

Potential National-Level Benefits of Alaska OCS Development

Prepared for
Shell Exploration and Production
February 2011



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Abbreviations

BOEMRE	Bureau of Ocean Energy Management, Regulation, and Enforcement
EIS	Environmental impact statement
EIA	Energy Information Administration
ERS	Financial Reporting System
ISER	Institute of Social and Economic Research
mmBtu	million British thermal units
NEI	Northern Economics, Inc.
NPR–A	National Petroleum Reserve-Alaska
NSB	North Slope Borough
OCS	Outer Continental Shelf
PI+	Policy Insight+
REMI	Regional Economic Models Inc.
TAPS	Trans-Alaska Pipeline System
TCF	trillion cubic feet
UERR	Undiscovered economically recoverable resource estimates
WTI	West Texas Intermediate crude oil

Executive Summary

In 2009, Northern Economics, Inc. and the Institute of Social and Economic Research at the University of Alaska Anchorage released a study that was commissioned by Shell Exploration and Production describing the potential economic benefits to the State of Alaska and local governments from developing oil and gas resources in Alaska's Outer Continental Shelf (OCS) areas, particularly the Beaufort Sea, Chukchi Sea, and the North Aleutian Basin.¹ The study showed that OCS development in those three areas could generate an annual average of 35,000 jobs in Alaska, total estimated payroll of \$72 billion (2007\$), \$15 billion (2007\$) in potential cumulative revenues to the State of Alaska, and over \$4 billion (2007\$) in estimated property tax payments to local governments, over a 50-year period.

The benefits of potential OCS development in Alaska extend beyond the state however—OCS leases generate direct revenues to the federal government and the increase in economic activity associated with exploration, development, and production of OCS oil and gas resources would also generate jobs, income, and additional tax revenues to the rest of the nation.

This study quantifies these other economic benefits beyond Alaska, focusing on estimated government take and employment effects on the rest of the nation. This follow-up study only considers development in the Beaufort Sea and the Chukchi Sea OCS; no activity is anticipated in the North Aleutian Basin. On March 3, 2010, the Secretary of the Interior Ken Salazar announced that as part of the Obama Administration's plan for the protection of special areas like the Bristol Bay in Alaska, the planning area (North Aleutian Basin) would be withdrawn from consideration for oil and gas development through 2017 (U.S. Department of the Interior, 2010).

The following key findings are based on a reasonable set of exploration, development, and production scenarios developed in the 2009 study for the Beaufort and Chukchi OCS areas.

Key Findings

- Commercialization of oil and gas resources in the Beaufort OCS and the Chukchi OCS, could generate \$97 billion and \$96 billion (in 2010\$), respectively, in revenues to federal, state, and local governments, over a 50-year period.
- Economic activity resulting from OCS development in the Beaufort Sea and Chukchi Sea could generate an annual average of 54,700 jobs nationwide, with an estimated cumulative payroll amounting to \$145 billion (in 2010\$) over the next 50 years. It is estimated that about 30,100 jobs would be generated from the Beaufort OCS development and 24,600 jobs from development of the Chukchi Sea OCS.

Table ES-1 and Table ES-2 summarize the estimated cumulative potential government revenues by entity and by revenue category accruing from exploration, development, and production activities in the Beaufort OCS and the Chukchi OCS, respectively. The values are expressed in 2010 U.S. dollars.²

Table ES-3 summarizes the potential employment effects in Alaska and the rest of the nation of exploration, development, and production activities in the Beaufort and Chukchi OCS areas.

Table ES-4 summarizes the results of the sensitivity analysis showing the effects of varying market prices for oil and gas on potential government revenues. As shown in the table, estimated government

¹ View the complete 2009 report at: <http://www.northerneconomics.com/ShellOCS>.

² The original study presented results in 2007 dollars. All the figures in this report are in 2010 dollars.

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take from corporate income tax receipts, lease revenues, and indirect revenues from new production due to lower tariff and expanded infrastructure, increase with higher market prices for oil and gas.

Table ES-1. Summary of Estimated Cumulative Government Revenues by Entity from Beaufort OCS Development, 2008 to 2057

Category	State of Alaska	North Slope Borough	Federal Government	Other State Governments	Total
	(\$2010 Millions)				
Direct Revenues					
Property Tax	94	1,163	-	-	1,257
Corporate Income Tax	236	-	26,684	-	26,919
Lease Revenues	25	-	48,170	-	48,195
Non-Petroleum Revenues					
Personal Income Tax	-	-	5,488	1,447	6,935
Potential Future Income Tax ¹	1,518	-	-	-	1,518
Other Taxes and Fees	440	-	1,590	2,283	4,314
Indirect Revenues²					
Value (Full Oil Pipeline)	3,064	-	1,608	-	4,672
Value (Extend Life of Oil Pipeline)					
Volume (New Production from Lower Tariff)	1,008	14	470		1,492
Volume (New Production from Expanded Infrastructure)	712	9	332	-	1,053
Value (Full Gas Pipeline)	528	-	277	-	805
Total:	7,626	1,185	84,619	3,731	97,161

Source: NEI and ISER estimates, 2010.

Notes:

¹ The state does not currently have either a general sales tax or a personal income tax. However, the non-OCS projection of future state population and public sector demands compared to revenues suggests that a number of adjustments to the state's fiscal structure will be necessary in future years to maintain adequate public services. Two options available to the state, in addition to reducing expenditures, are institution of a broad-based tax, and use of a portion of the earnings of the Permanent Fund. (Additional taxes on other resource industries could generate only very modest revenues.) It is anticipated that both options will be required in the non-OCS case. The value shown above assumes a personal income tax, similar to the tax that was eliminated in 1980, will be phased in between 2022 and 2026. This personal income tax will be the largest source of population-related revenues from OCS development because the tax base will be the entire payroll generated by the OCS development. It is assumed that the alternative of a statewide sales tax would generate an equivalent amount of revenue.

² In the previous study, these sources of indirect or spinoff revenues from petroleum activity in the North Slope were identified. These indirect revenues are generated as a result of lower cost of petroleum production and transportation generated by OCS development.

Table ES-2. Summary of Estimated Cumulative Government Revenues by Entity from Chukchi OCS Development, 2008 to 2057

Category	State of Alaska	North Slope Borough	Federal Government	Other State Governments	Total
	(\$2010 Millions)				
Direct Revenues					
Property Tax	202	2,491	-	-	2,693
Corporate Income Tax	611	-	24,790	-	25,401
Lease Revenues	-	-	48,692	-	48,692
Non-Petroleum Revenues					
Personal Income Tax	-	-	4,608	1,104	5,713
Potential Future Income Tax	1,276	-	-	-	1,276
Other Taxes and Fees	361	-	1,304	1,743	3,408
Indirect Revenues					
Value (Full Oil Pipeline)	2,989	-	1,569	-	4,558
Value (Extended Life of Oil Pipeline)	132	264	335	-	731
Volume (New Production from Lower Tariff)	1,062	14	495	-	1,571
Volume (New Production from Expanded Infrastructure)	387	9	480	-	877
Value (Full Gas Pipeline)	705	-	370	-	1,076
Total:	7,726	2,778	82,645	2,847	95,995

Source: NEI and ISER estimates, 2010.

