



ANALYSIS OF THE IMPACT ON THE SOCIAL, ECONOMIC AND ENVIRONMENTAL EFFECTS OF MAINTAINING OIL AND GAS EXPLORATION AND PRODUCTION MORATORIA

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Gas Technology Institute (GTI)**

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Presentation Overview



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Project Sponsors and Project Team



- **Project Sponsors**
 - As directed in the Resolution adopted by the National Association of Regulatory Utility Commissioners (NARUC) Board of Directors on July 18, 2007, and implemented through NARUC, this research project is sponsored by a group of private sector companies and organizations, together with NARUC, serving a majority of American energy consumers; the sponsors represent a large array of America’s energy regulators, producers, refiners, manufacturers and distributors.
- **“Moratoria Study Group”**
 - Support has been provided through coordination with the *Moratoria Study Group*, organized by NARUC, to gain the benefit of expertise from a **large and diverse body of private and public sector experts**. Federal agency economists provide guidance and information, but serve as “ex officio,” non-voting members due to their public employment. *(See the last slide in this presentation for a listing of all members)*
 - **Study Group Chair:** Commissioner **O’Neal Hamilton**
 - **Study Group Coordinator:** Commissioner **Emeritus Dave Harbour**
- **SAIC – Project Lead**
 - **Science Applications International Corporation (SAIC)** is a FORTUNE 500® scientific, engineering, and technology applications company that uses its deep domain knowledge to solve problems of vital importance to the nation and the world, in *national security, energy and the environment, critical infrastructure and health*.
 - SAIC provides energy analysis, energy modeling, energy IT and engineering solutions to commercial and government clients, including: major commercial enterprises, major oil and gas companies, the U.S. Department of Energy, the U.S. Environmental Protection Agency, and the U.S. Department of Defense.
 - SAIC had annual revenues of \$10.07 billion for its fiscal year ended January 31, 2009.
- **GTI – Project Partner**
 - **The Gas Technology Institute (GTI)** is one of the leading research, development and training organizations serving U.S. energy markets with significant exploration and production experience.
 - Customers include energy industry companies, equipment manufacturers, government agencies, and other organizations. GTI provides products, services and information that help customers solve problems or capitalize on opportunities related to finding, producing, delivering and using natural gas.
 - GTI is an independent technology organization, established as an Illinois not-for-profit corporation.

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Project Objectives: Overview



- This study uses the National Energy Modeling System (NARUC-NEMS) to provide a comprehensive analysis of the impact on the social, economic and environmental effects of maintaining oil and gas exploration and production moratoria on and beneath federal jurisdictional lands of the United States through 2030.
- The [NARUC Board of Directors approved the Resolution](#) “Developing Reliable Research Regarding the Social, Economic and Environmental Effects of Maintaining Domestic Energy Exploration and Production Moratoria On and Beneath Federal Lands” – giving birth to this project on July 18, 2007.
- While the presidential outer continental shelf (OCS) withdrawals were subsequently lifted on July 14, 2008, and congressional moratorium was lifted on October 1, 2008, the key focus of the study remains the assessment of the impacts of maintaining/reinstating the OCS moratoria and other onshore land-use restrictions.
- A key study objective is to *first* update oil and gas recoverable resource estimates for both the moratoria and non-moratoria areas, *then* insert the updates into the model.

Use of the word “moratoria” in this study meets the intent of the NARUC Resolution by applying to all federal lands which have been or are still unavailable for oil and gas leasing via Congressional, Presidential and/or Administrative actions.

The term “NARUC-NEMS” is used to distinguish use of the model in this project from uses by the U.S. Department of Energy’s Energy Information Administration (EIA).

OCS – Outer Continental Shelf; refers to all submerged lands, its subsoil, and seabed that belong to the United States

Summary of Key Findings – Oil and Gas Resource Assessment



- The study provides the most up-to-date assessment of U.S. on-shore and off-shore oil and natural gas resources in both moratoria and non-moratoria areas
- Based on historical trends, new production technologies, and increased geologic understanding, the study projects an increase in the oil and gas resource base currently acknowledged by the Department of Energy/Energy Information Administration (EIA) in their 2009 reference case forecast (AEO2009)
 - Natural gas:
 - Offshore resource base increases by 154 Tcf [excluding parts of Alaska OCS]*
 - Onshore resource base increases by 132 Tcf
 - Crude oil:
 - Offshore resource base increases by 37 Bbo [excluding parts of Alaska OCS]*
 - Onshore resource base increases by 6 Bbo barrels for the Arctic National Wildlife Refuge and no increase in Lower-48

*** NARUC-NEMS model accounts for project field-specific oil and gas production from Alaska's onshore North Slope, offshore North Slope, and other Alaska (primarily the Cook Inlet area). Other OCS areas are not included.**

Tcf = trillion cubic feet Bbo = billion barrels of oil OCS = outer continental shelf

Summary of Key Findings – Model Results



- Incorporating the incremental resource base into the NARUC-NEMS model, the study projects that maintaining the moratoria, would result in an alternative domestic energy future that significantly alters the cost and availability of domestic oil products and natural gas in all economic sectors and regions of the country.*
- Model projections for the period covering 2009 to 2030, as included in this presentation, indicate the following:*
 - Cumulative domestic oil and natural gas production decreases by 18 percent and 10 percent, respectively
 - Average natural gas price increases by 28 percent and average gasoline price increases by 8.4 percent
 - Cumulative net present value (NPV) of consumer purchases of electricity and natural gas increases by \$325 billion
 - Cumulative national real disposable income decreases by \$1,163 billion (\$4,000 per capita)
 - Cumulative oil imports from OPEC countries increase by 4.1 billion barrels
 - Cumulative national payments to OPEC countries increase by \$607 billion (\$295 billion NPV)
 - Shift in domestic oil and gas production versus overseas production yields “local” versus “distant” environmental effects that are complex to quantify
 - Domestic environmental effects also depend on the relative change in fuel resource utilization and associated infrastructure

*** Note that these results account for the combination of both maintaining the moratoria and increasing the oil and gas resource base relative to the current resource base**

Project Objective: Quantify Social, Economic, and Environmental Effects



NET CHANGE FROM “MAINTAINING MORATORIA BASIS” TO REMOVING MORATORIA”

SOCIAL METRICS	ECONOMIC METRICS	ENVIRONMENTAL METRICS
Domestic onshore/offshore energy production by fuel type and region Energy consumption by sector and fuel type Energy intensity (Btus/gross domestic product [GDP], Btus/household; delivered and total energy) Oil and gas end-of-year reserves and annual reserve additions International energy purchases (by region) Housing starts Employment in energy intensive industries by census region (manufacturing and non-manufacturing) Vehicle miles traveled	Energy prices by type and sector Real disposable income (billions of dollars by census region) Cost of energy to consumers by sector (annual and net present value [NPV], billions of dollars) Cost of real industrial shipments (billions of dollars) Cost of energy imports (annual and NPV, billions of dollars) GDP (billions of dollars) Real consumption (billions of dollars) Oil and gas production royalty and tax payments (billions of dollars)	Domestic onshore/offshore energy production by fuel type and region Natural gas imports (pipeline and liquefied natural gas) Crude oil imports Carbon dioxide production from energy conversion Renewables utilization Energy production by fuel type International impacts - qualitative

