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before the

U.S. House of Representatives
Subcommittee on Energy & Mineral Resources

Hearing on HR 1229 "Putting the Gulf Back to Work Act", HR 1230 "Restarting American Offshore Leasing Now Act", and HR 1231 "Reversing President Obama's Offshore Moratorium Act"

Wednesday, April 6, 2011, at 10:00a.m.
1324 Longworth House Office Building.

* The opinions expressed here are my own and are not necessarily reflective of those of LSU or any other entity.

I. THE IMPETUS FOR INCREASING U.S. OFFSHORE OIL PRODUCTION

Maintaining energy independence by increasing U.S. offshore oil and natural gas production has long been recognized as a national imperative. In 2006, the U.S. Minerals Management Service (MMS) reported to Congress that, "much of the growth in the Nation's energy demand will have to be met by OCS…if further increases of imported supplies are to be avoided." MMS also estimated that, "OCS oil production could account for as much as 40 percent of domestic oil production by 2010." Furthermore, the MMS indicated that the OCS natural gas resources would become an essential source of energy as imports from other countries—particularly Canada—decline.

Apart from national energy concerns, however, economic considerations also favor increased development of OCS energy resources. Specifically, the boost provided to local onshore economies by offshore production would be particularly welcome in the present economic climate. Similar to fiscal alternatives presently under consideration, OCS development would provide a *long-run* economic stimulus to the U.S. economy because the incremental output, employment, and wages provided by OCS development would be spread over many years. Unlike those policies, however, this stimulus would not require government expenditures to support that long-term growth.

A. The Present State of Offshore U.S. Oil and Gas Production

Despite its importance, U.S. oil and natural gas production in offshore areas is currently limited to only a few regions. At the present time, oil and gas is only actively produced off the coast of six U.S. states: Alabama, Louisiana, Mississippi, Texas, California, and Alaska. The Energy Information Administration (EIA) reports that Alabama, Louisiana, Mississippi, and Texas are the only coastal states that provide access to all or almost all of their offshore energy resources. Only two additional states—Alaska and California—are producing any offshore energy supplies. All California OCS Planning Areas and most Alaska OCS Planning Areas, however, were not open to any new facilities until the recent end of the Congressional and Presidential moratoria. The remaining 16 coastal states are not open to new production and are not presently extracting any offshore energy resources.

Even without those remaining sixteen states, plus California and Alaska, the OCS is already the most important source of U.S. energy supplies. According to the MMS, "the Federal OCS is a major supplier of oil and natural gas for the domestic market, *contributing more energy (oil and natural gas) for U.S. consumption than any single U.S. state or country in the world.*" That is, OCS production presently meets more U.S. energy demand than any other single source, including Saudi Arabia.

B. Offshore Oil Production Stimulates Onshore Economies

Offshore oil and gas production has a significant effect on local onshore economies as well as the national economy. There are broadly three "phases" of development that contribute to state economic growth: (1) the initial exploration and development of offshore facilities; (2) the extraction of oil and gas reserves; and (3) refining crude oil into finished petroleum products. Industries supporting those phases are most evident in the sections of the Gulf of Mexico that are currently open to offshore drilling.

For example, the U.S. shipbuilding industry – based largely in the Gulf region – benefits significantly from initial offshore oil exploration efforts. Exploration and development also requires specialized exploration and drilling vessels, floating drilling rigs, and miles and miles of steel pipe, as well as highly educated and specialized labor to staff the efforts.

The onshore support does not end with production. A recent report prepared for the U.S. Department of Energy indicates that the Louisiana economy is "highly dependent on a wide variety of industries that depend on offshore oil and gas production" and that offshore production supports onshore production in the chemicals, platform fabrication, drilling services, transportation, and gas processing. Fleets of helicopters and U.S.-built vessels also supply offshore facilities with a wide range of industrial and consumer goods, from industrial spare parts to groceries. As explained in Section IV.G, however, the distance between offshore facilities and onshore communities can affect the relative intensity of the local economic effects.