Note: See Table ES-1 notes.

Table ES-3. Estimated Employment Effects of OCS Development in the Beaufort and Chukchi OCS Areas, in Alaska and the Rest of the United States

Category	Beaufort OCS			Chukchi OCS			Both Areas
	Alaska	Rest of U.S.	Total	Alaska	Rest of U.S.	Total	
Annualized Average							
Entire Timeframe	13,700	16,400	30,100	12,500	12,100	24,600	54,700
Production Phase	16,900	20,300	37,200	16,200	15,200	31,400	68,600
Peak Employment	18,400	32,800	51,200	19,500	20,800	40,300	

Source: NEI and ISER estimates, 2010.

Table ES-4. Estimated Cumulative Government Take under Various Price Levels by Category and by Entity, Combined Beaufort and Chukchi OCS Development (in 2010\$ millions)

Category	Base Case \$65/barrel \$6.4/mmBtu	Case 1 \$80/barrel \$7.8/mmBtu	Case 2 \$100/barrel \$9.8/mmBtu	Case 3 \$120/barrel \$11.8/mmBtu
Direct Revenues				
Property Tax	3,950	3,950	3,950	3,950
Corporate Income Tax	52,320	59,595	76,759	93,923
Lease Revenues	96,887	109,876	140,525	171,175
Non-Petroleum Revenues				
Personal Income Tax	12,648	12,648	12,648	12,648
Potential Income Tax	2,794	2,794	2,794	2,794
Other Taxes and Fees	7,721	7,721	7,721	7,721
Indirect Revenues				
Value (Full Oil Pipeline)	9,230	9,230	9,230	9,230
Value (Extend Life of Oil Pipeline)	731	731	731	731
Volume (New Production from Lower Tariff)	3,064	3,144	4,019	4,893
Volume (New Production from Expanded Infrastructure)	1,930	1,980	2,532	3,082
Value (Full Gasline)	1,881	1,881	1,881	1,881
Total:	193,156	213,550	262,790	312,028

Source: NEI and ISER estimates, 2010.

1 Introduction

This study is a follow-up to the report released by Northern Economics, Inc. (NEI) and the Institute of Social and Economic Research (ISER) for Shell Exploration & Production in March 2009. The 2009 study entitled *Economic Analysis of Future Oil and Gas Development: Beaufort Sea, Chukchi Sea, and North Aleutian Basin* quantified the potential economic benefits of Outer Continental Shelf (OCS) development to the State of Alaska and local communities. The results of the study showed that OCS development in those three areas could generate an annual average of 35,000 jobs in Alaska, total estimated payroll of \$72 billion (2007\$), \$15.3 billion (2007\$) in potential cumulative revenues to the State of Alaska, and \$4.5 billion (2007\$) in estimated property tax payments to local governments, over a 50-year period.

The objective of this subsequent research is to quantify potential national-level benefits of economic activity associated with exploration, development, and production of oil and gas resources in the Beaufort and Chukchi OCS areas in Alaska; excluding the North Aleutian Basin. On March 3, 2010, the Secretary of the Interior Ken Salazar announced that as part of the Obama Administration's plan for the protection of special areas like the Bristol Bay in Alaska, the North Aleutian Basin planning area would be withdrawn from consideration for oil and gas development through 2017 (U.S. Department of the Interior, 2010).

The economic benefits described in this study are based on reasonable assumptions that were developed in the 2009 study about future OCS development. In order to quantify the potential effects of oil and gas development in the OCS, a set of scenarios that reflect possible industry-wide exploration, development, and production activities for each OCS area was developed.³ This set of scenarios represents only one possible picture of the future. The scenarios used were based in part on the scenarios discussed by the Bureau of Ocean Energy Management, Regulation, and Enforcement (BOEMRE) in published Environmental Impact Statements (EIS) and other materials.⁴ The scenarios include assessments of oil and gas resources,⁵ expected levels of exploration activities, development of oil and gas fields and required infrastructure, and operations and maintenance activities at the assumed production levels.

As in the previous study, it is assumed that development would occur given certain price and cost assumptions and that there will be no major regulatory impediments or delays to OCS development.

The assumptions used in the 2009 study are summarized below to provide context to the economic analysis in this follow-up study. Table 1 provides details on the Beaufort and Chukchi Sea OCS development scenarios.

³ BOEMRE, formerly the Minerals Management Service (MMS), the federal agency that manages OCS areas, develops exploration, development, and production scenarios for use in their environmental assessments and environmental impact studies. The scenarios developed by BOEMRE for these OCS areas were used as a starting point for this analysis. Major departures from the BOEMRE assumptions/scenarios include: 1) gas production in the Beaufort and Chukchi; 2) new on-shore facilities in the Beaufort; 3) updated resource estimates using the 2006 *BOEMRE Resource Assessment*; and 4) adjustments in timing and level of exploration and development activities to reflect changes in technology and resource potential, and to incorporate insights from industry and BOEMRE staff regarding recent experience operating in arctic conditions and in areas of greater water depths.

⁴ The recent Draft Environmental Impact Statement for the *Beaufort and Chukchi Sea Planning Areas, Oil and Gas Lease Sales 209, 212, 217, and 221* was issued after the analysis for this report was completed. The scenarios used in this report are based on earlier scenarios and other material that are broader in scope and duration than the November 2008 draft EIS.

⁵ The resource assessments are based on analyses of geology, development costs, and timing, as well as oil and gas prices.

Beaufort Scenario

- Exploration drilling occurs over 15 years with one to three drilling rigs per season.
- Development includes construction of seven offshore production platforms, offshore pipelines, on-shore pipelines that connect to the Trans-Alaska Pipeline System (TAPS) and a future gas pipeline, as well as new on-shore facilities.
- Production assumes first oil in 2019 and first gas in 2029, with seven fields producing a total cumulative volume of about five billion barrels of oil through 2045 and seven trillion cubic feet of gas through 2057.

Chukchi Scenario

- Exploration drilling occurs over 24 years with one to two drilling rigs per season.
- Development includes construction of four offshore production platforms, offshore pipelines, on-shore pipelines across the National Petroleum Reserve – Alaska (NPR–A) to connect to the TAPS and a future gas pipeline from the North Slope. A new shore base⁶ on the Chukchi coast is assumed to be constructed to support offshore exploration and development; other on-shore facilities are also assumed to be required to support production activities.
- Production assumes first oil in 2022 and first gas in 2036, with four fields producing a total cumulative volume of 4.8 billion barrels of oil and 7.8 trillion cubic feet of gas through 2057.

