



Economic Analysis of Future Offshore Oil and Gas Development: Beaufort Sea, Chukchi Sea, and North Aleutian Basin

Executive Summary

Prepared for
Shell Exploration and
Production
March 2009



Economic Analysis of Future Offshore Oil and Gas Development: Beaufort Sea, Chukchi Sea, and North Aleutian Basin

Executive Summary

Prepared for

Shell Exploration and Production

March 2009

Prepared by

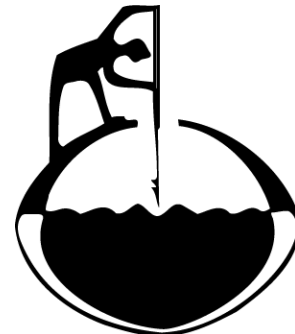


Northern Economics
880 H Street, Suite 210
Anchorage, Alaska 99501
Phone: (907) 274-5600
Fax: (907) 274-5601

114 W Magnolia Street, Suite 411
Bellingham, WA 98225
Phone: (360) 715-1808
Fax: (360) 715-3588
Email: mail@norecon.com

In association with

**Institute of Social and Economic
Research, University of Alaska
Anchorage**



PROFESSIONAL CONSULTING SERVICES IN APPLIED ECONOMIC ANALYSIS

Principals:

Patrick Burden, M.S. — President
Marcus L. Hartley, M.S. — Vice President
Jonathan King, M.S.

Consultants:

Anne Bunger, M.S. Bill Schenken, MBA
Leah Cuyno, Ph.D. Don Schug, Ph.D.
Michael Fisher, MBA Katharine Wellman, Ph.D.
Cal Kerr, MBA

Administrative Staff:

Diane Steele — Office Manager
Cynthia Morales, BBA
Terri McCoy, B.A.



Northern Economics
880 H Street, Suite 210
Anchorage, Alaska 99501
Phone: (907) 274-5600
Fax: (907) 274-5601

114 W Magnolia Street, Suite 411
Bellingham, WA 98225
Phone: (360) 715-1808
Fax: (360) 715-3588
Email: mail@norecon.com

Preparers

Team Member	Project Role	Company
Patrick Burden	Project Manager	Northern Economics, Inc.
Leah Cuyno	Economist	Northern Economics, Inc.
Kent Kovacs	Economist	Northern Economics, Inc.
Nancy Mundy	Policy Analyst	Northern Economics, Inc.
Anne Bunger	Analyst	Northern Economics, Inc.
Terri McCoy	Editor	Northern Economics, Inc.
Scott Goldsmith	Economist	Institute of Social and Economic Research, University of Alaska

Contents

Section	Page
Executive Summary.....	1
Major Findings.....	1
Background	4
Scenarios Considered	5
Potential OCS Oil and Gas Production.....	7
Potential Employment Effects.....	7
Potential State Population and State Fiscal Effects	13
Local/Regional Population and Fiscal Effects.....	15

Table	Page
Table ES-1. Potential Future Employment Effects of OCS Development in Alaska	2
Table ES-2. Potential Cumulative Direct Revenue Effects of OCS Development to State and Local Governments, 2008 to 2057 (in Billions of 2007\$).....	2
Table ES-3. Potential State Fiscal Effects of OCS Development: Cumulative Revenues and Expenditures Under Varying Price Assumptions, 2008 to 2057 (in Billions of 2007\$)	4
Table ES-4. Potential Direct Employment Estimates (Annual Average Employment) by OCS Area	9
Table ES-5. Estimated Annual Average Employment Generated from Potential OCS Development by Place of Work and by Place of Residence	11
Table ES-6. Summary of Potential Cumulative Direct Revenues to the State and Local Governments, 2008 to 2057 (in Billions of 2007\$).....	12

Figure	Page
Figure ES-1. Schedule of Activities for Beaufort, Chukchi, and North Aleutian Basins, 2008-2057	7
Figure ES-2. Potential Total Direct Annual Average Employment from OCS Development in Alaska, 2008 to 2057	8
Figure ES-3. Potential Total Employment Effects from OCS Development by Category	10

Executive Summary

This study describes and quantifies the potential economic benefits to the State of Alaska and local communities from developing oil and gas resources in Alaska's Outer Continental Shelf (OCS) areas. The findings of this study are not predictions of the future for Alaska, but rather they describe a reasonable approach that one might expect for OCS development. The findings also provide a basis for thinking about potential actions that state and local governments, industry, and other stakeholders might undertake to deal most effectively with the effects that do occur.

While there have been other studies in the past that looked at the potential effects of OCS development, this study is based on more recent information and represents the current state of knowledge in OCS resource estimates, exploration, development, and production activities; recent technology improvements; and state and local government fiscal systems. The economic benefits described here are based on assumptions about when and how OCS development, as well as other economic development in the state, might occur during the next 50 years.

The magnitude of the economic effects of OCS development are contingent on assumptions about petroleum prices, volumes of OCS resources that might be economically recoverable, the levels of investment that the petroleum industry would be willing to spend to develop in the OCS areas, and the fiscal regime or tax structure that would be in effect as OCS oil and gas development occurs. There is a great deal of uncertainty as to whether oil and gas production in the OCS would occur, and if production does occur, it is even more difficult to predict the timing and magnitude of exploration, development, and production activities. This study assumes that development would occur given certain price and cost assumptions and that there will be no major regulatory impediments or delays to OCS development. As with any other large industrial development, there could also be social and environmental considerations associated with offshore oil and gas development. This study is only focused on the economic effects of OCS development.