The economic effects in the refining phase are even more diffuse than the effects for the two preceding phases. Although significant capacity is located in California, Illinois, New Jersey, Louisiana, Pennsylvania, Texas, and Washington, additional U.S. refining capacity is spread widely around the country. As a result, refinery jobs, wages, and tax revenues are even more likely to "spill over" into other areas of the country, including non-coastal states like Illinois, as those are home to many refining and chemical industries that ride the economic coattails of oil exploration and extraction.

II. OFFSHORE OIL AND GAS RESERVE ESTIMATES AND THE SOURCES OF THEIR ECONOMIC BENEFITS

As described in my 2009 white paper, "The Economic Contribution of Increased Offshore Oil Exploration and Production to Regional and National Economies," available at www.americanenergyalliance.org/images/aea_offshore_updated_final.pdf, significant oil and gas reserves lie under the U.S. Outer Continental Shelf (OCS). According to the Energy Information Administration (EIA), the OCS (including Alaskan OCS Planning Areas) contains approximately 86 billion barrels of recoverable oil and approximately 420 trillion cubic feet of recoverable natural gas. As noted by the White House, however, the OCS estimates are conservative. Of the total OCS reserves, a significant portion was unavailable to exploration until recently. Specifically, Presidential and Congressional mandates banned production from OCS Planning Areas covering approximately 18 billion barrels of recoverable oil and 77.61 trillion cubic feet of recoverable natural gas. These bans covered approximately 31 percent of the total recoverable OCS oil reserves and 25 percent of the total recoverable OCS natural gas reserves.

Economic benefits of utilizing OCS reserves accrue from three primary sources: (1) exploration/platform investments; (2) production; and (3) refining. Sources (1) and (3) produce initial effects—that is, new industry expenditures—*today*; in contrast, source (2) produce economic effects only once production begins. The analysis therefore considers "initial" economic effects as those that flow from exploration or investments in new refining capacity and long-term economic effects as those that flow from production and ongoing refining.

A. Exploration and Offshore Facility Development

In contrast to other industries, the high fixed investment costs associated with offshore oil and gas production produce large initial investments that reverberate throughout the economy.

Once oil or gas reserves are located, billions of additional dollars must be spent before the well produces even $1 of revenue. For example, oil exploration costs can amount to between $200,000 and $759,000 *per day per site*. Additional production in the U.S. will also require a costly expansion refining capacity as well. Taken together, the fixed expenditures that precede actual offshore oil and gas production can amount to billions of dollars.

For example, Chevron's "Tahiti" project in the Gulf of Mexico is representative of the large investments that firms must make before production is achieved. In 2002, Chevron explored the Tahiti lease—which lies 100 miles off the U.S. coast at a depth of 4,000 feet—and found "an estimated 400 million to 500 million barrels of recoverable resources." Chevron estimates that it will take seven years to build the necessary infrastructure required to begin production at Tahiti. The firm estimates that its total development costs will amount to "$4.7 billion—before realizing $1 of return on our investment."

As a typical U.S. offshore project, the Tahiti project provides a wealth of information regarding the up-front investment costs, length of investment, and lifespan of future OCS fields. As noted above, the Tahiti field is estimated to hold between 400 million and 500 million barrels of oil and oil equivalents (primarily natural gas) and is expected to require an initial fixed investment of $4.7 billion. Using the mid-point reserve estimate of 450 million barrels of oil equivalent, up-front development costs amount to approximately $10.44 per barrel of oil reserves or $1.86 per 1,000 cubic feet of natural gas reserves. These costs will be spread over 7 years, resulting in average up-front development expenditures equal to $1.49 per barrel of oil and $0.27 per 1,000 cubic feet of natural gas. Chevron also estimates that the Tahiti project will produce for "up to 30 years". Although investment and production times vary widely, the analysis that follows uses the Tahiti project numbers – an average initial investment period of seven years followed by an average production period of 30 years – as indicative of the "typical" offshore project. I will thus assume an average initial investment period of seven years followed by an average production period of 30 years.