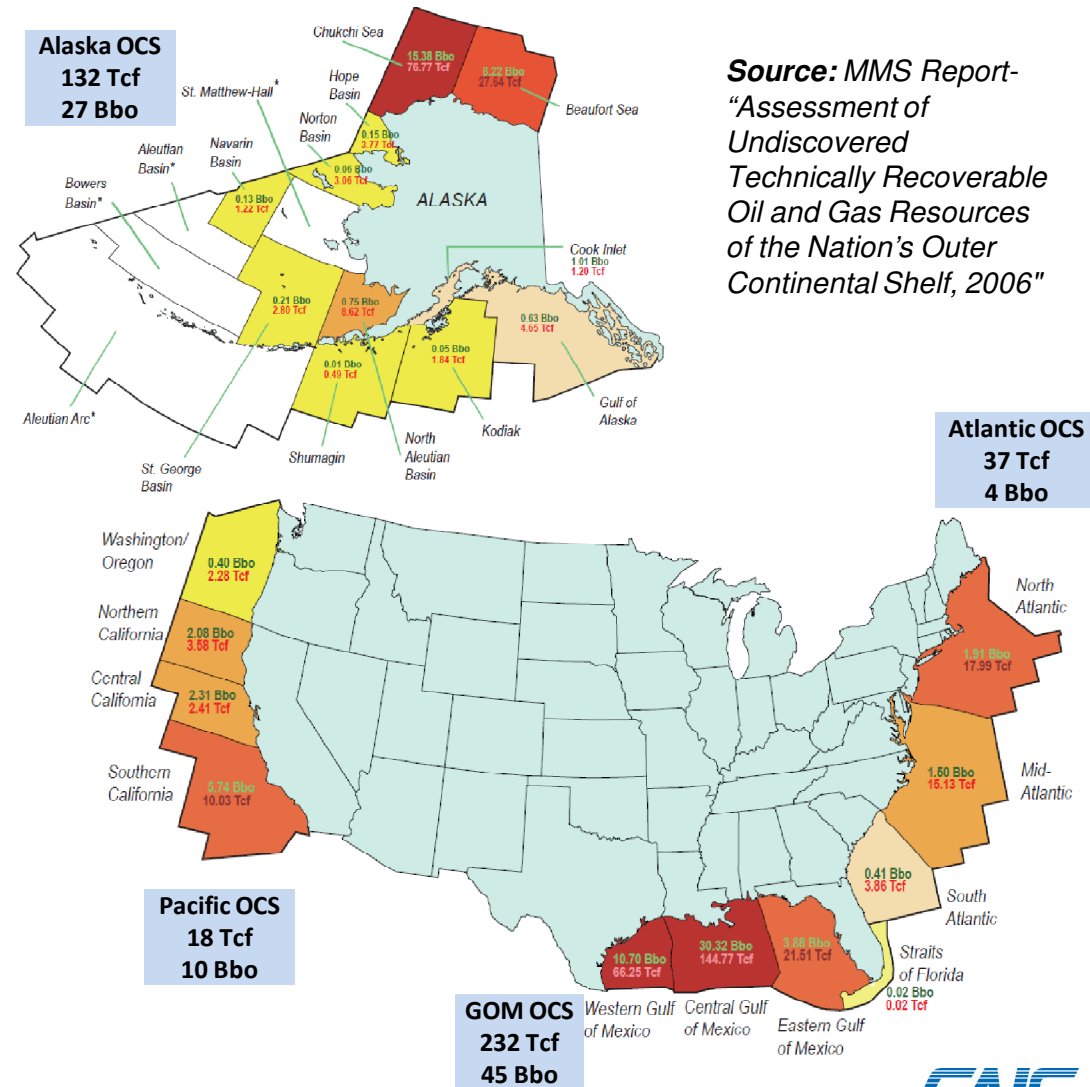
See ‘Attachment A’ “Impact Matrix” that quantifies some of these metrics. Final study report will expand on these metrics.

Moratoria and Restricted Areas:



OCS Moratoria Areas

- Congress, through the annual appropriations process beginning in 1982, and Presidents Bush and Clinton by Presidential Directive originating in 1990, restricted leasing activities in just over **85 percent of the OCS**, including the Atlantic and Pacific coasts and part of the eastern Gulf of Mexico (GOM) and Alaska
- North Aleutian Basin, Alaska, has not been included since 2004
- On **July 14, 2008, and October 1, 2008**, the executive moratorium and the congressional moratorium on oil and gas exploration and production activities in certain OCS areas were lifted/expired
- A portion of the Central Gulf of Mexico Planning Area (CPA) and most of the Eastern Gulf of Mexico Planning Area (EPA) is under restriction until 2022 as part of the *Gulf of Mexico Energy Security Act of 2006*
- *The Minerals Management Service (MMS) estimated a mean of 86 Bbo of undiscovered, technically recoverable oil and a mean of 420 Tcf of undiscovered, technically recoverable natural gas in the Federal OCS: 18 Bbo and 77 Tcf of gas is still off-limits*



Source: MMS Report-
 "Assessment of
 Undiscovered
 Technically Recoverable
 Oil and Gas Resources
 of the Nation's Outer
 Continental Shelf, 2006"

OCS = outer continental shelf
 Tcf = trillion cubic feet
 Bbo = billion barrels of oil



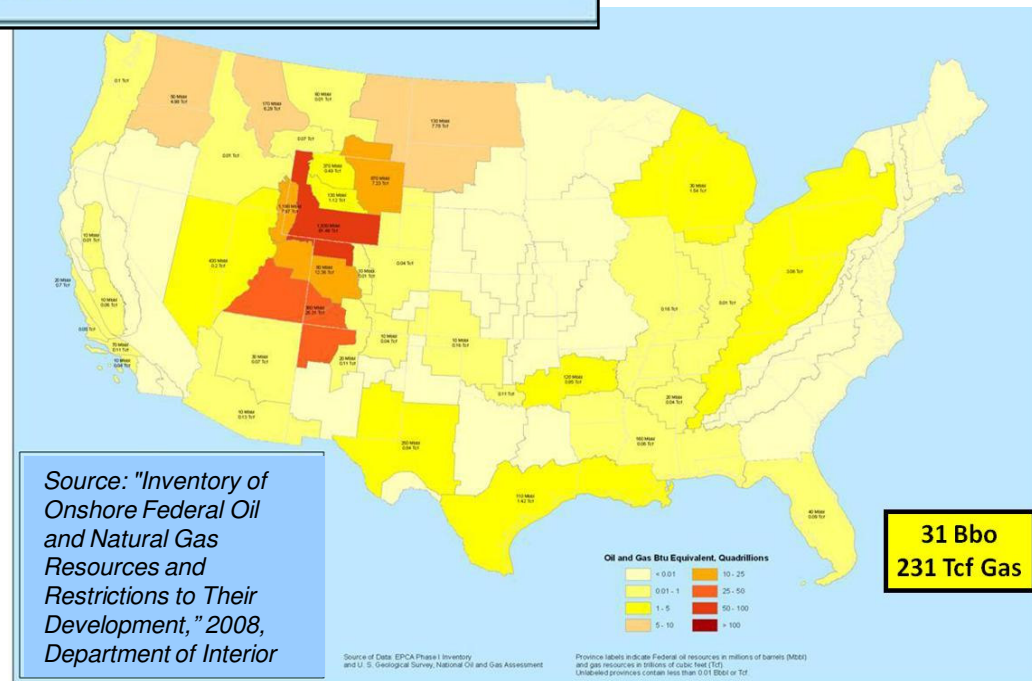
Moratoria and Restricted Areas: Onshore



Undiscovered, Technically Recoverable Oil and Gas on Federal Lands

Onshore Restricted Areas

- *Undeveloped oil resources* under federal lands = **30.5 Bbo**
 - **24.2 Bbo** undiscovered technically recoverable resources and **6.3 Bbo** of reserve growth
- *Undeveloped gas resources* under federal lands = **231 Tcf**
 - **214.1 Tcf** of undiscovered technically recoverable resources and **16.9 Tcf** of reserves growth
- Approximately 60 percent of the federal onshore land (including Alaska) is inaccessible - Significant percentage in Rockies
 - **62% oil (19 Bbo)** and **41% gas (95 Tcf)**
- Approximately 23 percent of the federal land is accessible with restrictions on oil and gas operations beyond standard stipulations
 - **30% oil (9.3Bbo), 49% gas (112.9 Tcf)**
- About 17 percent of the federal land is accessible under standard lease terms
 - **8% oil (2.3 Bbo) and 10% gas (23.6 Tcf)**
- Oil and gas resources are concentrated in **Northern Alaska** and the **Interior West**



