on energy availability, cost and economic consequences of policy and/or regulatory actions that would limit or ban domestic oil and gas development.** Key findings were as follows.

- A review of all available data and information for both moratoria and non-moratoria areas suggests that the natural gas resource base is estimated to increase by 132 trillion cubic feet (Tcf) onshore and 154 Tcf offshore (excluding parts of Alaska as detailed in the final report); the offshore crude oil resource base is estimated to increase by 37 billion barrels of oil (Bbo, excluding parts of Alaska19); the onshore crude oil resource base is estimated to increase by 6 Bbo for the Arctic National Wildlife Refuge (ANWR), with no estimated increase in the Lower-48 resource base. With these additions, GTI estimates the current resource base to increase from 1,748 Tcf to 2,034 Tcf for gas and from 186 Bbo to 229 Bbo for oil. The increases are driven by two primary factors: the increased shale gas activity and development successes, and an increase in resource estimates for the currently restricted offshore areas to better reflect the impact of new technology and successes in the currently available and developed offshore areas.
- The study committee and advisors tested a number of scenarios (to 2030) associated with keeping moratoria in place, and which provide some guidance should domestic oil and gas drilling decline.
    - Domestic crude oil production projected to decrease by 9.9 billion barrels, or nearly 15 percent per year, on average.
    - OPEC imports projected to increase by 4.1 billion barrels, or roughly 19 percent per year on average, resulting in increased cumulative payments to OPEC of $607 billion ($295 billion on a net present value or "NPV" basis).
    - Domestic natural gas production projected to decrease by 46 Tcf or 9 percent per year on average.
    - Net natural gas imports (both as liquefied natural gas or LNG and as pipeline deliveries) projected to increase by nearly 15.7 Tcf or almost 75 percent.

- Employment in energy intensive industries projected to decrease by nearly 13 million jobs, an average annual decrease of 0.36 percent.
- Energy prices projected to be higher: annual average natural gas prices increase by 17 percent; annual average electricity prices increase by 5 percent; annual average motor gasoline prices increase by 3 percent. More renewables would be used adding to the higher cost of delivered energy.
- Real disposable income projected to decrease cumulatively by $2.34 trillion ($1.16 trillion NPV or $4,500 per capita), an annual average decrease of 0.65 percent.
- Energy costs to consumers projected to increase cumulatively by $2.35 trillion ($1.15 trillion NPV or $3,700 per capita), an annual average increased cost of 5 percent.
- Import costs for crude oil, petroleum products, and natural gas are projected to increase cumulatively by $1.6 trillion ($769 billion NPV), an annual average increased cost of over 38 percent.
- Gross domestic product (GDP) projected to decrease cumulatively by $2.36 trillion ($1.18 trillion NPV), an annual average decrease from the base case of 0.52 percent.

Using 2007 data, PriceWaterhouseCoopers estimated that the more than nine million employees, $558 billion in labor income and $1 trillion in total value added by the domestic oil and gas industry constituted more than 5 percent of US total employment, more than 6 percent of US total labor income and more than 7 percent of US total value added, respectively. However, this study did not account for the GDP effects utilizing oil and gas in our energy systems as inputs to other goods and services, nor did PWC attempt to measure the GDP impact of goods manufactured from oil and gas feedstocks or economic effects of exporting these goods. Finally, PWC did not attempt to estimate economic benefits of US oil and gas industry investments abroad, or the total contribution in taxes, royalties and other fees paid by the oil and gas industry to all government jurisdictions as well as public (including federal) and private mineral owners. All of these benefits would push the total economic value of the US industry into the trillions of dollars and a substantial chunk of US GDP.

Of great concern is the impact on livelihoods associated with my home state's commercial and recreational fisheries and seafood businesses. A widely quoted estimate of the value of Louisiana's seafood industry is $3 billion. This is vital to the coastal communities and families that depend on these activities. But even more vital and much, much larger are the employment, income and tax revenue benefits associated with Louisiana's and the Gulf Coast region's oil and gas businesses. To understand the full scale of negative consequences and social displacement that could result from a sharp drop in drilling activity one has only to investigate the outcomes from the collapse in oil prices during the mid-1980s. In that instance, the total effect of lost jobs and income in the states that host oil and gas industry activity along with home and commercial mortgage foreclosures and subsequent collapse of the savings and loan industry shaved roughly one percent from US GDP growth.