Price Assumptions

The long term assumptions about petroleum price were based upon projections from the 2008 Annual Energy Outlook of the Energy Information Administration (EIA) of the US Department of Energy. The Annual Energy Outlook projected the price of crude oil to fall in a range between \$56 and \$83 per barrel (2006\$) and the price of gas to fall in a range between \$5.8 and \$7.4 per mmBtu (2006\$) through 2030. Beyond that time, a growth rate of 0.5 percent per annum (in real \$) was assumed.

A sensitivity analysis considering higher price assumptions was also conducted and is presented in Section 7 of this report.

⁶ A shore base is an on-shore facility that will be used for staging people and equipment during exploration, and later on to support construction and production activities. The base will likely serve as living quarters for industry workers as well as the transportation, storage, and communication hubs for all of the offshore activities.

Table 1. Summary of Development Scenarios in the Beaufort and Chukchi OCS Areas

	Beaufort OCS	Chukchi OCS
Resource Size (Mean)		
Oil and condensates (billion barrels)	5.97	8.38
Gas (trillion cubic feet)	15.94	34.43
Exploration		
Exploration/Delineation Wells	47	43
Exploration Rig Seasons	31	27
Development		
No. of offshore production platforms	7	4
Offshore/Onshore pipelines (miles)	235	680
Shore bases / facilities		
Marine terminal	yes	yes
Liquefied natural gas (LNG) facility	no	no
Production facility	yes	yes
Support base	yes	yes
Production		
Year 1 st oil flows	2019	2022
Year 1 st gas flows	2029	2036
No. of producing fields	7	4
Total cumulative volume produced (through 2057)		
Oil & gas (billion barrels of oil equivalent)	6.34	6.16
Oil & condensates (billion barrels)	5.10	4.79
Gas (trillion cubic feet)	6.96	7.78
Daily peak production		
Oil & condensates (barrels per day)	1,165,707	565,472
Gas (million cubic feet per day)	883	1,421

Source: NEI and ISER, 2009.

Note: The resource size estimates are from the 2006 BOEMRE Resource Assessment. The numbers shown in the table are the mean undiscovered economically recoverable resource estimates (UERR) assuming resource commodity prices of \$60 per barrel of oil and \$9.07 per thousand cubic feet of natural gas.

Given the level of exploration, development, and production activities in the Beaufort and Chukchi OCS areas, this study shows that the federal government and other states outside of Alaska are expected to receive significant financial benefits from OCS lease payments, taxes, and other fees associated with the increase in economic activity resulting from exploration, development, and production of OCS oil and gas resources. Moreover, oil and gas sector jobs, manufacturing jobs, jobs in the trade and services sector, and other support sector jobs would also be generated in the rest of the nation to support the OCS activities in Alaska.

The rest of this report describes the analysis and results of the national-level economic benefits of OCS development in the two Alaska OCS areas. The discussion is organized according to the tasks outlined in the scope of work requested by Shell Exploration & Production, as follows: 1) Direct and indirect Alaska and local government revenues, 2) Federal lease revenues, 3) Federal corporate income tax revenues, 4) Federal personal income tax, 5) Additional indirect revenues to federal and other state governments, 6) Sensitivity Analysis, and 7) Total jobs generated in Alaska and the rest of the nation.

2 Direct, Non-Petroleum, and Indirect Alaska and Local Government Revenues

The values shown in Table 2 and Table 3 are estimated cumulative state and local government revenues over the 50-year period resulting from the development and commercialization of petroleum resources in the Beaufort and Chukchi OCS.⁷ Table 4 presents the combined results for the Beaufort and the Chukchi OCS. These results are primarily summarized from the 2009 study with adjustments in units from 2007 dollars to 2010 dollars, and additional estimated indirect revenues to local governments.

Direct Revenues

Three categories of direct revenues that would potentially accrue to the State of Alaska and the North Slope Borough are estimated: 1) property taxes, 2) state corporate income taxes, and 3) shared lease revenues.

The State of Alaska collects a property tax on petroleum-related property located onshore and a corporate income tax on a portion of income generated by OCS activities. The state property tax estimate is based on the share of total infrastructure associated with OCS production that is located on shore. Most of the tax is passed through to local jurisdictions within which the infrastructure is located, so the state retains just a small share of the total amount collected.

The state corporate income tax liability is based on the percentage of worldwide corporate profits attributable to activities in Alaska—determined by a three-part allocation formula including the shares of worldwide production, sales, and property based in Alaska. OCS activity would increase worldwide profits for any company. Alaska corporate income tax revenue would increase for a company with no Alaska onshore activity (or no activity elsewhere in the world) since the onshore portion of OCS related property would be attributed to Alaska in the allocation formula and increase the percentage of worldwide corporate profits attributable to activities in Alaska. For a company with existing onshore activity in Alaska, the allocation formula would fall with the addition of mostly offshore OCS production, so the percentage of worldwide profits attributable to activities in Alaska would fall. The Alaska tax liability of such a company would fall or rise depending on whether the percent drop in the Alaska formula was greater or less than the percent increase in worldwide profits. A modest increase in corporate income tax revenues from activities in the Alaska OCS is assumed.

The state also receives a share of bonuses and lease revenues on federal tracts between three and six miles offshore (known as 8(g) common pool lands).

Non-Petroleum Revenues

Non-petroleum revenues are generated from non-petroleum business activity supportive of OCS development as well as household income resulting from OCS development.

Besides the direct corporate income taxes that would be collected by the State of Alaska, various excise taxes on motor fuels, alcohol, and tobacco would also be generated due to increase in economic activity in the state.

Although the state does not currently have a personal income tax or a statewide general sales tax, it is anticipated that based on fiscal projections, the state will be forced to impose one or both in the

⁷ Estimated Chukchi revenues are slightly higher than reported in the original study because of inclusion of state property tax revenues from extended life of the oil pipeline.

future as revenue from petroleum production on state lands continues to decline. A state personal income tax is assumed to be phased in during the decade after 2020. Income tax revenues attributed to OCS development in this report are from the additional new payroll associated with OCS development only, including petroleum-related workers and workers in supporting businesses.

Indirect Revenues

Indirect revenues result from the increased value and volume of petroleum production from state and non-OCS federal lands in Alaska because OCS production reduces development and production costs. Five enhancements to production on state and non-OCS federal lands from OCS development were considered and the indirect revenues associated with each enhancement were estimated.