Major Findings

The economic impacts of OCS development are described as incremental effects in relation to a baseline economic projection of the Alaska economy without OCS development. The Alaska economy and population are anticipated to continue to grow in the next 50 years given the development of the natural gas pipeline, new development in the mining sector, and modest growth in tourism, fisheries, and military and civilian federal operations. However, declining oil production from existing onshore fields is expected to pose long-term challenges to Alaska's economic and fiscal well-being. OCS development, if it were to occur, could be a significant driver of the next generation of economic activity by extending the duration of the petroleum industry in the state.

The following major findings are based on a reasonable set of exploration, development, and production scenarios for three OCS areas: (1) Beaufort Sea; (2) Chukchi Sea; and (3) North Aleutian Basin.

Job and Population Growth

- OCS development could generate an annual average of 35,000 jobs over the next 50 years—a six percent increase compared to total statewide employment without OCS development.
- These jobs represent a total payroll of \$72 billion (2007\$) over the 50-year period.

- OCS-related employment growth could more than offset losses from the decline of petroleum production on state lands and could help sustain the economy for several decades.
- Opportunities would be created throughout the state in both high paying, long-term, year-round jobs and in seasonal and short-term jobs. Of the 6,000 oil and gas sector jobs, about 3,900 could be long-term, year-round jobs.
- The growth in jobs resulting from OCS development could lead to a five percent increase in statewide population. Most of the growth would be concentrated in Alaska's population centers, but directly impacted regions could experience a much greater percent increase.

Table ES-1. Potential Future Employment Effects of OCS Development in Alaska

Sector	Average Annual Employment
Oil and Gas (extraction and oilfield services)	6,000
Infrastructure	3,000
Support	22,000
State/Local Government	4,000
Total:	35,000

Note: Employment is rounded and expressed in annual average, 2008 to 2057. It should be noted that it could take several years before OCS employment might reach the annual average of 6,000 direct jobs in the oil and gas sector, and for the other sectors to reach the levels noted above (see Figure ES-1 for the projected direct employment per year and Figure ES-2 for the projected employment by sector per year).

Projected Direct Revenues

The potential cumulative direct petroleum revenues to state and local governments is estimated to be \$5.8 billion (2007\$) with most revenues going to directly impacted local governments from property taxes on onshore petroleum facilities.

Table ES-2. Potential Cumulative Direct Revenue Effects of OCS Development to State and Local Governments, 2008 to 2057 (in Billions of 2007\$)

Entity/Source of Revenue	Amount
State of Alaska	1.4
Property Tax	0.4
Corporate Income Tax	1.0
Shared Lease Payments	--
Directly Impacted Local Governments	4.5
Property Tax	4.5
Total Alaska:	5.8

Notes: (1) The sum of the amounts do not equal total due to rounding. (2) For this table, *Directly Impacted Local Governments* include the North Slope Borough and the Aleutians East Borough. (3) Federal lease payments shared with the state (from 8(g) leases) are estimated to be about \$20 million (2007\$).

Fiscal Effects

- Potential total state government revenues (under the current tax system) from OCS-related activities including direct OCS petroleum revenues, population-related revenues, and indirect petroleum revenues, are projected to be \$15.3 billion (2007\$) given the base case price level of approximately \$65 per barrel of crude oil. As expected, given the results of the sensitivity analysis, state government stands to benefit from higher petroleum prices.
- The estimated population-related revenues would come primarily from a state personal income tax that is assumed in the baseline projection to partially offset falling petroleum revenues from declining onshore production. This is an assumption in the baseline analysis, regardless of OCS development. In the OCS case, the \$72 billion (2007\$) of wages and salaries augments the personal income tax.
- OCS production reduces the tariffs and other costs of onshore production, which results in an increase in state revenues from this production. These lower costs also lead to a modest increase in production onshore. Together these indirect petroleum revenues are estimated to be \$10.1 billion (2007\$)
- Incremental state government expenditures for providing public services to support OCS development and the associated population increase are projected to be about \$8.8 billion (2007\$).
- The projected net revenues to the State of Alaska could be about \$6.6 billion (2007\$), reflecting a positive fiscal effect of OCS development.
- At the local/regional government level, the projected growth in revenues of directly impacted communities from property taxes on onshore OCS petroleum facilities, estimated at \$4.5 billion, would increase the capacity of local governments to respond to public needs generated by OCS developments.
- OCS development will be an important factor in reducing risks for the proposed natural gas pipeline from the North Slope to Lower 48 markets. The Alaska OCS has some of the largest natural gas resources in Alaska and knowledge of the potential development of these resources reduces the financial risk to the shippers that may commit to the natural gas pipeline project.