The speed of OCS development also factors into the analysis. Because most areas of the U.S. OCS have been closed to new exploration and production for almost forty years, it is unclear how quickly firms would move to develop new offshore fields. Given its large potential reserves, however, the OCS is sure to attract significant investment. Without the benefit of government data, a rough estimate suggests that annual total investment in OCS fields would be $9.09 billion per year.

Those annual expenditures are expected to last, on average, the full seven years of the development phase. Additional investment in states that already support significant production – Alabama, Louisiana, Mississippi, and Texas – are limited. Some of the greatest benefits accrue to areas that are home to enormous – but unavailable – total reserves: California and Florida.

B. Production

The likely value of state recoverable oil and gas reserves are estimated using the likely lifetime revenue that could be generated by the project. In that case, average wholesale energy prices provide the information necessary to translate reserves into revenues. Taking the simple average of the EIA's latest inflation-adjusted energy price forecasts through 2030 as provided by its *Annual Energy Outlook 2009,* the average inflation-adjusted price of oil will be $110.64 per barrel and the average inflation-adjusted price of natural gas will be $6.83 per thousand cubic feet. At these prices, the estimated OCS reserves are worth about $13 trillion.

The value of each state's available reserves are calculated as the sum of (1) its share of available OCS Planning Area oil reserves times $110.64 per barrel and (2) its share of available OCS Planning Area natural gas reserves times $6.83 per thousand cubic feet. The same method applies to the valuation of total state OCS reserves. By those estimation methods, states such as California, facing a budget crisis in the current recession, have an estimated $1.65 trillion in resources available in nearby OCS planning areas. Florida, while not facing as dire a fiscal crisis, has about $0.55 trillion in resources available in nearby OCS planning areas. Hence, a permanent relaxation of all federal OCS production moratoria would unlock more than $3.4 trillion in new production among all the coastal states.

C. Investments in Incremental Refining Capacity

Since U.S. refineries are presently operating near maximum capacity increased offshore oil and gas production would also spur investment in new refineries. The U.S. refining industry is presently operating at 97.9 percent of capacity and can no longer depend on excess foreign refining to meet production shortfalls arising from seasonality or repairs. In response, many large refiners are already considering refinery expansions: ConocoPhillips announced that it planned to spend $6.5 billion to $7 billion on capacity expansion at its U.S. facilities; Chevron has also considered a major refinery expansion; and while Shell is completing a $7 billion expansion and its Port Arthur, Texas refinery they are considering further expansion elsewhere.

Additional refinery investments are likely to occur in the few U.S. states that already host significant U.S. refineries. This result is largely due to environmental restrictions that severely limit the placement of new refining capacity. Current capacity is primarily concentrated in California, Louisiana, and Texas.

The U.S. presently has an operating refining capacity of approximately 6.287 billion barrels of crude oil per year. Conservative estimates of OCS production would add approximately 3.773 billion barrels per year, or about sixty percent of current U.S. operating refinery capacity. Because some OCS refining production would most likely substitute for foreign production, however, the analysis conservatively assumes that only one-quarter of this new OCS production necessitates additional U.S. refinery capacity. That is, I estimate that U.S. refinery demand would increase by 943.25 million barrels per year, or 15 percent of current installed capacity.

Even this modest capacity increase would require substantial new investments. In response to existing capacity constraints, Shell is already increasing the capacity of its Port Arthur, Texas refinery. This expansion will take approximately two and one-half years to complete and cost $7 billion. The facility will add 325,000 barrels per day (or 118.6 million barrels per year) in new capacity, at a cost of approximately $59.02 per barrel of new annual capacity.