- 1. Value (Full Oil Pipeline)**—OCS oil production would add to the existing flow of oil through the existing oil pipeline, so the tariff (inversely related to throughput) would be reduced and the wellhead value of non-OCS oil would increase. The higher wellhead value of non-OCS oil would increase state revenue from the production and corporate income taxes as well as from royalties. Federal and state corporate income tax revenues would increase as well.
- 2. Value (Extend Life of Oil Pipeline)**—OCS oil production would extend the life of the oil pipeline that otherwise would cease to operate when daily throughput fell below a threshold level of about 200,000 barrels per day. The value of the pipeline would be enhanced with extension of the operating life of the oil pipeline. (This occurs only in the Chukchi development case.) The state would collect additional property tax revenue from the extended life of the pipeline and most of this additional revenue would pass through to local governments. The state would also collect some additional corporate income tax revenue because the onshore pipeline would increase the share of worldwide income subject to the state tax compared to an offshore transportation system for the remaining North Slope oil. Federal and state corporate income tax revenues would increase because of the additional pipeline profits produced by its longer life.
- 3. Volume (New Production from Lower Tariff)**—A lower tariff would result in higher wellhead value for North Slope oil and enhance the profitability of marginal oil production from state and non-OCS federal lands. This would result in a modest increase in production from existing fields (estimated at 141 million barrels). The production increase would generate state revenue from the production, corporate income, and property taxes as well as royalties. (It is assumed that this production is on state land.) Most of the property tax revenues would pass to local government. Federal corporate income tax revenue would also increase.
- 4. Volume (New Production from Expanded Infrastructure)**—The increase in and extension of infrastructure on the North Slope from OCS development would enhance the profitability of marginal oil fields and result in a modest expansion of production from these fields (87 million barrels). The production increase would generate state revenue from the production, corporate income, and property taxes as well as royalties. We assume the enhanced production associated with Chukchi OCS development takes place on federal land (NPR–A) where the royalties are shared equally between the federal government and the state. The enhanced production associated with Beaufort development takes place on state land. Most of the property tax revenues would pass to local government. Federal corporate income tax revenue would also increase, and the federal government would also collect the royalties from NPR–A development, retaining 50 percent and passing the other 50 percent to the state.
- 5. Value (Full Gasline)**—OCS production would increase the flow of gas through a gas pipeline, so the tariff would be reduced and the wellhead value of non-OCS gas would increase. (It is assumed that the value of non-OCS production increases but that there is no increase in the volume of non-OCS production.) The higher wellhead value of non-OCS gas would increase state

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revenue from the production and corporate income taxes as well as from royalties. Federal corporate income tax revenue on that production would increase as well.

Table 2. Estimated Cumulative State of Alaska and North Slope Borough Revenues from Beaufort OCS Development, 2008 to 2057

Category	State of Alaska	North Slope Borough	Total
	(\$2010 Millions)		
Direct Revenues	355	1,163	1,518
Property Tax	94	1,163	1,257
State Corporate Income Tax	236	-	236
Shared Lease Revenues	25	-	25
Non-Petroleum Revenues	1,958	-	1,958
Indirect Revenues	5,312	23	5,335
Value (Full Oil Pipeline)	3,064	-	3,064
Value (Extended Life of Oil Pipeline)	-	-	-
Volume (New Production from Lower Tariff)	1,008	14	1,022
Volume (New Production from Expanded Infrastructure)	712	9	721
Value (Full Gas Pipeline)	528	-	528
Total:	7,626	1,185	8,811

Source: NEI and ISER, 2009 study; and 2010 estimates.

Table 3. Estimated Cumulative State of Alaska and North Slope Borough Revenues from Chukchi OCS Development, 2008 to 2057

Category	State of Alaska	North Slope Borough	Total
	(\$2010 Millions)		
Direct Revenues	813	2,491	3,304
Property Tax	202	2,491	2,693
State Corporate Income Tax	611	-	611
Shared Lease Revenues	-	-	-
Non-Petroleum Revenues	1,637	-	1,637
Indirect Revenues	5,276	287	5,563
Value (Full Oil Pipeline)	2,989	-	2,989
Value (Extended Life of Oil Pipeline)	132	264	396
Volume (New Production from Lower Tariff)	1,062	14	1,077
Volume (New Production from Expanded Infrastructure)	387	9	396
Value (Full Gas Pipeline)	705	-	705
Total:	7,726	2,778	10,504

Source: NEI and ISER, 2009 study; and 2010 estimates.

Table 4. Estimated Cumulative State of Alaska and North Slope Borough Revenues from Beaufort and Chukchi OCS Development, 2008 to 2057

Category	State of Alaska	North Slope Borough	Total
	(\$2010 Millions)		
Direct Revenues	1,169	3,654	4,822
Property Tax	296	3,654	3,950
State Corporate Income Tax	847	-	847
Shared Lease Revenues	25	-	25
Non-Petroleum Revenues	3,595	-	3,595
Indirect Revenues	10,588	309	10,897
Value (Full Oil Pipeline)	6,052	-	6,052
Value (Extended Life of Oil Pipeline)	132	264	396
Volume (New Production from Lower Tariff)	2,071	28	2,099
Volume (New Production from Expanded Infrastructure)	1,100	17	1,117
Value (Full Gas Pipeline)	1,233	-	1,233
Total:	15,352	3,963	19,315

Source: NEI and ISER, 2009 study; and 2010 estimates.

3 Federal Lease Revenues

OCS leases generate bonus bids, rental payments, and royalty payments to the federal government. A description of each of the various lease revenue types is presented below, followed by an estimate for total federal lease revenues.

Lease Revenue Types

Bonus bids are cash payments paid to the federal government in exchange for the right to explore and develop the petroleum reserves in OCS areas. Companies/explorers participate in a sealed bid auction to lease tracts of land during scheduled area-wide lease sales.

Bonus bids are generated at the time the area-wide lease sales occur. The model estimates bonus bids based on historical patterns. Typically, succeeding lease sales generate fewer bids because the best prospects have been previously leased. In the Chukchi, therefore, it is expected that the next lease sale will generate significantly fewer bonus bids than the 2008 lease sale. Revenues from bonus bids were assumed in the model to follow BOEMRE's planned lease sales in the Beaufort (2009 and 2011), and the Chukchi (2010 and 2012). The results of the recent Chukchi lease sales that generated \$2.66 billion in bonus bids have been incorporated into the model.

A **rental payment** is established in the lease agreement and made to the lessor (BOEMRE) every year. However, there is no rental payment once production begins. BOEMRE does not place a lease back on annual rental status once production has begun, even though production has stopped and the lease is still in its primary term. In such cases, the lessee pays minimum royalty, which for BOEMRE is calculated at the same rate as the rental. Rental rates vary per year and are usually specified in the Final Notice of Sale. The model assumes a flat rental rate of \$7.50 per acre for the Beaufort and Chukchi leases.