Table ES-3. Potential State Fiscal Effects of OCS Development: Cumulative Revenues and Expenditures Under Varying Price Assumptions, 2008 to 2057 (in Billions of 2007\$)

Revenue/Expenditure Category	Base Case	Sensitivity Analysis		
		Case 1	Case 2	Case 3
Projected State Revenues	15.3	16.0	17.1	18.2
Direct OCS Petroleum Revenues	1.4	1.4	1.4	1.4
Population Related Revenues	3.9	3.9	3.9	3.9
Indirect Petroleum Revenues due to OCS development				
TAPS-Fuller Pipeline Enhanced Value of North Slope Production	5.7	5.7	5.7	5.7
TAPS-Fuller Pipeline Additional North Slope Production	2.0	2.4	3.1	3.8
Gas Pipeline Tariff Reduction Effect	1.2	1.2	1.2	1.2
Incremental Production due to OCS Infrastructure	1.2	1.5	1.9	2.3
Projected Incremental State Expenditures	(8.8)	(8.8)	(8.8)	(8.8)
Projected State of Alaska Net Fiscal Balance:	6.6	7.2	8.3	9.4

Notes: (1) The sum of the amounts may not equal the total due to rounding. (2) Base case estimates are based on the Energy Information Administration's petroleum price projection with a long-term average price of \$65.50 per barrel of oil and \$6.40 per million Btu's of gas (in 2006\$). The sensitivity analysis considers the following oil and gas price levels through 2030; prices thereafter are assumed to increase at a rate of 0.5 percent per year (same assumption as the base case):

- Case 1: Oil: \$80 per barrel and Natural gas: \$7.8 per mmBtu
- Case 2: Oil: \$100 per barrel and Natural Gas: \$9.8 per mmBtu
- Case 3: Oil: \$120 per barrel and Natural Gas: \$11.8 per mmBtu

The sensitivity analysis cases estimate the effects of higher petroleum prices, holding all other factors constant.

Background

Increasing petroleum prices in the past five years have renewed interest in exploring for oil and gas in Alaska's OCS areas. This is evidenced by the recent OCS lease sales in Alaska—Beaufort Lease Sale 195 was the most successful sale in the Beaufort OCS (tracts and high bids) since 1988 and Chukchi Lease Sale 193 held in February 2008, collected \$2.66 billion in high bids for 488 tracts (this is the biggest lease sale onshore or offshore in Alaska's history). More lease sales are planned in the Beaufort Sea, Chukchi Sea, and the North Aleutian Basin as part of MMS's *5-Year Lease Program* for 2007-2012. Exploration drilling is already planned for leases in the Beaufort Sea, covering five prospects in the eastern Beaufort (including Sivulliq, formerly the Hammerhead discovery), and another prospect located about 20 miles north of the Colville River Delta (MMS 2007).

MMS estimates that the OCS areas of the Beaufort Sea, Chukchi Sea, and the North Aleutian Basin have undiscovered technically recoverable resources (UTRR) ranging from 2.8 to 65.8 billion barrels of oil (BBO) and 11.4 to 305 trillion cubic feet (TCF) of natural gas, depending on the likelihood of occurrence. MMS also estimates that the three OCS areas have undiscovered economically recoverable resources (UERR) ranging from 1 to 46 billion barrels of oil and 3.8 to 175.1 TCF of gas. Economically recoverable resources represent the portion of the undiscovered technically recoverable resources that can be explored, developed and commercially produced at given costs and price considerations. MMS assumed market prices of \$60 per barrel of oil and \$9.07 per thousand cubic feet of gas (in 2006\$) for the UERR estimates of the three Alaska OCS areas.

Scenarios Considered

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.¹ Of course, this set of scenarios represents only one possible picture of the future. It is likely that different activities and timing will occur in the future, as each company operating in these basins could have unique plans for identifying and recovering the hydrocarbon resources. Furthermore, there is a high level of uncertainty regarding the volumes of oil and gas that could be commercialized in the future, as the estimated resource potential shown in the table above is not yet proven commercial reserves. It is impossible to anticipate what the actual development pattern would be, but the scenarios provide a reasonable basis to begin thinking about potential effects, particularly since they provide employment estimates consistent with historical patterns of petroleum development in the state.

The scenarios used for this study are based in part on the scenarios discussed by MMS in published Environmental Impact Statements (EIS) and other materials.² The scenarios include assessments of oil and gas resources,³ expected levels of exploration activities, development of oil and gas fields and required infrastructure, and operations and maintenance activities at the assumed production levels.

These scenarios are the basis for determining the level of manpower requirements, as well as the amount of revenues that could potentially accrue to the state and local governments. Summaries of the scenarios are presented below.

Beaufort Scenario

- Exploration drilling occurs over 15 years with 1 to 3 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 and seven trillion cubic feet of gas through 2057.

¹ The Minerals Management Service, 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 MMS for these OCS areas were used as a starting point for this analysis. Major departures from the MMS 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 MMS 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 MMS staff regarding recent experience operating in arctic conditions and in areas of greater water depths.

² 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.

³ The resource assessments are based on analyses of geology, development costs, and timing, as well as oil and gas prices.

Chukchi Scenario

- Exploration drilling occurs over 24 years with 1 to 2 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 base⁴ 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.