As noted above, since tough environmental regulations effectively limit new refinery capacity to a few states, refinery investments are likely to be limited to only a few states with large existing capacity. These states can be reasonably assumed to be the same states the already have large installed refinery capacity. Hence, incremental refinery capacity will be added predominantly in states already home to large refining capacity—those with a present capacity of more than 200 million barrels per year. There are seven such states: California, Illinois, Louisiana, New Jersey, Pennsylvania, Texas, and Washington.

Expected increases in offshore oil production will induce approximately $22 billion in refining capacity investments each year for two and one half years. California, Texas, and

Louisiana will receive the bulk of this investment, but investments of more than $1 billion annually can be expected in Illinois, New Jersey, Pennsylvania, and Washington.

III. INCREASED INVESTMENTS IN OFFSHORE OIL AND GAS PRODUCTION WILL CAUSE SUBSTANTIAL INCREASES IN WAGES, EMPLOYMENT, AND TAXES, AND PROFOUND EFFECTS ON COMMUNITIES THROUGHOUT THE NATION

Onshore state and local economies benefit from the development of OCS reserves by providing goods and services to offshore oil and gas extraction sites. Onshore communities provide all manner of goods and services required by offshore oil and gas extraction. A variety of industries are involved in this effort: shipbuilders provide exploration vessels, permanent and movable platforms, and resupply vessels; steelworkers fashion the drilling machinery and specialized pipes required for offshore resource extraction; accountants and bankers provide financial services; and other onshore employees provide groceries, transportation, refining, and other duties. These onshore jobs, in turn, support other jobs and other industries (such as retail and hospitality establishments).

The statistical approach known as an "input-output" analysis measures the economic effects associated with a particular project or economic development plan. This approach, which was pioneered by Nobel Prize winner Wassily Leontif, has been refined by the U.S. Department of Commerce. The most recent version of the Commerce Department's analysis is known as the Regional Input-Output Modelling System, or "RIMS II." The RIMS II model provides a variety of multipliers that measure how an economic development project—such as offshore drilling—would "trickle down" through the economy providing new jobs, wages, and government revenues. This analysis can be broken down into two parts: (1) a "direct" analysis measuring the benefits that arise from industries that directly supply offshore oil and gas exploration and (2) the "final" analysis that measures the direct *and* indirect benefits associated with offshore exploration.

The RIMS II model is the standard method governmental authorities use to evaluate the benefits associated with an economic development project. According to the Commerce Department, the RIMS II model has been used to evaluate the economic effects of many projects, including: opening or closing military bases, tourist expenditures, new energy facilities, opening or closing manufacturing plants, shopping malls, sports stadiums, and new airport or port facilities.

A. Opening OCS Planning Areas would Unleash More than $11 trillion in Economic Activity

The broadest measure of the incremental effect of increased OCS oil and natural gas extraction is the effect on total economic output. Until OCS production begins, onshore communities will realize only the benefits associated with offshore investment. These benefits take two forms: (1) the development of the offshore facilities themselves and (2) the expansion of onshore refining capacity. These two effects, taken together, provide a rough approximation of the additional output that would be created by allowing greater access to offshore reserves.

Of course, the investment expenditures and resulting output estimated above is only made to facilitate oil and gas extraction. Once extraction begins, additional economic activity continues for the lifetime of the oil and natural gas reserves.

Using the total U.S. multipliers (2.2860 for refining and 2.3938 for extraction), the total increase in U.S. output from *initial investment* is estimated to be a total of about $0.5 trillion, or approximately $73 billion per year for the first seven years the OCS is open. For comparative purposes, a $73 billion stimulus amounts to approximately 0.5 percent of total U.S. output (GDP) per year.

Increased OCS oil and gas *extraction* would yield approximately $5.75 trillion in new coastal state output over the lifetime of the fields. Approximating the total increase in output associated with increasing offshore resource production throughout the U.S. (including states in the interior), yields approximately $2.45 trillion in additional output.