A **royalty** is a share of the minerals produced from a lease. It is a percentage of production paid either in money or in kind that a federal lessee is required to pay. On the Alaska OCS, typically a 12.5 percent royalty rate is applied for OCS leases that are in production. A minimum royalty payment is typically established as part of the lease agreement. The lessee pays BOEMRE a minimum royalty at the expiration of each lease year with a credit applied for actual royalty paid during the lease year.

Under certain circumstances, a royalty relief or suspension is granted by the Secretary of the Interior to promote increased oil and gas production. The royalty suspension is prorated by lease acreage and is subject to price thresholds. This analysis assumes, given the projected oil and gas prices, that no royalty suspension would apply to any of the Alaska OCS leases.

For the purpose of this analysis, royalties were estimated based on projected oil prices fluctuating around \$65 per barrel in constant dollars and natural gas (Henry Hub) prices fluctuating around \$6.40 per mmBtu for the period between 2008 and 2030, and then increasing at one-half of one percent per year through 2057. The price assumptions through 2030 are based on publicly available long-term price projections for oil and natural gas generated by the EIA (Annual Energy Outlook 2008). The Annual Energy Outlook presents a projection and analysis of U.S. energy supply, demand, and prices through 2030. The projections are based on results from the EIA's National Energy Modeling System. The implications of higher prices on the potential revenue effects are discussed in Section 7. To calculate the royalties, netback prices for oil and gas were used. The netback price reflects the price of the resource at the point of production (market price less transportation costs).

The estimated federal lease payments were generated using the revenue models developed in the March 2009 study for Shell Exploration and Production released in March 2009.

Estimated Federal Government Take from Beaufort OCS Lease Payments (in 2010\$)

Total cumulative federal government take from lease revenues in the Beaufort OCS is estimated to amount to \$48.2 billion over the 50-year period. This amount includes bonus bids, rental payments, and royalty payments. Royalty payments account for the majority of the lease payments, amounting to \$47.6 billion, assuming a 12.5 percent royalty rate on the Beaufort leases.

Estimated Federal Government Take from Chukchi OCS Lease Payments (in 2010\$)

Total cumulative federal government take from lease revenues in the Chukchi OCS is estimated to amount to \$48.7 billion over the 50-year period. Of this total amount, \$44.3 billion is estimated to accrue from royalty payments on the Chukchi leases.

4 U.S. Federal Corporate Income Tax Revenues

Table 5 shows the estimated cumulative and annual average federal corporate income tax payments directly generated from the Beaufort and Chukchi OCS development.

Table 5. Estimated Potential Federal Government Take from Corporate Income Tax Payments

Category	Beaufort OCS	Chukchi OCS	Both OCS Areas
	(\$2010 Millions)		
Cumulative Total : 2008 to 2057	26,684	24,790	51,474
Annual Average	684	689	1,373

Source: NEI estimates, 2010.

These estimates are based on the following data sources and approach:

- The EIA data on offshore petroleum acquisition, exploration, development, and production costs for 2008 (Source data: Financial Reporting System⁸ S5211: Refining, Exploration & Production Operations, Expenditures & Operating Expense Detail).
- EIA data on offshore production volumes for oil and gas in 2008 (Source data: Financial Reporting System T-21: Exploration and Development Expenditures, Reserves, and Production by Region).
- 2008 average West Texas Intermediate (WTI) crude oil price and 2008 average Henry Hub natural gas price as reported by the Energy Information Administration.

Net income as a percentage of total revenues was determined using the above data. The costs of exploration, development, and production in the Beaufort and Chukchi OCS areas are anticipated to be double the current costs of operating in the Gulf of Mexico OCS, which is the basis for most of the 2008 EIA data. This higher cost assumption is based on BOEMRE's 2006 analysis of economically recoverable resources in the different OCS areas. Given higher costs in Alaska OCS areas, oil and gas companies' net operating income is estimated to be 20 percent of total revenues.

Using the Beaufort and Chukchi production scenarios and oil and gas price assumptions from the March 2009 study, the amount of taxable income (net operating income) was derived and a 35 percent federal corporate income tax rate was applied.

⁸ The Financial Reporting System (FRS) is designed to permit review of the functional performance of the major U.S. energy-producing companies in total, as well as by specific functions and geographic areas of operation. The financial reporting schedules obtain data on revenues, costs, and profits, thereby indicating financial flows and performance characteristics. In addition, Form EIA-28 collects balance sheet data (i.e., accumulated property, plant, and equipment, etc.), along with data on new investment in these accounts. To complement the financial data, a series of statistical schedules are included to trace physical activity patterns and to evaluate several physical/financial relationships.

5 Federal Personal Income Tax Revenues

Table 6 presents the estimated federal personal income tax receipts associated with the direct, indirect, and induced jobs generated within Alaska. This estimate accounts for the high tax revenues from high wage petroleum workers as it is based on industry-specific wage rates calculated in the original study and 2008 federal average income tax rates (as a share of adjusted gross income) taken from IRS reports. The direct share represents estimated taxes of workers directly engaged in OCS activities. The estimated total payroll associated with the Alaska-based jobs is \$63 billion (in 2010\$).

Table 7, on the other hand, shows the estimated federal personal income tax payments associated with the direct, indirect, and induced jobs generated outside of Alaska (or the rest of the nation) that result from activities in the Beaufort and Chukchi OCS. This estimate is also based on the 2008 average federal income tax rates. The estimated total payroll associated with the jobs generated outside of Alaska is \$82 billion (in 2010\$).

Table 6. Estimated Cumulative Federal Personal Income Tax from Activity within Alaska (Millions of 2010\$), 2008 to 2057

OCS Area	Direct (basic) Personal Tax Share	Indirect and Induced Personal Tax Share	Total
Beaufort OCS	2,019	1,540	3,558
Chukchi OCS	1,815	1,321	3,136
Total: Both Areas	3,834	2,861	6,694

Source: ISER estimates, 2010.

Table 7. Estimated Cumulative Federal Personal Income Tax from Activity Outside Alaska (Millions of 2010\$), 2008 to 2057

OCS Area	Amount
Beaufort OCS	1,930
Chukchi OCS	1,473
Total: Both Areas	3,402

Source: ISER estimates, 2010.

Table 8 presents the combined estimated federal personal income tax payments resulting from activity within Alaska and the rest of the U.S. The estimated combined total payroll associated with OCS jobs within and outside of Alaska is \$145 billion.

Table 8. Summary of Estimated Cumulative Federal Personal Income Tax Receipts from OCS Activity within and Outside of Alaska, (Millions of 2010\$), 2008 to 2057

OCS Area	Activity Within Alaska	Activity in the Rest the U.S.	Total
Beaufort	3,558	1,930	5,488
Chukchi	3,136	1,473	4,608
Total: Both Areas	6,694	3,402	10,096

Source: ISER estimates, 2010.