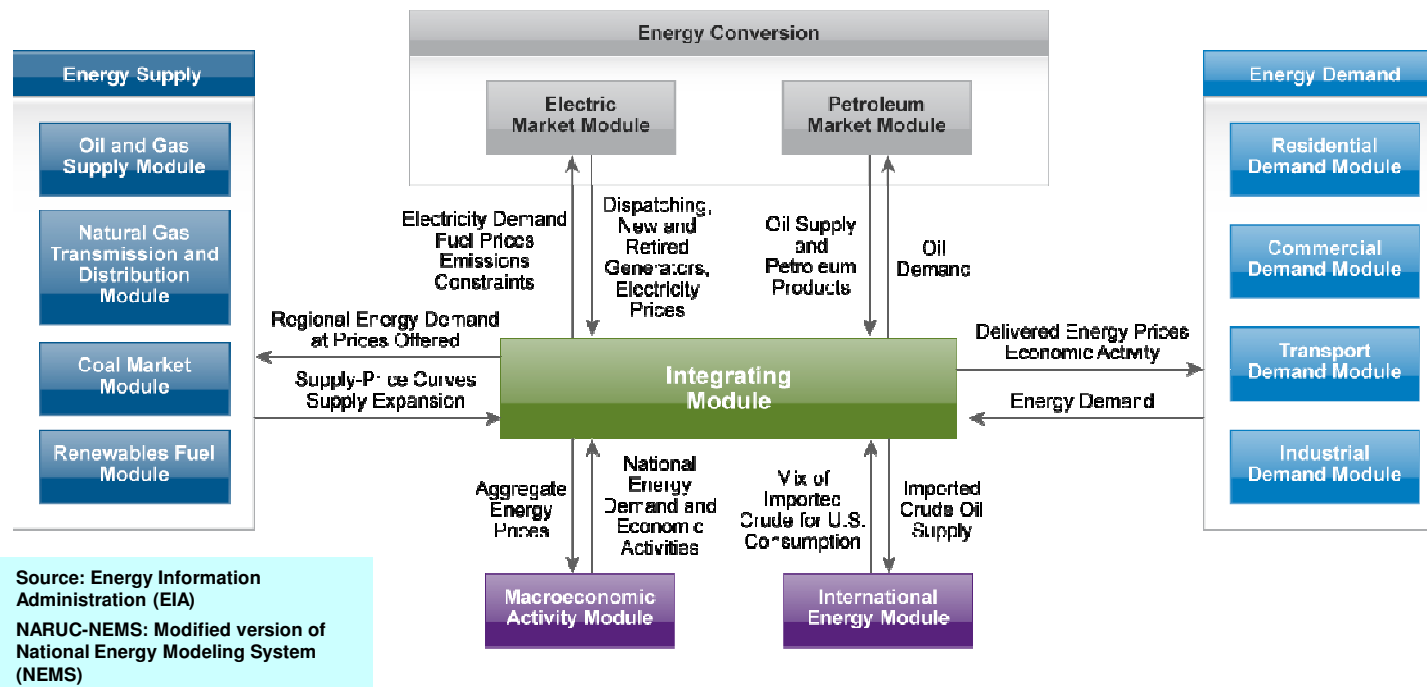
Tcf = trillion cubic feet
Bbo = billion barrels of oil



Study Methodology: Model Description



- NARUC-NEMS is used as the study model because the EIA’s NEMS is considered the “gold standard” that the U.S. government relies upon to understand the complex interactions of the energy markets
- Economy-wide, integrated energy model that includes 12 modules covering domestic fuel supply markets, conversion sectors, and end-use consumption sectors of the energy system
- The model balances the energy supply and demand for each fuel and consuming sector, accounting for economic competition between various energy supply sources while fully integrating economic activity at the national, industrial and regional levels, and the international energy markets



Study Methodology: Model Assumptions



Standards and Policies Accounted for in Model (among others):

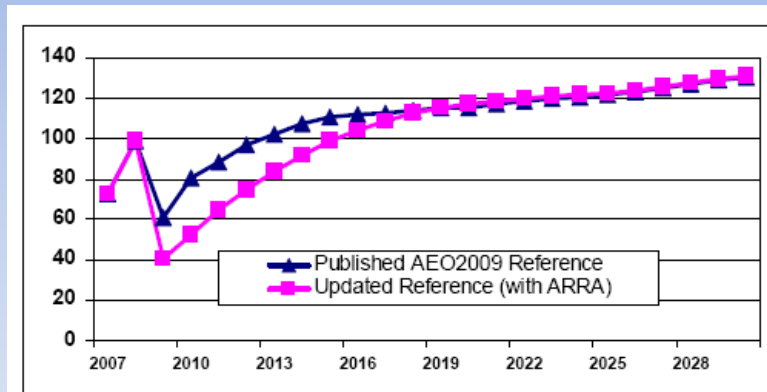
- *American Recovery and Reinvestment Act (ARRA)* of mid-February 2009 - significant new federal funding, loan guarantees, and tax credits to stimulate investments in energy efficiency and renewable energy, smart grid, carbon capture and storage (CCS)
- *Energy Improvement and Extension Act of 2008*: Various tax provisions
- *Energy Independence and Security Act of 2007*
- Emissions limits (for example, NO_x, SO₂, mercury) based on federal and state laws and regulations in effect on or before October 31, 2007
- Energy Policy Acts of 1992 (EPACT92) and 2005 (EPACT05) tax credits, among other provisions, including *investment tax credit for new or repowered coal-fired and nuclear power projects*
- Clean Air Act Amendments of 1990 (CAAA90)
- Federal and state mercury rules
- State competitive retail markets for electricity
- State Renewable Portfolio Standards (RPS)
- Clean Air Interstate Rule (Reinstated December 2008)
- Updated Corporate Average Fuel Economy (CAFE) standards

Macroeconomic Projection

- Updated macroeconomic baseline projection based on fourth quarter 2009 economic growth
- Short-term real gross domestic product growth rates reduced - 2.7 percent and 2.0 percent for 2009 and 2010

Updated World Oil Price Projection (2007 dollars per barrel)

- Reflects lower expected world oil price assumptions in the near- and mid-term

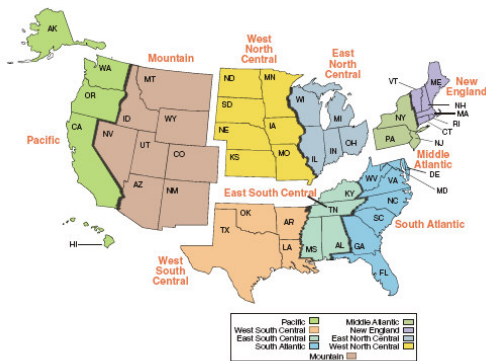


Source: National Energy Modeling System runs AEO2009.D120908A and STIMULUS.D041409A.