North Aleutian Scenario

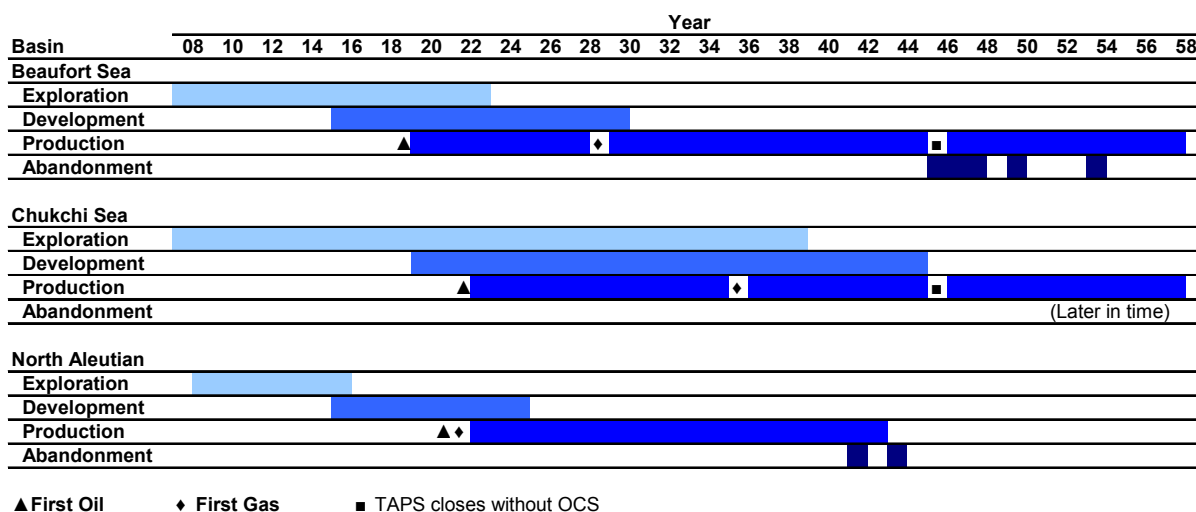
- Exploration drilling occurs over 5 years with 1 to 2 drilling rigs per season.
- Development includes construction of two offshore production platforms, offshore and overland pipelines, a new shore base on the north side of the Alaska Peninsula, and on the south side a marine terminal for oil, as well as a liquefied natural gas (LNG) facility and an export terminal for gas.
- Production assumes first oil in 2021 and first gas in 2022, with two fields producing a total cumulative volume of about 0.394 billion barrels of oil and 5 trillion cubic feet of gas through 2044 when production ceases.

Activity Schedule

Figure ES-1 shows a potential schedule for exploration, development, production and abandonment activities from 2008 through 2057. The figure shows the expected years for first oil and gas production under the scenarios for each basin. The first gas production in the Beaufort Sea is assumed to occur with the first expansion of the proposed natural gas pipeline in 2029, nine years after initial throughput of the gas pipeline. First gas production from the Chukchi Sea is assumed to occur in 2036 with the second expansion of the natural gas pipeline. Both of these expansions are anticipated to reduce the gas pipeline tariff.

The Beaufort scenario assumes that production would still be ongoing in 2057 when the study period ceases. The relatively late discovery and production from expected large resources in the Chukchi Sea result in no platforms being abandoned during the study period. The smaller field sizes expected in the North Aleutian Basin result in the fields ceasing production and the platforms being abandoned by 2044.

⁴ 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.

Figure ES-1. Schedule of Activities for Beaufort, Chukchi, and North Aleutian Basins, 2008-2057

Source: Northern Economics, Inc. assumptions

Potential OCS Oil and Gas Production

Based on the MMS resource assessments and the production scenarios described above for all three OCS areas, the total OCS oil and gas that might be produced through 2057 could amount to about 10.2 billion barrels of oil and 19.8 trillion cubic feet of gas. This translates to a peak daily production from all three OCS areas equal to 1.8 million barrels of oil and 2.9 billion cubic feet (BCF) of gas. In comparison, in 2007 the total statewide daily production of oil and gas was 796,289 barrels and 8.831 BCF, respectively, although most of the gas was re-injected to maintain reservoir pressure (Division of Oil and Gas, 2007 Annual Report).

In terms of the value of this assumed level of production, 10.2 billion barrels of oil alone at \$100 a barrel, would translate to over \$1 trillion; at \$60 per barrel, the value would be over \$600 billion.

Without OCS development, the projected statewide production volumes of oil and gas (on-shore) through 2057 are 7.7 billion barrels and 54 TCF, respectively.