The total increase in output in the United States is estimated to total approximately $8.2 trillion or about $273 billion per year, which amounts to just over two percent of GDP. Because the OCS areas are currently unavailable, the entire amount—$8.2 trillion—is completely new output created by a simple change in policy allowing resource extraction in additional OCS Planning Areas.

B. Opening OCS Planning Areas could Create Millions of New Jobs

An economic expansion tied to increased OCS resource production would also create millions of new jobs both in the extraction industry and in other sectors that serve as suppliers or their employees.

The annual increase in coastal state employment from initial investments in previously unavailable OCS planning areas and additional refining capacity is estimated to be 185,320 full-time jobs per year. Again, this number does not consider the spill-over effects of investment in productive capacity and refining to other U.S. states. The total increase in U.S. employment from the investment phase is approximately 271,570 full-time jobs per year.

Applying the BEA multipliers to the estimated production value results in approximately 870,000 coastal state jobs *in addition to* the jobs created during the initial investment phase. Again, the total increase in U.S. employment in all states (including those in the interior) resulting from increased OCS production is 340,000 greater, for a total of approximately 1,190,000 jobs be sustained for the entire OCS production period.

Increased investment and production in previously unavailable OCS oil and gas extraction and the ancillary industries that support the offshore industry would produce thousands of new jobs in stable and valuable industries. Among the 271,572 jobs created in the investment phase and sustained during the first seven years of the investment cycle. The majority of new positions (162,541 jobs, or 60 percent) would be created in high-skills fields, such as health care, real estate, professional services, manufacturing, administration, finance, education, the arts, information, and management. Although the largest total increase in employment in the production phase would occur (quite naturally) in the mining industry, significant numbers of jobs would be created in other industries. Again, many of these new jobs would be created in high-skills fields, representing approximately 49 percent of all new jobs and approximately 61 percent of all new non-mining jobs.

C. Opening OCS Planning Areas can Release Trillions of Dollars of Wages to Workers Hit by Recession

Those jobs pay wages. OCS development is estimated to yield approximately $10.7 billion in new wages in coastal states each year. OCS production would yield approximately $1.406 trillion in additional wage income to workers in coastal states over the lifetime of the

fields (or $46 billion per year over 30 years). Across the U.S., the investment phase would generate approximately $15.7 billion in additional annual wages *per year for the first seven years* and $70 billion per year for the next thirty years, or approximately $2.1 trillion in additional wage income.

BLS data suggest that all four broad industry classifications related to oil and gas extraction pay higher wages and similar jobs in other industries. Jobs in: (1) Oil and Gas Extraction, (2) Pipeline Transportation of Crude Oil, (3) Petroleum and Coal Products Manufacturing, and (4) Support Activities for Mining, typically pay higher wages than the average American job. Taking this broader measure, the average job created by increased offshore oil and gas production pays approximately 28 percent more than the average U.S. job.

D. Opening OCS Planning Areas can Contribute Trillions of Dollars in Taxes and other Public Revenues to Local, State, and Federal Governments

Greater output, more jobs, and higher wages translate into higher tax collections and increases in other sources of public revenues. The MMS Report to Congress suggests that public revenues derived from OCS extraction are significant—the U.S. federal government has collected more than $156 billion in lease and levy payments for OCS oil and natural gas production. Note that this amount counts only lease and royalty payments and thus does not include any sales and income taxes paid by firms or workers supported by OCS production.

Conservative estimates suggest that seven years of initial annual exploration and refining investments would produce approximately $4.8 billion annually in coastal state and local tax revenue and $11.1 billion in U.S. federal tax income. Over thirty years of production, I estimate that the extraction phase of OCS development would yield approximately $561 billion ($18.7 billion per year) in coastal state and local tax revenue and approximately $1.64 trillion ($54.7 billion per year) in new U.S. federal tax income.