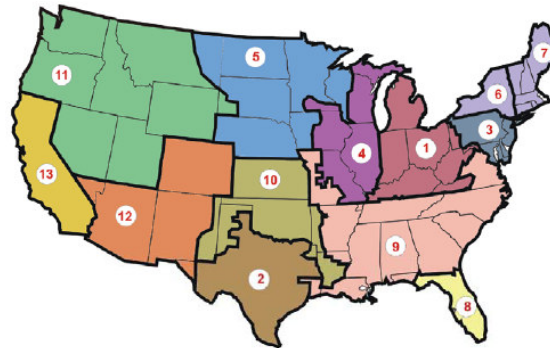
Study Methodology: Model Analysis Regions



CENSUS DIVISIONS USED IN NEMS



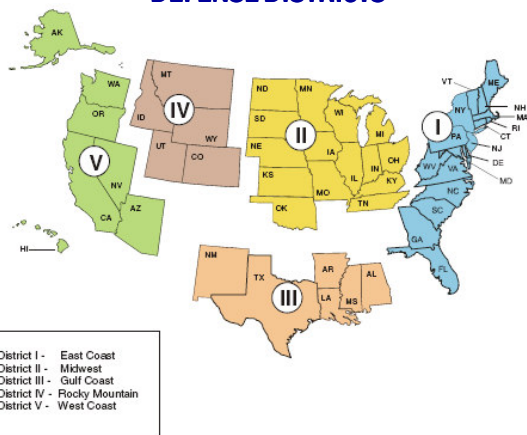
13 ELECTRICITY MARKET REGIONS IN NEMS



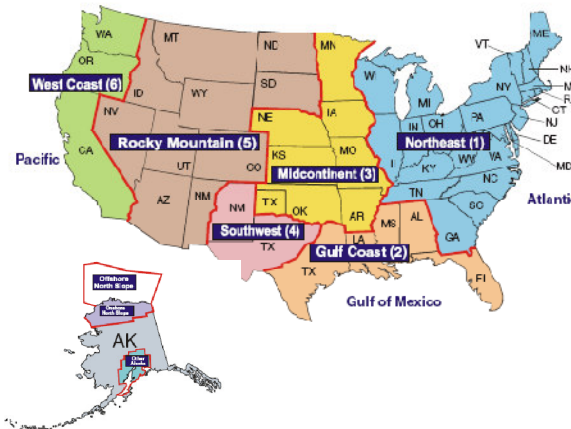
12 NATURAL GAS TRANSMISSION AND DISTRIBUTION DEMAND REGIONS



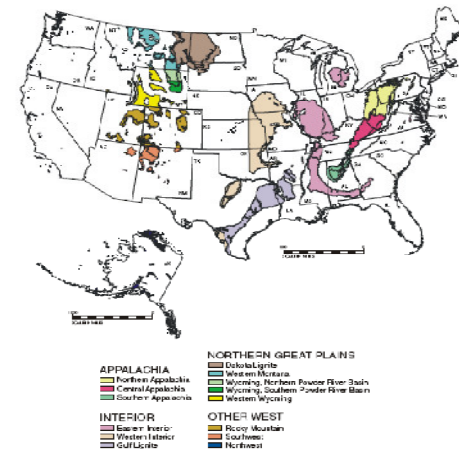
5 PETROLEUM ADMINISTRATION FOR DEFENSE DISTRICTS



12 OIL AND GAS SUPPLY REGIONS



14 COAL SUPPLY REGIONS



NEMS = National Energy Modeling System



Study Methodology: Modeling Cases



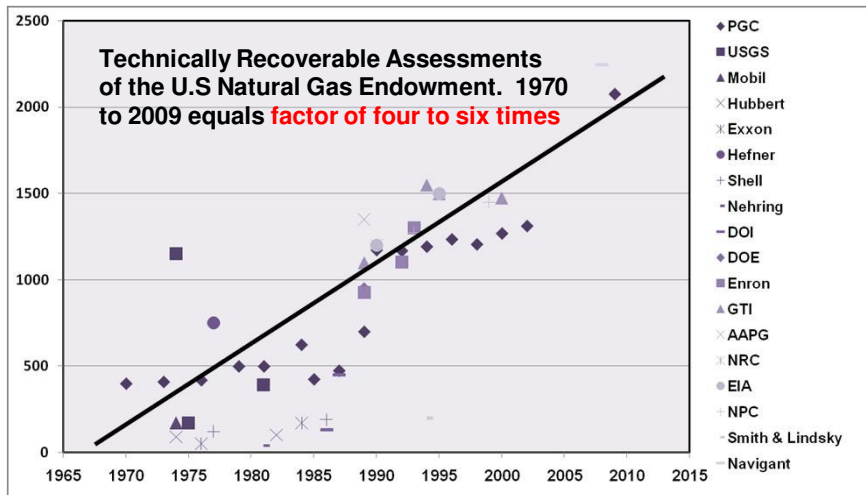
CASE	MODELING CASE DESCRIPTIONS
Base1	EIA AEO2009 Reference Case: OCS moratoria areas are available for leasing (as defined earlier) and all onshore restrictions are maintained per EIA specifications; uses current EIA resource base
Base2	Same as Base1, but all OCS moratoria and all onshore restrictions are <u>maintained</u> (“ Limited Access ” Base); uses current EIA resource base
Base3	Same as Base1, but all OCS moratoria and onshore restrictions are <u>eliminated</u> and available for exploration, leasing, and production (“ Full Access ” Base); uses current EIA resource base
A1	Increase in the offshore oil and natural gas resources based on historical trends and changes in resource base from currently explored areas (Basis: Base 1)
A2	Based on <i>new technology</i> being developed for deep water resources (greater than 5000 feet), increase the level of improvement for offshore oil and gas for each of the following criteria (Basis: Base 1; also accounts for Case A1 changes): 1) E&P Development Drilling Costs; 2) Production Facility Construction Costs; 3) Operating Costs
A3	For the onshore U.S., increase Lower-48 natural gas resources based on recent gas shale activity and general improvements for development of unconventional gas resources (Basis: Base1 + access)
A4	For the onshore U.S., increase Lower-48 natural gas resources based on technology development and geologic understanding of the gas shale resource (also accounts for Case A3 changes)
A5	For onshore Alaska, increase gas and oil resources for ANWR based on new technology and potential greater knowledge of the resource once drilling activity were to commence (Basis: Base1 + access)
A6	Combination Case: Same as Base3 + A2 + A4 + A5 (Full Access + updated oil and gas resources)
A7	Combination Case: Same as Base2 + A2 + A4 + A5 (Limited Access + updated oil and gas resources)

OCS – Outer Continental Shelf ANWR – Alaska National Wildlife Refuge EIA – Energy Information Administration