Potential Employment Effects

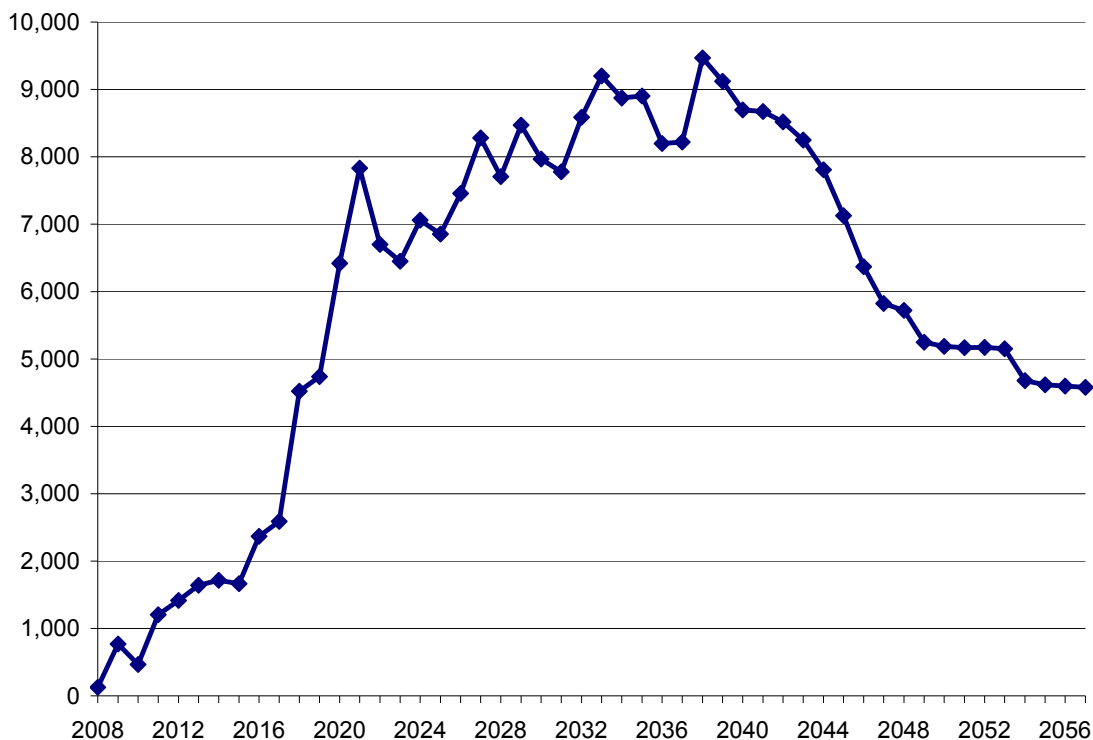
Direct Employment

Given the scenarios described above, OCS development in the Beaufort, Chukchi, and the North Aleutian could directly generate an estimated annual average employment of about 6,000 jobs over the course of 50 years (2008 to 2057). These are direct jobs⁵ (both on-site and in headquarters assumed to be located in Anchorage) that are involved in exploration activities, construction of off-shore and on-shore production and transportation facilities, spill prevention, logistics, and operations and maintenance activities. The estimated 6,000 direct jobs for OCS activity represent roughly 48 percent of 2007 average annual oil and gas employment of 12,600 (ADOLWD, 2008).

⁵ These direct employment estimates do not include jobs involved in building modules outside of Alaska, but do include non-resident jobs involved in installing pre-fabricated modules at the site.

Figure ES-2 shows the potential direct annual average employment in the oil and gas industry that could result from OCS development in all three areas across time. The growth in employment in the next decade associated with OCS development could offset the decline in petroleum employment associated with the decline in oil production from state lands and maintain employment levels after the construction of the gas pipeline. Subsequently, for about 2 decades, employment could be relatively stable as fields are developed and produced over that period. Eventually, direct employment will decline as production declines and fields are abandoned. As noted earlier, this is just one possible pattern; OCS development could occur in different locations and different times and the development of multiple fields could tend to smooth out any boom and bust phenomenon.

Figure ES-2. Potential Total Direct Annual Average Employment from OCS Development in Alaska, 2008 to 2057



Source: Northern Economics Inc. estimates.

Peak employment across all OCS areas based on these development scenarios could occur in 2038 with an estimated annual average employment of 9,500; the peaking occurs when major discoveries are being developed and facility construction is underway. Table ES-4 shows the potential direct employment effects that could result from oil and gas development in each of the OCS areas. The peak employment for each OCS area occurs at different times, and the production phases are of different durations so the rows cannot be summed across to arrive at the estimates shown for all areas.

Table ES-4. Potential Direct Employment Estimates (Annual Average Employment) by OCS Area

	Beaufort	Chukchi	North Aleutian	All Areas
Annualized Average				
Entire time frame	2,800	2,500	900	6,000
Production phase	3,300	3,000	1,100	7,100
Peak Employment	4,800	4,200	2,200	9,500
Year of Peak Employment	2027	2038	2018	2038

Source: Northern Economics Inc. estimates.

The job estimates are expressed in annual average employment, but there would be opportunities for both year-round and seasonal or short-term jobs. As noted earlier, of the 6,000 direct oil and gas industry jobs, about 3,900 could be high paying year-round jobs. The current average annual wage in the oil and gas sector is \$108,538—which is more than double the statewide annual average of \$43,524.

Seasonal and short-term job opportunities include those associated with oil spill response operations, equipment operations, construction of support facilities, marine mammal observer program, camp support, seismic survey, etc. The number of persons that might be employed for short-term or seasonal jobs could be greater than the number of year-round jobs.

Indirect and Induced Employment

Besides the direct jobs in the oil and gas sector, jobs would be created in other sectors of the economy; these jobs are referred to as indirect and induced jobs. These jobs are generated as a result of the multiplier effects of in-state spending—industry purchases from other Alaska businesses, government spending of OCS-related revenues, and household spending of wages and salaries. The potential employment effects of OCS development by sector are shown in Figure ES-3.