6 Additional Federal and State Tax Revenues

Additional federal and state tax revenues arise from corporate income taxes associated with extending the life of the oil pipeline, federal corporate income taxes on indirect effects of OCS activity, federal royalty payments from incremental marginal oil field development in the NPR-A, taxes and revenues from non-petroleum associated business activity, and non-Alaska state sales, personal income, and corporate income taxes.

Additional Revenues from Extending Life of Oil Pipeline

The oil pipeline was assumed to cease operation in 2045 under the No OCS development case in the 2009 study, with remaining North Slope oil transported to market by more expensive tankers. That study also estimated the state production tax, income tax, and royalty revenues that a full or fuller pipeline resulting from OCS production would generate because of a lower tariff (Both higher revenues from existing production and incremental production.) However, if the pipeline were to remain operational beyond 2045, it would also continue to generate property taxes for the State of Alaska, which would be shared with the North Slope Borough and other local governments in which TAPS is located. In addition, the state would capture some revenues through the corporate income tax on the pipeline itself because, as property, the pipeline increases the share of worldwide oil company income to Alaska (compared to an offshore marine transit system). Federal corporate income tax revenues would also be higher because the total return on pipeline operations would be greater than the return on marine transportation because the higher tariff of marine transportation would result in lower oil production.

Table 9. Summary of Estimated Cumulative Property and Income Tax Receipts from Extension of Oil Pipeline Life, (Millions of 2010\$), 2008 to 2057

OCS Area	State Property Tax	Local Property Tax	State Income Tax	Federal Income Tax
Beaufort	-	-	-	-
Chukchi	29	264	103	335
Total: Both Areas	29	264	103	335

Source: ISER estimates, 2010.

Note: Beaufort Sea OCS production in the March 2009 report was assumed to cease in 2045, the same year as the oil pipeline would cease operating; hence, Beaufort OCS production would not contribute to extending the life of the oil pipeline.

Additional Federal Revenues from OCS Development

The federal government would collect revenues from three additional sources associated with OCS development. The first would be corporate income taxes on the income generated in Alaska from the indirect effects of OCS activity—the reduction of the oil pipeline and gas pipe line tariffs (Value) and the incremental production from marginal oil fields stimulated by the higher wellhead oil price and the additional infrastructure (Volume). This estimated additional federal corporate income tax is determined based on indirect state revenue calculated in the 2009 study.

Table 10. Summary of Estimated Cumulative Federal Corporate Income Tax Receipts from Indirect Revenue Activities, (Millions of 2010\$), 2008 to 2057

OCS Area	Value (Full Oil Pipeline)	Volume (Oil Pipeline Life)	Marginal Oil Fields	Expanded Infrastructure	Total
Beaufort	1,608	470	332	277	2,687
Chukchi	1,569	495	276	370	2,710
Both Areas	3,177	965	608	647	5,397

Source: ISER estimates, 2010.

Note: These include increase in taxable income from a lower oil pipeline tariff, the increase in production stimulated by the lower tariff, and the increase in production from reduced costs associated with expansion of petroleum related infrastructure.

The second revenue source would be non-petroleum revenues—other taxes and revenues collected on business activity generated by OCS development—both within and outside Alaska (in addition to the personal income tax). This additional federal revenue is estimated as a share of the personal income tax, based on the ratio of other taxes to the personal income tax revenue collected by the State of Alaska.

Table 11. Summary of Estimated Cumulative Federal Other Taxes and Fees from OCS Activity within and Outside Alaska, (Millions of 2010\$), 2008 to 2057

OCS Area	Within Alaska	Outside Alaska	Amount
Beaufort	1,031	559	1,590
Chukchi	887	417	1,304
Total: Both Areas	1,918	976	2,894

Source: ISER estimates, 2010.

The third revenue source would be royalty payments for incremental marginal oil field development in the NPR–A as a result of the Chukchi OCS development and the availability of infrastructure resulting from that development. It is estimated that about \$194 million would accrue to the federal government in royalty payments. This assumes a royalty rate of 12.5 percent (for less attractive fields; a royalty rate of 16.67 percent is usually applied to areas that are more attractive). Fifty percent of the royalty payments are retained by the federal government and the remaining payments go to the State of Alaska for addressing impacts on affected communities.

No federal royalty payments are anticipated to accrue from the development of marginal fields due to Beaufort Sea OCS infrastructure since infrastructure already exists or is being planned for areas east of Prudhoe Bay and this is a region of the North Slope that is primarily state-owned.

Non-Alaska State Tax Revenues from OCS Development

Alaska OCS development would generate jobs and expenditures in other states, creating government revenues from personal income tax, sales tax, and other taxes and fees. The magnitude of those revenues is estimated based on anticipated personal income and the national average rates of state income and sales taxes (as a ratio to personal income). The national average rates of state income, sales, and other taxes were obtained from the U.S. Department of Commerce, *State and Local Government Finances*.

Table 12. Summary of Estimated Cumulative Non Alaska State Personal Income and Sales Tax Receipts from OCS Activity, (Millions of 2010\$), 2008 to 2057

OCS Area	Amount
Beaufort	3,731
Chukchi	2,847
Total: Both Areas	6,578

Source: NEI and ISER estimates, 2010.

7 Sensitivity Analysis

A sensitivity analysis was conducted to consider effects on government take of higher market prices for oil and gas (holding all other factors constant). In this sensitivity analysis, the higher price scenarios do not result in greater volumes of oil and gas production than is presented in the base case analysis.

The base case as presented in the previous sections, assumed long-term (50-year) projected prices of oil and gas fluctuating around \$65 per barrel and \$6.40 per million Btu of natural gas, respectively. These price assumptions are based on EIA's June 2008 published petroleum price forecast.

This sensitivity analysis considers the following oil and gas price levels through the year 2030:

Case 1: Oil: \$80 per barrel and natural gas: \$7.80 per mmBtu

Case 2: Oil: \$100 per barrel and natural gas: \$9.80 per mmBtu

Case 3: Oil: \$120 per barrel and natural gas: \$11.80 per mmBtu

Market prices after 2030 and through 2057 were assumed to increase at a rate of 0.5 percent per year (same assumption as the base case).

As expected, higher market prices for oil and gas would result in higher government revenues from oil and gas development in Alaska's OCS areas.