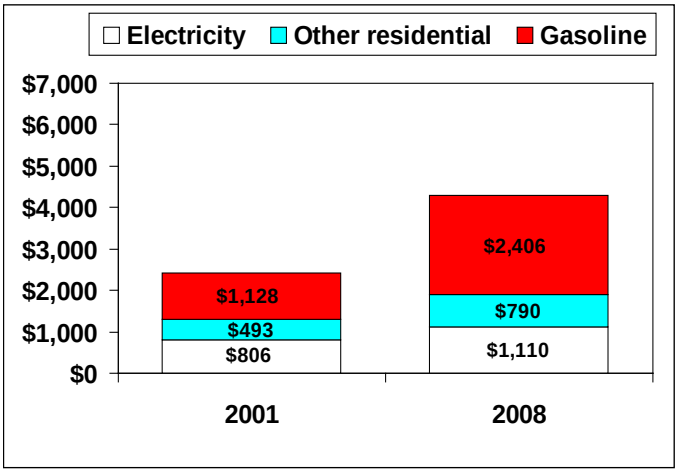
We know and understand very well the distribution of oil and gas resources and proved reserves around the world, the extent of sovereign government control over access and development, and the structure and role of national oil companies. While we support free and open international trade in oil, natural gas and other critical raw materials, US domestic production is our best hedge against global oil and gas geopolitical risk. Indeed, outside of the US, many other nations view our access policies and existing limitations on drilling and replenishment as hoarding our own supplies while draining those of others. Meaningful efforts to sustain our domestic industry over the long term and meaningful policy signals that we intend to continue replenish our reserves in a consistent manner would send one of the most impressive foreign policy signals we could engineer, as well as serving as a moderating force on global commodity prices.

Finally, oil and gas exploration and production activity serves up amazing, and humbling, lessons about the earth, its history and biology, physical and chemical properties and the forces that drive our planet. Offshore oil and gas exploration in particular both consumes and produces advances in science and technology that extend from global positioning to advanced composites and other lightweight materials. These are the immeasurable but absolutely necessary benefits that emanate from the industry and its workforce.

3. The impact of energy costs, including costs of alternatives, is very real.

Any reduction in US oil and gas production and consequent upward pressure on energy prices will impact households. Middle and lower income households are particularly vulnerable because energy costs are a larger share of their disposable income. It is these households that are most susceptible to energy price shocks. Indeed, in our view, given all available data, we feel that the national recession incorporated classic energy price shock components—extraordinarily high oil prices, combined with several years of generally rising energy costs as the US economy expanded rapidly, stretched these households to the breaking point. Borrowers from this population, no longer able to meet their obligations, in all likelihood triggered the first wave of mortgage foreclosures.

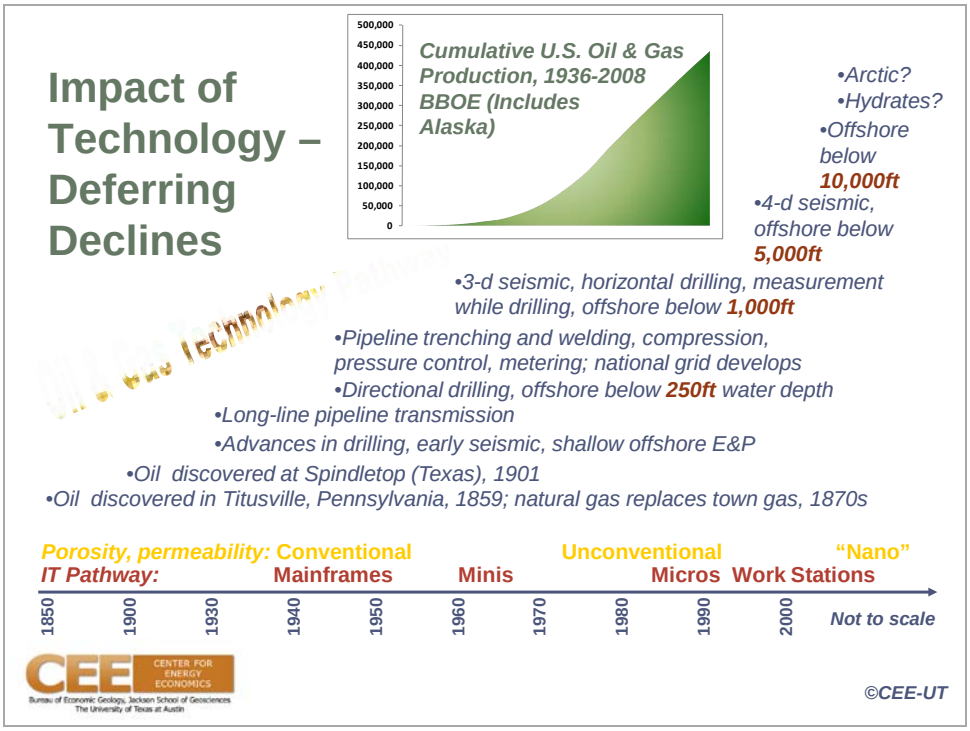
Energy costs for families earning less than $50,000. Energy costs as a share of after tax incomes for these families rose from 11 percent in 2001 to 20 percent in 2008. USEIA and US Census data as compiled by American Coalition for Clean Coal Electricity.