The large number of indirect and induced employment⁶ associated with OCS development is attributable to the following:

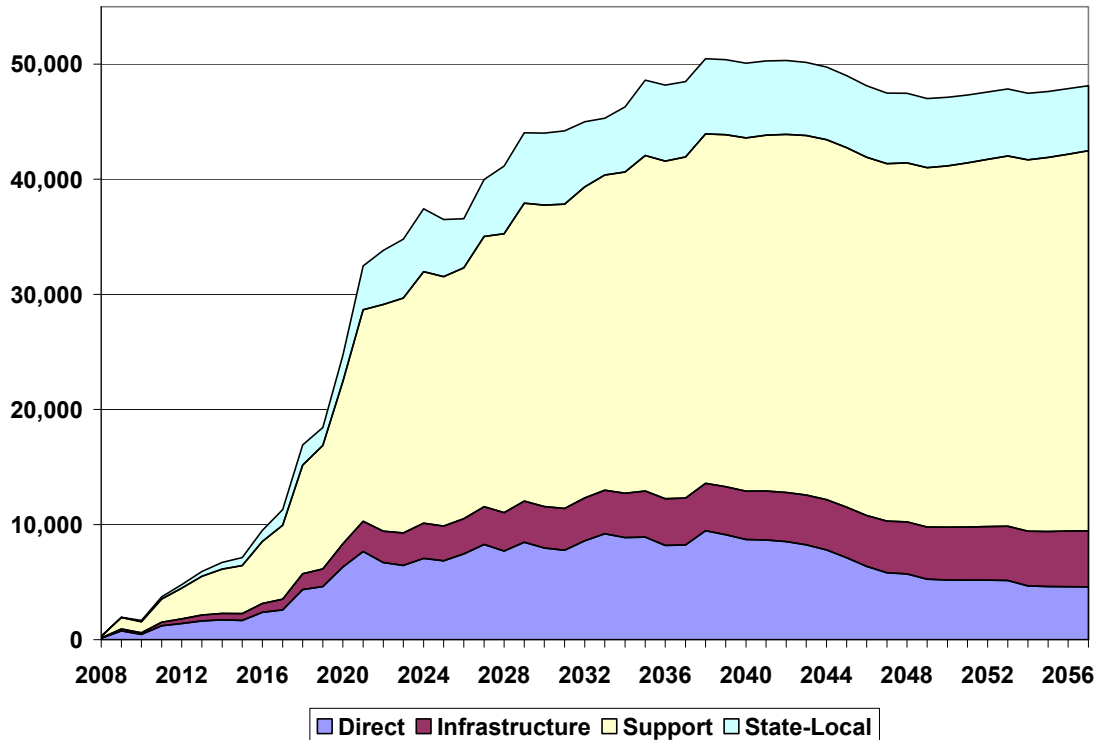
- Potential large in-state purchases of goods and services by the businesses directly engaged in exploration, development, and production
- High wages of the oil and gas industry
- Significant revenues paid by the industry to state and local governments

Although direct oil and gas employment would taper off as OCS production declines, total employment could remain high due to the effects on the rest of the economy from the economic expansion associated with OCS development. These effects include increased public and private wealth, the expansion of in-state businesses offering goods and services to other Alaska businesses and households, expansion of local markets creating more competition and lower costs, and enhanced economic stability from reduced seasonality.

⁶ The ratio of total to direct OCS employment, commonly referred to as the employment multiplier, is approximately 5.9 over the entire period, a level consistent with historical oil and gas activities in the state. If the ratio is calculated as total divided by direct plus government employment, since Alaska government employment is driven by oil revenues, the multiplier is 3.4.

It is estimated that total annual average employment from OCS development—including all the direct, indirect, and induced employment—could be about 35,000 per year on average through 2057, with a peak employment of over 50,000 in 2038. Total wages and salaries associated with OCS development over the 50-year period are estimated to be about \$72 billion (2007\$).

Figure ES-3. Potential Total Employment Effects from OCS Development by Category



Source: Northern Economics, Inc. and ISER estimates.

As shown earlier in Table ES-1, 35,000 direct, indirect, and induced jobs could be created in different sectors of the economy. The majority of the total employment, about 22,000, would be in the support sector, which includes trade, services, and other related businesses. These businesses provide goods and services to other Alaska businesses as well as Alaska households. Projected infrastructure employment consists of about 3,000 workers in the transportation, communications, public utilities, and business services sectors that work closely with the petroleum industry. State/local government employment includes all the public sector jobs; OCS development is estimated to generate 4,000 public sector jobs.

Employment by Place of Work and by Place of Residence

Based on history, workers will come from throughout the state and elsewhere to take the on-site jobs. Given the current distribution of North Slope oil and gas industry workers around the state, it is anticipated that residents of Anchorage, Kenai, and the Matanuska-Susitna (Mat-Su) Borough could capture a large share of the potential employment. The opportunity exists for rural residents of the state, particularly residents of the North Slope Borough and other areas in proximity to the three OCS

areas, to capture a larger share of these jobs than shown in Table ES-5, which is based on past employment data. Table ES-5 shows the incremental increase in annual average employment by place of work and by place of residence resulting from the development scenarios in all three OCS areas.