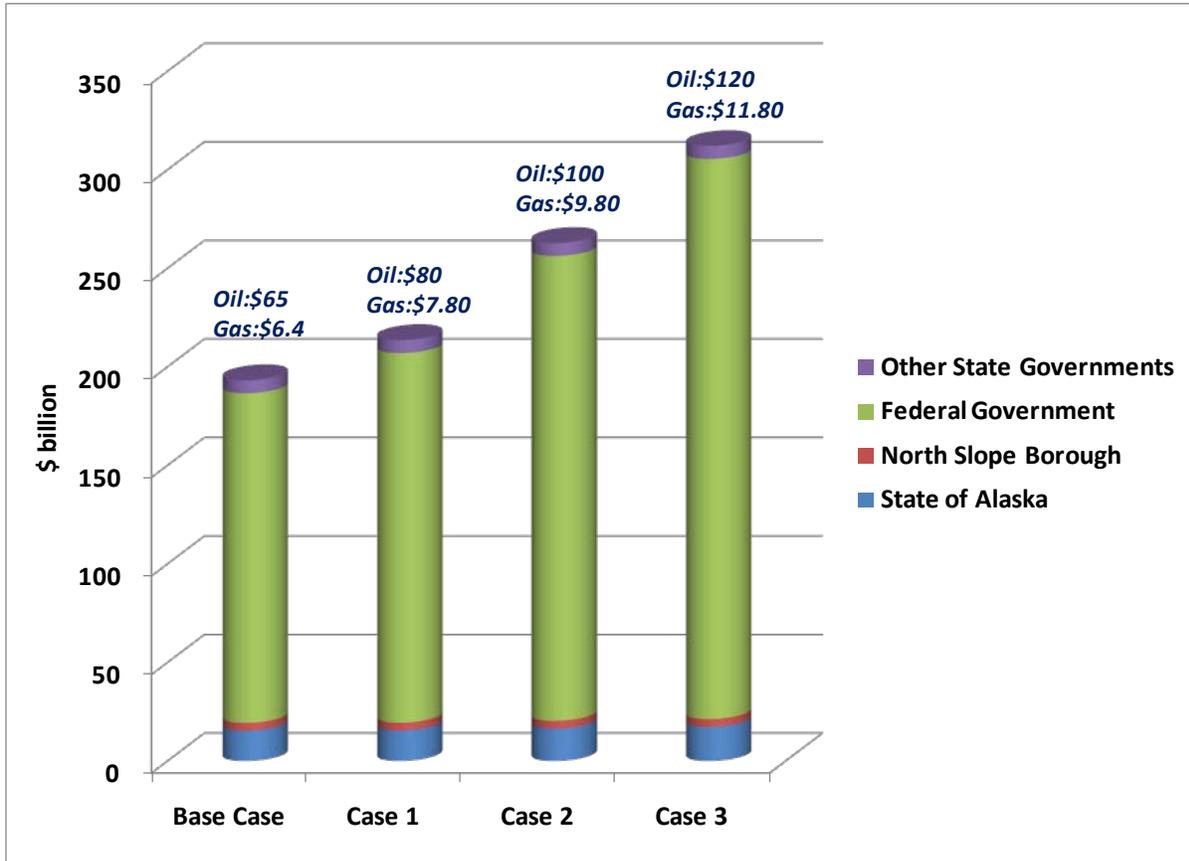
The results of the sensitivity analysis are summarized in the following figures. Figure 1 presents the estimated government take by entity under different petroleum price levels. Figure 2 illustrates the sensitivity of various estimated government revenues to changes in market prices for oil and gas. This figure only includes those revenue categories (federal and state) that are anticipated to be affected by changes in oil and gas prices.

In particular, the sensitivity analysis indicated the following:

- Total government take (federal, state, and local) increases from \$193 billion under the base case to \$214 billion under Case 1, \$263 billion under Case 2, and \$312 billion under Case 3 (See Figure 1).
- Of the various direct and indirect revenue streams, the most sensitive to higher oil and gas price levels is federal government take from lease revenues (see Figure 2). In the base case, estimated total cumulative lease revenues accruing to the federal government from the Beaufort and Chukchi OCS development is \$97 billion. Higher prices are expected to result in \$110 billion under Case 1 price level, \$140 billion under Case 2 price level, and \$171 billion under Case 3 price level.
- Federal corporate income taxes also increase with higher price levels. Base case estimated cumulative federal corporate income tax payment from the Beaufort and Chukchi OCS development is \$52 billion (See Figure 2). Under Case 1 price level, government take is estimated to increase to \$59 billion, \$76 billion under Case 2, and \$93 billion under Case 3.
- With higher prices, indirect revenues to the State of Alaska increase as a result of higher oil and gas wellhead values on the new production considered in the base case—new production from lower tariff and new production from expanded infrastructure. Higher wellhead prices result in higher royalties, production, and income tax payments from the oil and gas industry (see Table 13).
- Higher prices do not have any significant effect on indirect revenues associated with the full pipeline effects (oil and gas pipelines) since those revenue effects are quantified based on the

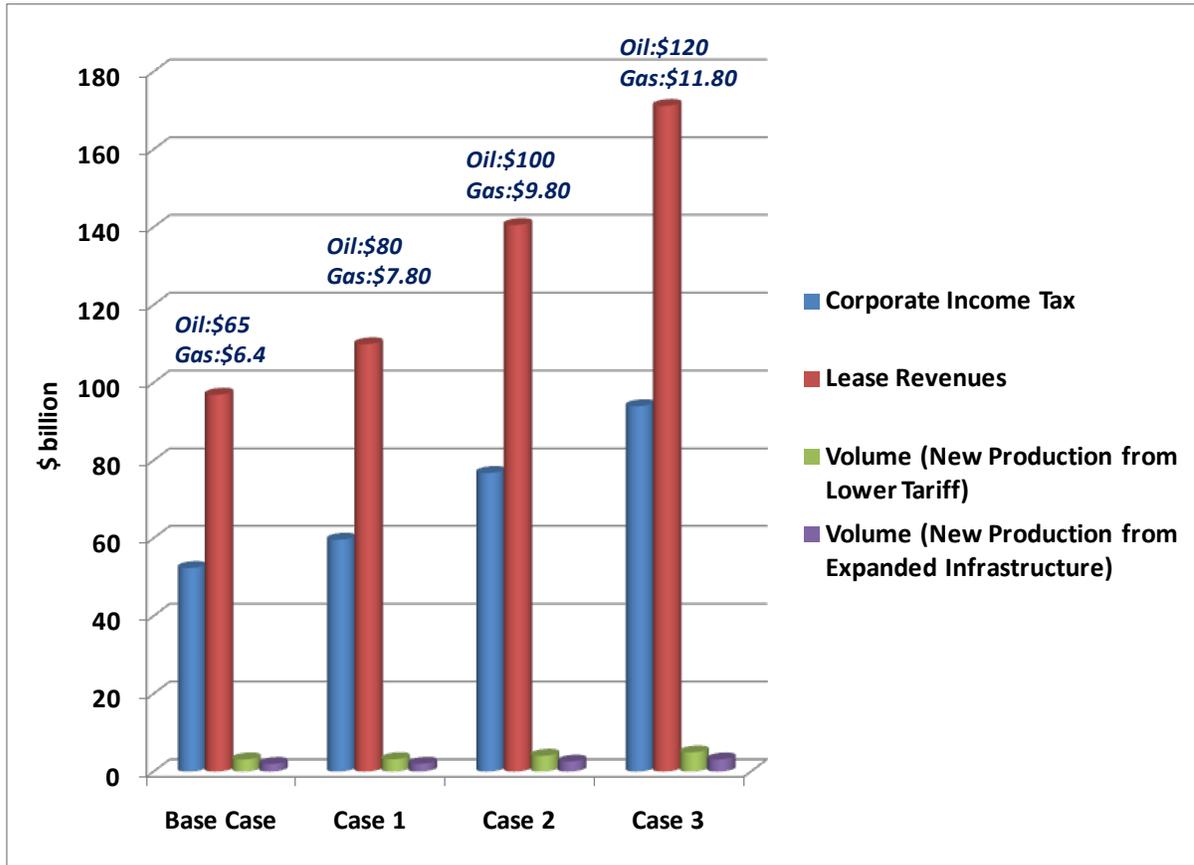
impact of additional throughput on pipeline tariffs (the difference in the pipeline tariff due to additional throughput does not change with higher petroleum market prices). Similarly, indirect effects associated with the extended life of TAPS are not affected by changes in prices since higher price scenarios do not result in greater volumes of oil and gas production.