While we are optimistic about some alternative energy technologies being pursued, the reality is that costs of alternatives—including the cost of public subsidies which far too often is discounted or ignored—are high. Timing and "scalability" of low energy density options are uncertain. The law of unintended consequences plays out in large and visible new land use impacts; introduction of new and profound environmental risks (for instance "dead zones", like that in the Gulf of Mexico, are expanding due in large part to more intense cultivation and use of fertilizers for biofuels production); and security implications associated with critical non-fuel minerals requirements. This last consideration represents a distinct trade off and risk associated with rapid acceleration of alternative energy and advanced grid technologies that we have not nearly begun to explore.

4. Future sustainability of the oil and gas industry must be assured.

The domestic US oil and gas industry has repeatedly shown an ability to absorb and deploy advanced technologies in order to progress to the next frontier of discoveries.



Note: BBOE = billion barrels of oil equivalent.

To sustain the oil and gas technology pathway, a number of variables must be considered.

- Finding and lifting costs and the economics of exploration and production are susceptible to, and underlie, cycles in commodity prices. Low prices send signals to producers that demand is low and supply surpluses exist. Drilling is reduced. Low prices stimulate demand, reducing excess supplies and pushing prices up. Drilling resumes. Investment decisions for oil and gas projects

involve time—the larger the project, the longer the lead times. Companies must be able to manage through price cycles and adverse business conditions in order to replace reserves and be positioned to meet future demand. In a world of fast growing emerging markets and complex international geopolitics these challenges can be extreme. The oil and gas industry is a major contributor of tax revenue across all levels of government. Imposing new obligations for taxes and royalties that are rigid and not market responsive will hinder replenishment with all concomitant economic impacts.

- Environment and safety protections must be at the forefront and solutions must be flexible, adaptable, innovative and appropriate to the problem at hand. This is not a matter of regulatory oversight as we know it. As the industry progresses into new frontiers new mechanisms for assuring environment and safety protocols are needed, supported by data and analysis and bolstered by technologies that encompass real time information and rapid deployment, not least to manage the public cost and burden of regulatory oversight. Remote logistics arrangements are needed for crisis management in frontier locations. Smooth management processes are essential. Most crucial is that we have the patience, in a trying time, to understand the sources and causes of failure and evaluate best practice future actions for prevention before engaging in wholesale restructuring and redirection of our regulatory apparatus.
- Finally, public education is essential. Very little is understood about the oil and gas industries in general. From a mass polity point of view, offshore operations, especially those in deeper waters and more remote locations, truly are akin to moon shots. Hydrocarbons in marine environments need to be better understood, both in terms of natural occurrence—the source of 70 to 80 percent of concentrations—and mitigation when accidents happen. In sum, public education on US energy sources, technologies, needs and choices could be better served.

The industry overall will be better off as lessons are learned from the Deepwater Horizon accident and new practices and technologies are developed and deployed. This will be a powerful tribute to both the lives lost and the lives saved as the industry progresses. Thank you for your time and attention.

Impact of Technology – Deferring Declines

•*Arctic?*
•*Hydrates?*
•*Offshore below* ***10,000ft***
•*4-d seismic, offshore below* ***5,000ft***

Oil & Gas Technology Pathway

•*3-d seismic, horizontal drilling, measurement while drilling, offshore below* ***1,000ft***
•*Pipeline trenching and welding, compression, pressure control, metering; national grid develops*
•*Directional drilling, offshore below* ***250ft*** *water depth*
•*Long-line pipeline transmission*
•*Advances in drilling, early seismic, shallow offshore E&P*
•*Oil discovered at Spindletop (Texas), 1901*
•*Oil discovered in Titusville, Pennsylvania, 1859; natural gas replaces town gas, 1870s*

Porosity, permeability: **Conventional** **Unconventional** **"Nano"**

IT Pathway: **Mainframes** **Minis** **Micros** **Work Stations**

1850 1900 1930 1940 1950 1960 1970 1980 1990 2000

Not to scale

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