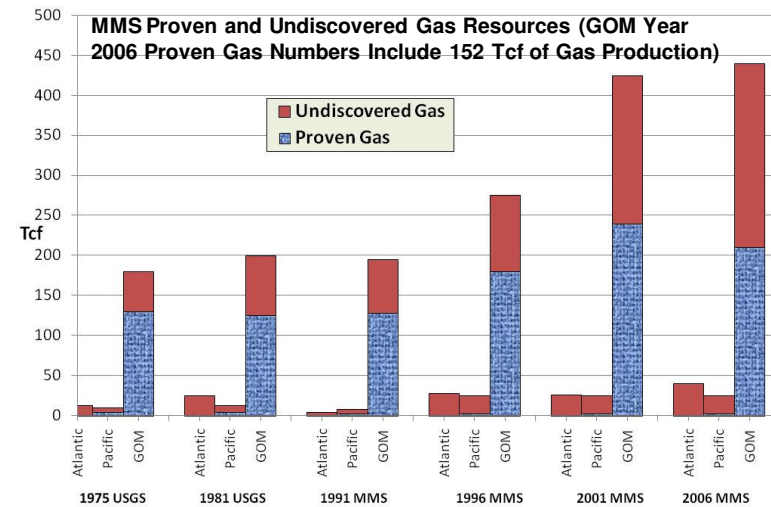
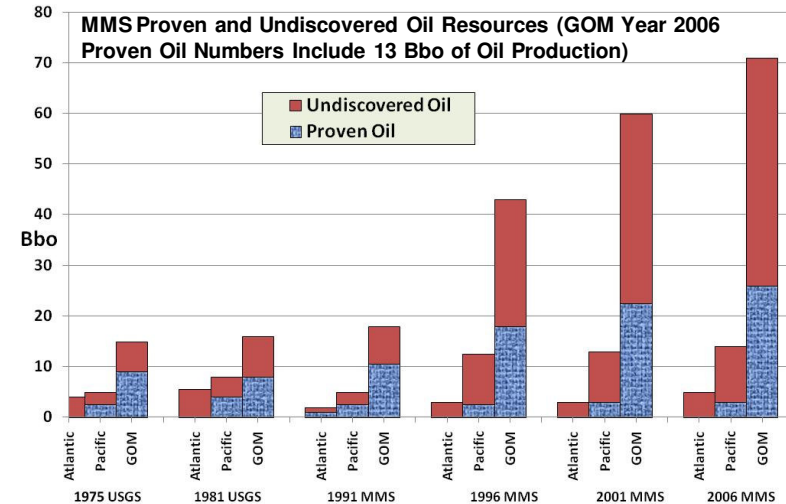
Study Methodology: Resource Assessment



- Historical assessments of U.S. technically recoverable onshore gas resource base indicates a strong tendency for resource assessments to increase as exploration and production development occurs and technology is developed (bottom left figure).
- Similar pattern for offshore oil and natural gas has also occurred for the same reasons. The Minerals Management Service (MMS) assessed OCS proven and undiscovered oil and gas from 1975 to 2006:
 - Total gas resource in the Gulf of Mexico (GOM) has increased from 175 Tcf in 1975 to almost 450 Tcf in 2006 (a factor of 2.6) .
 - GOM oil resources have increased from 15 Bbo to over 70 Bbo (a factor of 4.7) over the same time period.



Source: Modified from Bill Fisher et. al., Bureau of Economic Geology



Source: "Strengthening Our Economy: The Untapped U.S. Oil and Gas Resources," American Petroleum Institute, December 2008



OCS = outer continental shelf Tcf = trillion cubic feet
Bbo = billion barrels of oil



Study Methodology: Onshore Resource Assessment Results



- Areas of change for onshore resources are directed at onshore natural gas and the ANWR area of Alaska
- Oil resource base (ANWR excluded) is not changed for the L-48 onshore areas – this is a mature area that has undergone development for a considerable period of time
- Increase in L-48 gas resource is based primarily on new gas shale activity and results
 - **1st increment:** Gas resource value (EIA 2009 Energy Outlook) is increased by **60 Tcf** for the active shale areas to reflect recent activity levels
 - **2nd increment :** Gas resource value (EIA 2009 Energy Outlook) is increased by **122 Tcf** for the active shale areas to also reflect ongoing technology development – continued improvement in resource characterization, well stimulation, drilling cost improvements and water handling and operating costs
- Alaska resource increase is for the ANWR area-only and is based on U.S. Geological Survey (USGS) estimates of oil and gas resources
 - Increase takes both the gas and oil resource to the USGS high-case based on the same premise of new technology and potential increase through greater knowledge of the resource once drilling activity were to commence
 - Net increase is in addition of **10 Tcf** of natural gas and **6 Bbo**

Tcf = trillion cubic feet Bbo = billion barrels of oil
 EIA = Energy Information Administration

U.S. Onshore Basin/Area	Estimated Gas Resource (Tcf)	Resource Addition for Natural Gas to Reflect Historical Trends	Resource Addition for Natural Gas to Reflect New Technology
Onshore Lands Gas			
Denver Basin	0.09	+ 2 Tcf	+3 Tcf
Montana Thrust Belt	6.31	0	0
Paradox Basin	1.05	0	0
Powder River Basin	9.15	0	0
San Juan Basin	25.1	+3 Tcf	+6 Tcf
Southwestern Wyoming	68.03	+5 Tcf	+10 Tcf
Uinta-Piceance Basin	14.11	+1 Tcf	+3 Tcf
Williston Basin	0.61	0	0
Wyoming Thrust Belt	0.64	0	0
Eastern Orgeon-Washington	0.86	0	0
Ventura Basin	0.45	0	0
Eastern Great Basin	0.2	0	0
Florida Peninsula	0.32	0	0
Black Warrior Basin	0.39	0	0
Appalachian Basin	2.42	+11 Tcf	+23 Tcf
Extrapolated Results for Alaska	2.34	0	0
Extrapolated Results for Western Region	14.74	+21 Tcf	+42 Tcf
Extrapolated Results for Eastern Region	1.44	+17 Tcf	+35 Tcf
Total Onshore	148 Tcf	60 Tcf	122 Tcf

U.S. Onshore Basin/Area	Estimated Gas Resource (Tcf)	Estimated Oil Resource (Bbo)	Resource Addition for Gas to Reflect Historical Trends	Resource Addition for Oil to Reflect Historical Trends
Alaska Onshore				
Northern Alaska (ANWR Area)	79.61	17.78	+10 Tcf	+6 bbo
Central Alaska	2.7	0.15	0	0
Southern Alaska	0.39	0.27	0	0
Total Onshore Alaska	83 Tcf	31 bbo	+10 Tcf	+6 Bbo

Study Methodology: Offshore Resource Assessment Results



- Increase in resources reflects the results of drilling and exploration in the Gulf of Mexico over time that has led to more oil and gas discoveries than cumulative production
- New technology has been developed and deployed allowing industry to explore in deeper water and access smaller and more complex accumulations of oil and gas
- While the degree of increase for both the Atlantic and Pacific areas has been significantly less than the Gulf of Mexico, this reflects the lack of recent drilling and exploration in these regions due to access restrictions.
 - It is reasonable to assume that if development had been allowed, each of these regions would have realized an increase in assessed resources similar to the Gulf of Mexico
- The proposed increase for economic modeling purposes is an increase of the gas resource in each no-access area by a **factor of 3**
 - For example, the North Atlantic gas resource of **18 Tcf** is increased by a factor of 3 to **54 Tcf** - Net increase equals **36 Tcf**
- Given the resource increase over time in active areas of factors as high as four to seven times, a factor of 3 is viewed as a conservative estimate of resource growth

Note: The study does not include projected changes to all offshore Alaska oil and gas resources – yielding a conservative estimate; current OCS resources are estimated at 132 Tcf and 27 Bbo

Tcf = trillion cubic feet Bbo = billion barrels of oil

U.S Offshore Region (No Access)	Estimated Gas Resource (Tcf)	Resource Addition for Natural Gas to Reflect New Technology and Historical Trends from other Regions
Atlantic OCS		
North Atlantic	17.99	+36 Tcf
Mid Atlantic	15.13	+30 Tcf
South Atlantic	3.86	+8 Tcf
Gulf of Mexico OCS		
Eastern GOM ("No Access")	21.51	+43 Tcf
Pacific OCS		
Washington/Oregon	2.28	+5 Tcf
Northern Cal	3.58	+7 Tcf
Central Cal	2.41	+5 Tcf
Southern Cal	10.03	+20 Tcf
Total	77 Tcf	+ 154 Tcf