Table ES-5. Estimated Annual Average Employment Generated from Potential OCS Development by Place of Work and by Place of Residence

Place	Direct		Total Employment Direct + Indirect + Induced	
	Place of Work	Place of Residence	Place of Work	Place of Residence
Anchorage	800	2,500	15,000	16,000
Mat-Su Borough	--	500	3,000	3,000
Kenai Peninsula Borough	--	500	2,000	3,000
Fairbanks North Star Borough	<100	250	3,000	3,000
Aleutians East and West	600	100	1,000	1,000
North Slope Borough	4,500	<100	6,000	2,000
Balance of State	--	<100	5,000	5,000
Outside Alaska	--	2,000	--	2,000
Total	6,000	6,000	35,000	35,000

Source: Northern Economics and ISER estimates. Distribution of workers by place of residence is based on Alaska Department of Labor and Workforce Development data.

Direct Petroleum Revenues

Federal, state, and local governments could directly benefit from offshore oil and gas development with three potential streams of revenues—property tax revenues, corporate income tax revenues, and revenues from OCS leases. The estimated incremental revenues from OCS development accruing to the state and local governments are shown in Table ES-6.

Table ES-6. Summary of Potential Cumulative Direct Revenues to the State and Local Governments, 2008 to 2057 (in Billions of 2007\$)

Entity	Amount
State of Alaska	1.4
Property Tax	0.4
Corporate Income Tax	1.0
Shared Lease Payments	--
Impacted Local Governments	4.5
North Slope Borough	
Property Tax	3.5
Aleutians East Borough	
Property Tax ⁷	1.0
Total Alaska:	5.8

Source: Northern Economics Inc. and ISER MAP model estimates.

Notes:

(1) The sum of the amounts may not equal the total due to rounding.

(2) The potential revenue effects shown above reflect the base case analysis that is based on the Energy Information Administration's price projection; a relatively conservative long-term average price of about \$65.50 per barrel of oil and \$6.40 per million Btu's of gas (in 2006 dollars).

Property taxes would primarily be generated from the new onshore facilities that could be built to support the offshore operations of the industry. The state collects a property tax on oil and gas related facilities within its boundaries, which it shares with local political jurisdictions where those facilities are located, if the local government chooses to impose a property tax.

The state also imposes a corporate income tax on petroleum activity within the state.⁸ The federal government collects revenues from bonus bids, rental payments, and royalty payments from the offshore activity. A portion of these federal revenues is shared with the state, which in turn may distribute a portion to some local governments.

Given the current OCS revenue sharing system in Alaska, all lease revenues from OCS areas directly accrue to the federal government except for a portion of revenues from leases in the 8(g) zone⁹ and funds allocated through the Coastal Impact Assistance Program (CIAP) that are shared with the state and coastal political subdivisions. Under the current system, Alaska would receive a 27 percent share of OCS lease revenues from the 8(g) zone and a share of the CIAP Funds that are allocated among different producing states based on a formula. The CIAP funds however are temporary and may not

⁷ For this analysis, the potential revenue benefits accrue to the North Slope Borough (NSB) and the Aleutians East Borough (AEB), assuming that all support base, production, and transportation facilities would be built within the geographic jurisdiction of these two Boroughs. It is of course possible that industry would choose to locate some facilities in other areas such as the Northwest Arctic Borough or the Lake and Peninsula Borough, or the City of Unalaska. Also, it is assumed that the Aleutians East Borough would ultimately levy a property tax similar to the North Slope Borough. Again, the findings presented here are contingent on the assumptions about likely development and production activities as described in the scenarios for each OCS area.

⁸ A share of world income is attributed to Alaska based upon the share of property, sales, and extraction within the state.

⁹ This three-mile wide band extends from the 3-nautical mile state-federal demarcation line seaward to 6-nautical miles offshore.

be available after federal fiscal year 2010. It should be noted that lease sales in 2007 and 2008 are expected to generate a significant increase in CIAP funds to Alaska, especially given the successful Chukchi lease sale held in 2008.¹⁰ In the OCS development scenarios developed for this study, the Beaufort Sea would be the only OCS area with 8(g) producing leases.

Without a change in the current revenue sharing arrangement, the state and local governments are expected to receive direct revenues from OCS development of about \$5.8 billion (2007\$)—mostly from leases located between three nautical miles to six nautical miles offshore (referred to as the 8(g) zone), a share of the Coastal Impact Assistance Program (CIAP) funds, which is due to sunset in 2010, and taxes on corporate income and on-shore properties.

Potential State Population and State Fiscal Effects

The new jobs generated by OCS development could lead to an increase in statewide population that averages 49,000 over the projection period—about five percent higher than projected population without OCS activity. The population increase would consist mostly of families, including infants, children, and seniors, although the majority of new Alaskans would be working age adults.

The population increase would place new demands on state government, which funds the majority of public services in Alaska either directly or through transfers to local governments. The most important state-provided public services sensitive to population are education, health and social services, corrections, the University of Alaska, transportation, and public safety.

The cost of OCS development to state government would consist of the cost of providing services to the new population as noted above (estimated at \$8.6 billion) as well as the cost of administering OCS programs (estimated at \$0.2 billion). In total, the incremental cost to the state of Alaska from OCS development is estimated to be \$8.8 billion (2007\$).