Figure 1. Estimated Cumulative Government Take by Entity under Different Petroleum Price Levels, Combined Beaufort and Chukchi OCS Development (in 2010\$)



Source: NEI and ISER estimates, 2010.

Figure 2. Estimated Cumulative Federal and State Government Take by Revenue Stream under Different Petroleum Price Levels, Combined Beaufort and Chukchi OCS Development (in 2010\$)



Source: NEI and ISER estimates, 2010.

Potential National-Level Benefits of Alaska OCS Development

Table 13 summarizes the results of the sensitivity analysis by revenue category under the different price level assumptions. As shown in the table, estimated government take from property taxes, non-petroleum taxes, and indirect revenues from full oil pipeline effect, extended life of oil pipeline effect, and full gas pipeline effect are not significantly affected by changes in market prices and remain unchanged from base case estimates. On the other hand, estimated government take from corporate income tax receipts, lease revenues, and indirect revenues from new production due to lower tariff and expanded infrastructure increases with higher market prices for oil and gas.

Table 13. Estimated Cumulative Federal, State, and Local Government Take under Various Price Levels by Category and by Entity, Combined Beaufort and Chukchi OCS Development (in 2010\$ millions)

Category	Base Case \$65/barrel \$6.4/mmBtu	Case 1 \$80/barrel \$7.8/mmBtu	Case 2 \$100/barrel \$9.8/mmBtu	Case 3 \$120/barrel \$11.8/mmBtu
Direct Revenues				
Property Tax	3,950	3,950	3,950	3,950
Corporate Income Tax	52,320	59,595	76,759	93,923
Lease Revenues	96,887	109,876	140,525	171,175
Non-Petroleum Revenues				
Personal Income Tax	12,648	12,648	12,648	12,648
Potential Income Tax	2,794	2,794	2,794	2,794
Other Taxes and Fees	7,721	7,721	7,721	7,721
Indirect Revenues				
Value (Full Oil Pipeline)	9,230	9,230	9,230	9,230
Value (Extend Life of Oil Pipeline)	731	731	731	731
Volume (New Production from Lower Tariff)	3,064	3,144	4,019	4,893
Volume (New Production from Expanded Infrastructure)	1,930	1,980	2,532	3,082
Value (Full Gasline)	1,881	1,881	1,881	1,881
Total:	193,156	213,550	262,790	312,028

Source: NEI and ISER estimates, 2010.

8 Estimated Jobs Generated in the Rest of the Nation (Outside Alaska)

Potential employment effects of OCS development on the rest of the nation were generated using Policy Insight+ (PI+). This model, which is similar to ISER’s MAP model for Alaska, is a dynamic forecasting and policy analysis model that integrates input-output, computable general equilibrium, econometric, and economic geography methodologies. PI+ was developed by Regional Economic Models, Inc. (REMI) and is widely used by government agencies (including most U.S. state governments), private and public research firms, and utilities.

The analysis considered the effects of an increase in economic activity associated with exploration, development, and production of OCS oil and gas resources. The inputs to the PI+ model were the estimated annual direct jobs associated with 28 different OCS activities starting from geological survey all the way to abandonment. These direct job estimates are based on previous manpower requirements results generated in the March 2009 study. The results only go through 2050, a constraint of the PI+ model.

Table 14. Estimated Annual Average Employment Effects of the Beaufort and Chukchi OCS Development on the Rest of the United States

Category	Beaufort OCS	Chukchi OCS	Both OCS Areas
Annualized Average			
Entire Timeframe	16,400	12,100	28,500
Production Phase	20,300	15,200	35,500
Peak Employment	32,800	20,800	
Year of Peak Employment	2027	2038	

Source: REMI’s PI+ model results using direct job estimates from 2009 NEI and ISER study.

9 References

- Energy Information Administration. Federal Reporting System Public Data, S5211: Refining, Exploration & Production Operations, Expenditures & Operating Expense Detail. Available at <http://www.eia.doe.gov/finance/frsdata.html>. Accessed on November 9, 2010.
- Energy Information Administration. Federal Reporting System Public Data, T-21: Exploration and Development Expenditures, Reserves, and Production by Region. Available at <http://tonto.eia.doe.gov/cfapps/frs/frstables.cfm>. Accessed on November 16, 2010.
- Northern Economics, Inc. and Institute of Social and Economic Research. 2010. Economic Analysis of Future Offshore Oil and Gas Development: Beaufort Sea, Chukchi Sea, and North Aleutian Basin. A report prepared for Shell Exploration. Released March 2009 in Anchorage, Alaska.
- Regional Economic Models, Inc. 2010. PI+ model results provided by REMI in response to request by Northern Economics, Inc. on November 19, 2010.
- U.S. Department of the Interior. "Secretary Salazar Announces Comprehensive Strategy for Offshore Oil and Gas Development and Exploration." A Press release issued on March 31, 2010. Available at http://www.doi.gov/news/pressreleases/2010_03_31_release.cfm. Accessed on November 24, 2010. 2010.
- U.S. Department of the Interior. Bureau of Ocean Energy Management, Regulation, and Enforcement (formerly the Minerals Management Service [MMS]). Assessment of Undiscovered Technically Recoverable Oil and Gas Resources of the Nation's Outer Continental Shelf. MMS Fact Sheet RED-2006-01b. Released in February 2006. 2006.
- U.S. Department of Commerce. State and Local Government Finances. Available at <http://www.census.gov/govs/estimate/>. 2010.