U.S Offshore Region (No Access)	Estimated Oil Resource (Bbo)	Resource Addition for Natural Oil to Reflect New Technology and Historical Trends from other Regions
Atlantic OCS		
North Atlantic	1.91	+4 Bbo
Mid Atlantic	1.50	+3 Bbo
South Atlantic	0.41	+1 Bbo
Gulf of Mexico OCS		
Eastern GOM ("No Access")	3.88	+8 Bbo
Pacific OCS		
Washington/Oregon	.40	+1 Bbo
Northern Cal	2.08	+4 Bbo
Central Cal	2.31	+5 Bbo
Southern Cal	5.74	+11 Bbo
Total	18 Bbo	+ 37 Bbo



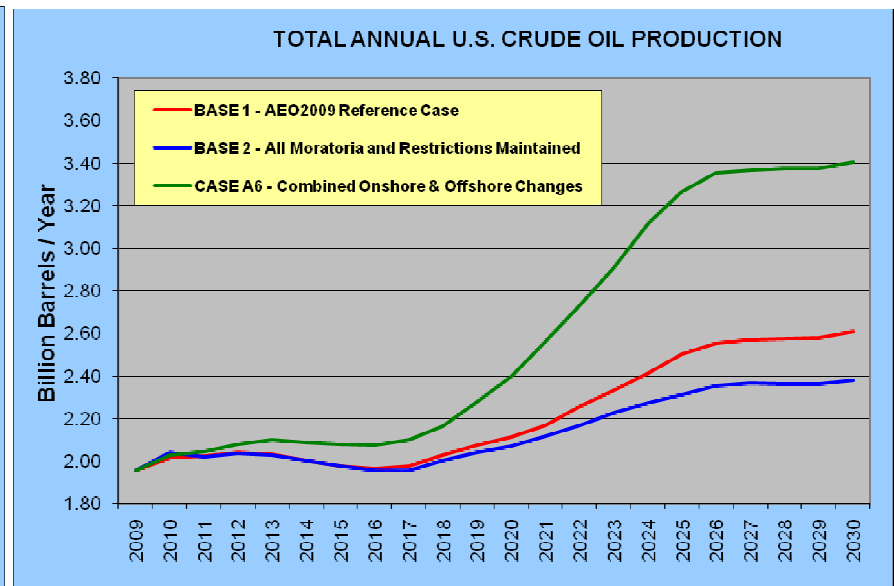
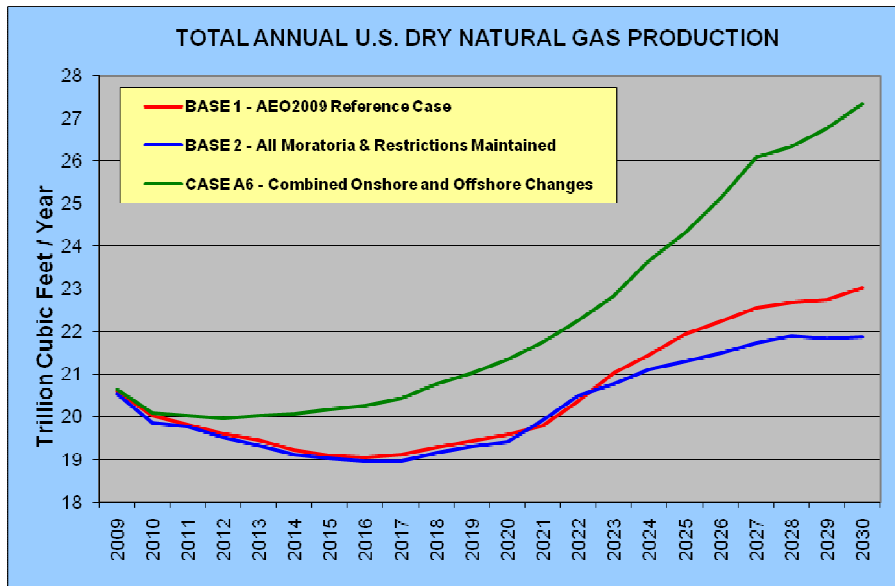
**Current Modeling Results Comparing
Case A6 with Base Cases 1 and 2:
Differences Represent the Impacts of Maintaining
the Moratoria and Land-Use Restrictions, and
Updated Oil and Gas Available Resources**



Current NARUC-NEMS Model Results: Projected Change in Oil and Gas Production if Moratoria Is Maintained and Resources Increase*



- Decrease in cumulative domestic natural gas production of **10 percent** through 2030 (Base2 versus Case 6)
- Decrease in cumulative domestic crude oil production of **18 percent** through 2030 (Base2 versus Case 6)

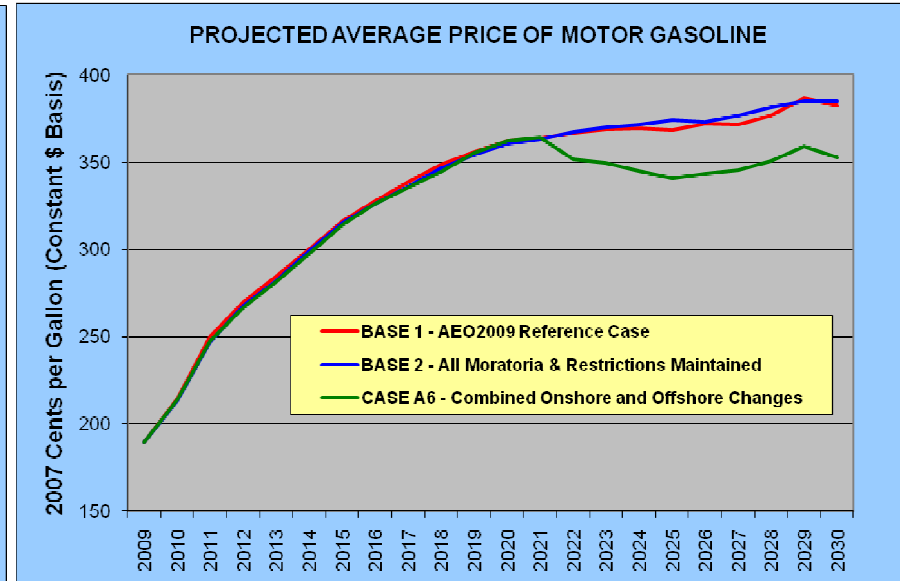
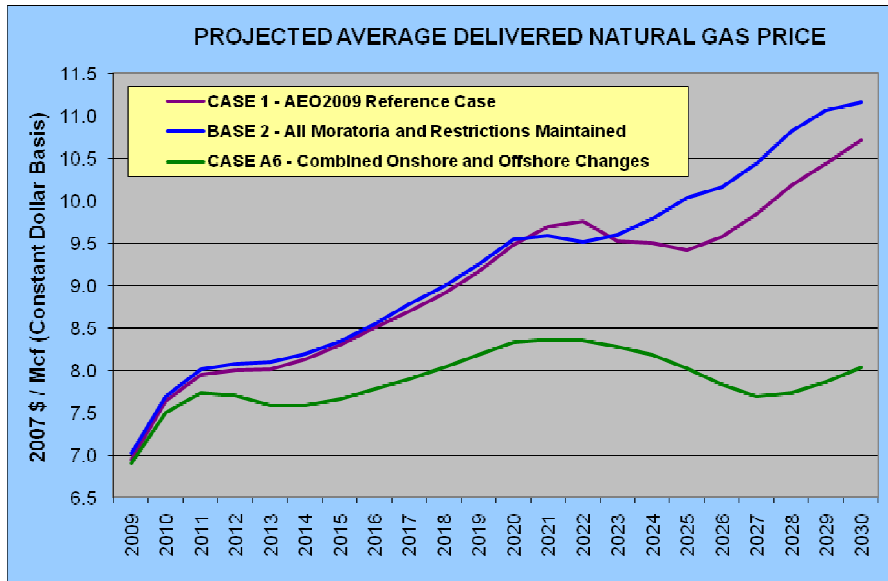