E. The Economic Effects Associated with Increasing U.S. Offshore Oil and Gas Production Vary by Drilling Distance from Shore

Government sources indicate that the economic effects associated with increased OCS oil and gas production are likely to vary with the distance from shore. This dynamic has important implications for the analysis because increasing OCS development includes a mix of both shallow and deep water projects. Deep water projects are far more expensive than shallow water projects, however, so far fewer are undertaken.

According to the MMS, the cost of developing a deep water field can exceed $1 billion. This cost far exceeds the cost of developing a shallow field, which the MMS places at approximately $100 million. While some are tempted to argue that deep water fields are significantly larger than shallow water fields, that argument in part arises from an observational bias arising in part because firms will only bear the high cost of development for sufficiently large fields. Nonetheless, while it is estimated that deep and ultra deep water oil reserves are some 35-60 times the magnitude of shallow water reserves, the economics of exploration and development, as well as production, dictate that deep and ultra deep projects will not generate sufficient production to relieve the importance of shallow water projects any time soon.

The increased cost and offshore distance associated with deep water operations has several implications for the above economic analysis. While the increased cost of development translates into increased purchases of goods and services in local communities, as distance increases shore operations can be more easily centralized into a few communities that serve

many deep water fields. Thus the local economic effects associated with deep water production are likely to be greater and more concentrated than they are for shallow water production.

IV. SUMMARY AND CONCLUSIONS

The present paper estimates the *net* local and national economic effects that can be expected from opening OCS Planning Areas. In contrast to previous analyses of offshore development, the present study estimates economic growth and output associated with the production phase, but also estimates the economic effects of the exploration and development phases as well. In truth, exploration and development involve a great deal of economic activity, suggesting that opening OCS Planning areas can increase economic growth, provide jobs, increase aggregate wages, and add to public revenues both today and for years in the future.

Over the life span of development, OCS planning areas will contribute approximately $8.7 trillion dollars to U.S. economic growth, of which some $2.2 trillion can be expected to be paid out in wages to employees in almost 38 million annual jobs, many in high-paying professional career fields.

That economic growth will also generate just over $1.7 trillion in Federal tax revenue, almost $0.6 trillion in state and local tax revenue, and inestimable royalty and lease revenue that will in many cases be split between the two. Those revenues will contribute to schools, health centers, and infrastructure projects that will contribute substantially to the quality of life in not only coastal regions directly affected by the development, but nationwide. Immediate revenues from exploration can also help many coastal states weather the effects of the present recession and mortgage crisis without Federal aid.

While some are suggesting limiting OCS Planning Area development to areas located more than one hundred miles offshore, it is important to point out that such limitations substantially curtail the benefits of OCS development. Not only are the costs of such deep and ultradeep water development often prohibitive, but production in such areas is more volatile as a result and Federal subsidies substantially diminish the potential public revenue gains from opening OCS Planning Areas.

In summary, investment and development in OCS Planning Areas can increase economic growth with attendant effects on jobs, wages, taxes, and other public revenues, helping to both invigorate and stabilize economic growth while reducing oil price volatility. The resulting economic growth and public revenues are particularly attractive to local economies close to previously prohibited OCS planning areas like those off the coasts of California and Florida, which are experiencing the full force of recession and mortgage foreclosures. Jobs in these areas can be particularly powerful in resuscitating the economy and restoring economic growth. It makes no sense to consciously choose to forego such a substantial source of economic growth in a recession.

In closing, a caveat. The present analysis is only meant to be a starting point for discussing the economic effects of unavailable OCS reserves rather than an exact estimate of the economic effects of OCS Planning Area development and operation. Clearly there will be debate about many of the parameters used in the analysis. No amount of debate, however, should detract from the simple reality that reaffirming the OCS moratoria will leave valuable economic growth opportunities on the table precisely at a time when the country owes its citizens access to jobs and wages that can help them weather the current recession.