* These results account for the combination of both maintaining the moratoria and increasing the oil and gas resource base relative to the current resource base

Current NARUC-NEMS Model Results: Projected Change in Delivered Energy Prices if Moratoria Is Maintained and Resources Increase*



- Projected 2030 average delivered natural gas price increases by **28 percent** (Base2 versus Case 6)
- Projected 2030 average motor gasoline price increases by **8.4 percent** (Base2 versus Case 6)

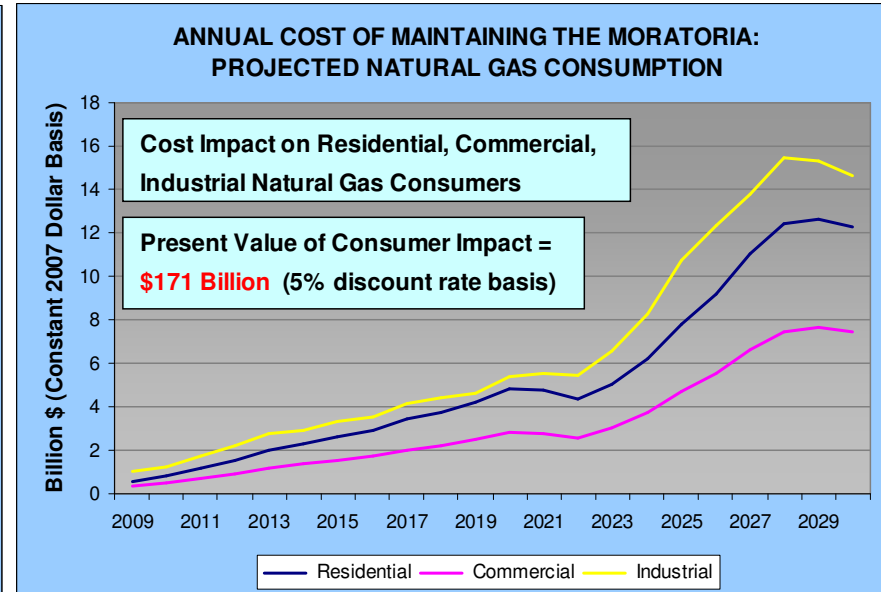
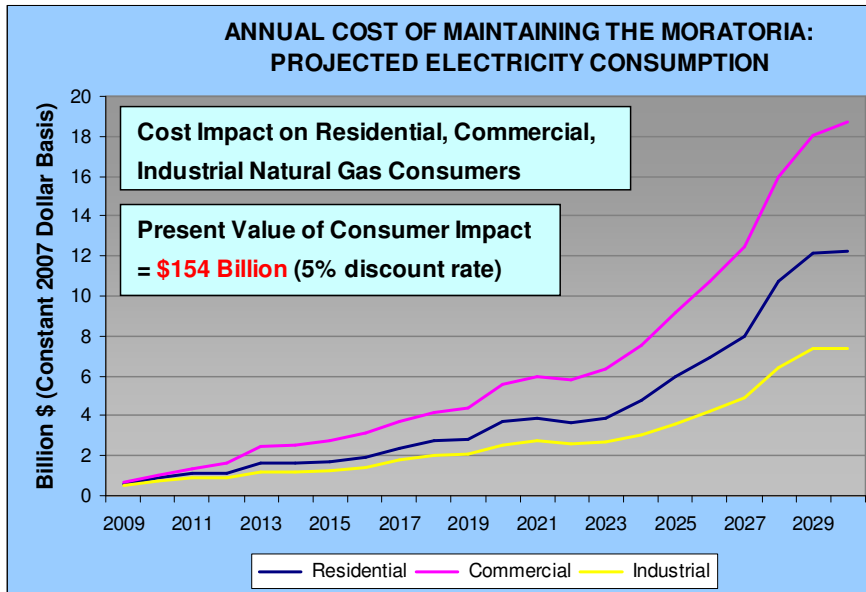


*** These results account for the combination of both maintaining the moratoria and increasing the oil and gas resource base relative to the current resource base**

Current NARUC-NEMS Model Results: Projected Cost to Consumers if Moratoria Is Maintained and Resources Increase*



- Projected increase in cumulative net present value of consumer purchases of electricity and natural gas is **\$325 billion** (Base2 versus Case 6)
- This represents **5.5 percent** of the Base 2 consumer expenditures for electricity and natural gas from 2009 to 2030 (Base2 versus Case 6)

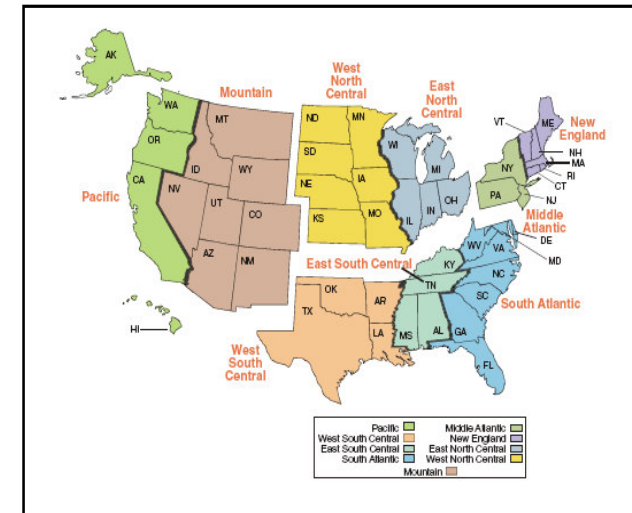
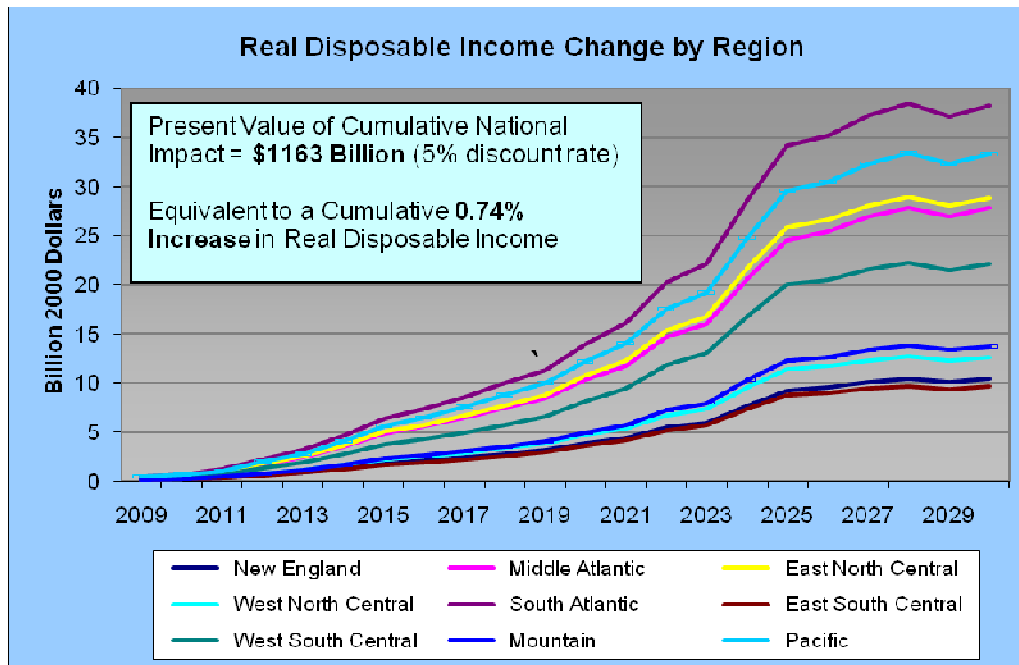


*** These results account for the combination of both maintaining the moratoria and increasing the oil and gas resource base relative to the current resource base**

Current NARUC-NEMS Model Results: Projected Cost to Consumers if Moratoria Is Maintained and Resources Increase*



- Model projects significant regional differences in the impacts on real disposable income due to unequal impacts on regional energy prices and types of energy consumption
- Projected decrease in cumulative national real disposable income is **\$1,163 billion** (\$4,000 per capita) by maintaining the moratoria (Base2 versus Case 6)
- This represents **0.74 percent** of the projected Base 2 consumer real disposable income from 2009 to 2030 by maintaining the moratoria (Base2 versus Case A6)

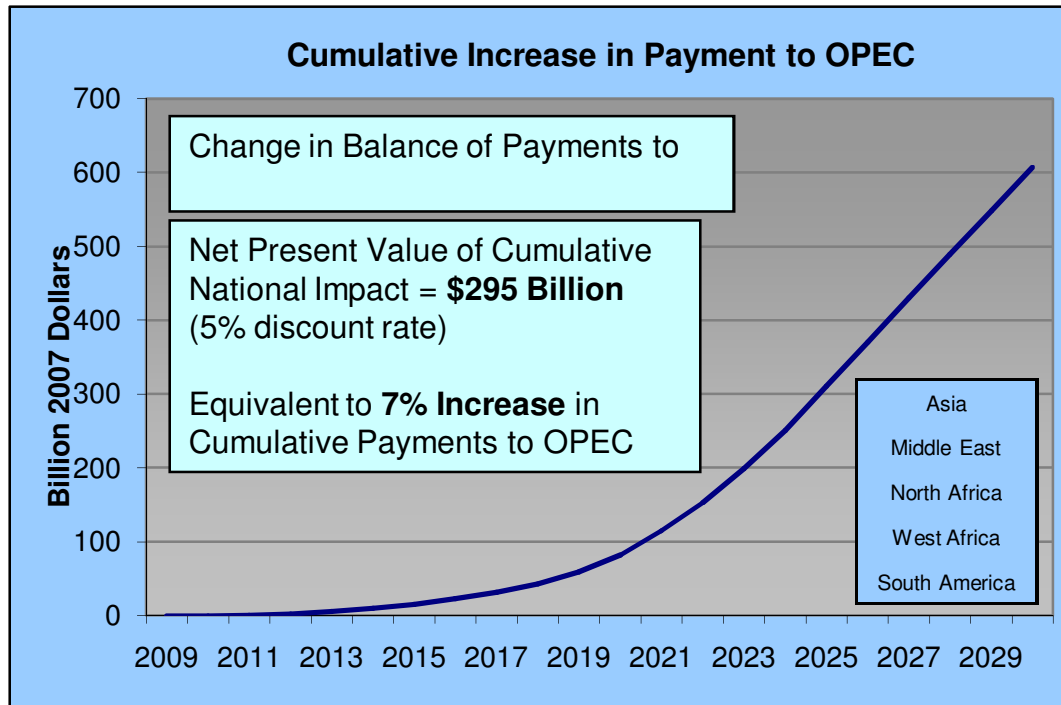


*** These results account for the combination of both maintaining the moratoria and increasing the oil and gas resource base relative to the current resource base**

Current NARUC-NEMS Model Results: Projected Energy Security Cost if Moratoria is Maintained and Resources Increase



- Projected increase in cumulative oil imports from OPEC countries is **4.1 billion barrels** from 2009 to 2030, which represents **13 percent** of the Base 2 OPEC cumulative imports (Base2 versus. Case 6)
- Projected increase in the cumulative national payments to OPEC countries is **\$607 billion** from 2009 to 2030, which represents **7 percent** of the Base 2 OPEC cumulative payments (Base2 versus Case 6)



* These results account for the combination of both maintaining the moratoria and increasing the oil and gas resource base relative to the current resource base

Current NARUC-NEMS Model Results: Projected Environmental Impact if Moratoria Is Maintained and Resources Increase*



- Relatively neutral impact on the following environmental metrics through 2030:
 - Emissions of sulfur dioxide (SO₂), nitrogen oxides (NO_x), mercury, and carbon dioxide (CO₂)
 - Energy intensity (energy consumed/gross domestic product [GDP])
 - Carbon intensity (tons CO₂ emitted/GDP)
 - Renewables intensity (renewables production/total energy production)
- Significant shift in power generation sources by 2030 yields environmental impacts:
 - 40 percent decrease in natural gas power generation (kW-Hours) and **57 GW less** generating capacity
 - 5 percent increase in coal-fired generation and **10 GW more** generating capacity
 - 7 percent increase in nuclear generation and **8 GW more** generating capacity
- Significant shift in domestic oil and gas production versus overseas production yields domestic and international environmental impacts:
 - 18 percent decrease in cumulative domestic oil production and 10 percent decrease in cumulative domestic natural gas production from 2009 to 2030
 - 16 percent increase in cumulative oil imports and 43 percent increase in cumulative natural gas imports from 2009 to 2030
 - **Impacts depend on “local” versus “distant” production and fuels transport consequences**
 - **Impacts depend on the relative change in resource utilization and associated infrastructure**

*** These results account for the combination of both maintaining the moratoria and increasing the oil and gas resource base relative to the current resource base (Base2 vs. Case 6)**

Concluding Remarks



- This study transparently and objectively assesses and models the *social, economic and environmental* effects of maintaining oil and gas exploration and production moratoria on and beneath federal jurisdictional lands
- The study is based on existing energy and environmental policies/regulations and is not intended to cover future policies as may pertain to renewables and carbon
- Various metrics are used to assess the overall impacts of maintaining the moratoria, but only a limited number are included in this presentation
- Considering the updated domestic oil and gas projections described, *particularly for shale gas*, modeling outcomes project the following general impacts:
 - Maintaining the moratoria results in an alternative domestic energy future that significantly alters the cost and availability of domestic oil products and natural gas in all economic sectors and regions
 - The change in cost and availability of domestic fuels impacts the future selection and operation of energy conversion technologies in all sectors, particularly impacting natural gas utilization
 - Regional impacts may differ significantly based on the projection of regional energy prices and energy consumption, which is dependent upon existing energy supply infrastructure and projected energy infrastructure changes
- A sampling of quantitative results has been presented that provides perspective on the potential extent of impacts to the national economy and consumers

Concluding Remarks



- SAIC and GTI are currently preparing the comprehensive draft study report for review by the project's independent Moratoria Study Group
 - The study group is a large and diverse body of experts, including a wide range of private and public sector viewpoints
- After review and comment by the study group, SAIC and GTI will prepare a final report to be released in January 2010



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