Total direct and indirect revenues generated by the OCS development scenarios presented here could amount to \$15.3 billion (2007\$), which could pay for the new public services as well as produce a revenue surplus that could be used by the state for any purpose. Total revenues would include the direct OCS petroleum revenues, plus general tax revenues of \$3.9 billion and spinoff or indirect revenues from other petroleum activity of \$10.1 billion.

The general tax revenues would come primarily from income taxes paid by the new workers. In the baseline projection (without OCS development), there is a fiscal assumption of a state personal income tax based on the fact that revenues from existing sources are projected to decline in future years, thus requiring new sources of revenues to fund the state budget. To be consistent with that no-OCS assumption, it is assumed that the state government utilizes the potential of the \$72 billion (2007\$) of wages and salaries generated by OCS activity to help to pay for the new public services.

Indirect or spinoff revenues from other petroleum activity are difficult to quantify, but the history of development at Prudhoe Bay demonstrates their importance. Four sources of indirect revenues are identified that arise from the lower cost of petroleum production and transportation generated by OCS development (Table ES-3 summarizes the estimated indirect revenues from each source):

- It is estimated that \$5.7 billion (2007\$) in additional revenues to the state could be collected on non-OCS oil production due to the increase in TAPS throughput with OCS oil from the Beaufort and Chukchi Seas. If OCS oil is transported through TAPS, the higher volume of throughput

¹⁰ Due to an increase in OCS revenues generated by the recent Chukchi Lease Sale 193, MMS has estimated that the state of Alaska's annual CIAP allocation will increase from approximately \$2.5 million in 2007 and 2008 to be between \$29 million and \$41.2 million for 2009 and 2010.

would reduce the TAPS tariff and would extend the life of TAPS. The associated reduction in tariff would in turn raise the wellhead price of North Slope oil. An increase in the wellhead price would increase the tax base and revenues from the state production tax and corporate income tax and also increase state royalties. And, in the absence of OCS oil throughput, TAPS is anticipated to shut down when it reaches the minimum technically viable level of daily throughput—estimated at 200,000 barrels per day—which could be reached in 2046. Because this shut down would leave oil worth billions stranded on the North Slope, some alternative to move the oil to market could be deployed. It is assumed that a marine transport system would be used to move the remaining oil to market at an estimated cost of \$15 per barrel (\$2007).

- A higher wellhead value resulting from higher TAPS pipeline throughput because of OCS oil is also anticipated to have a stimulating effect on exploration and development of North Slope reserves. The average increase in wellhead value due to higher TAPS throughput is estimated to be six percent. The effect would be similar to an increase in industry activity due to higher oil prices or a reduction in taxes. Based on studies of the sensitivity of North Slope production to the price of oil, as well as observations that higher prices stimulate the development of satellite fields (smaller accumulations of oil that are adjacent to larger fields), it is estimated that this stimulating effect could result in an increase in oil production equal to 141 million barrels over the projection period. This could translate to an increase in state revenues of about \$2 billion.
- The addition of OCS natural gas to throughput of the pipeline moving North Slope gas to market is estimated to increase state revenues by \$1.2 billion. Although the pipeline capacity would need to be expanded to accommodate this additional throughput, expansion could be done at a cost that would reduce the tariff on all the gas moving through the line. Like the reduced oil pipeline tariff, this would raise the wellhead value of the gas and increase state revenues from the production and income taxes as well as royalties.
- Finally, the presence of additional petroleum infrastructure and its geographic distribution suggests that there could be opportunities for the development of fields that are in close geographic proximity to OCS infrastructure or that could share OCS facilities that would not be developed without those advantages. An expanded support industry due to OCS developments could also be the source of cost savings that could make some marginal fields economically attractive. The potential production and revenues from these latter effects could be very large indeed, but they are virtually impossible to quantify. However, to demonstrate the potential magnitude of these effects on state revenues, it was assumed that cumulative North Slope production is increased by two percent—87 million barrels—as a result of these effects. This could generate \$1.2 billion (2007\$) in additional state revenues from production and corporate income taxes and royalty payments to the state.

In addition to the benefits noted above, the potential for OCS development will be an important factor in reducing risks for the proposed natural gas pipeline from the North Slope to Lower 48 markets. At this time, there are not sufficient gas reserves to operate the gas pipeline for the 20 to 25 years that will be necessary to finance the pipeline; the natural gas shippers who must commit to moving gas in the pipeline for that period of time will need confidence that other natural gas resources can be found, and studies by the Minerals Management Service and others indicate that the OCS has some of the largest natural gas resources in Alaska. Knowledge of this potential resource reduces the financial risk to the shippers that commit to the natural gas pipeline project.

Local/Regional Population and Fiscal Effects

Local economic impacts will be most significant in the regions adjacent to the basins where OCS activity occurs. As noted earlier, onsite employment in the North Slope Borough could average 45 percent higher with OCS development, while employment in the Aleutians region could be 11 percent higher. Although the percent increases in resident employment and population could be less than the increase in onsite employment, the increases in population as well as other local requirements to deal with the costs associated with development could require considerable new local revenues.

The OCS revenues that flow to the directly impacted regions would come primarily from a share of the state property tax based on the value of petroleum facilities onshore in their region. Under the fiscal regime, where no federal lease revenues are shared with the state and local governments, directly impacted local governments would rely on the property tax to pay for government services. The estimated cumulative OCS-related property tax revenues to the North Slope Borough could be \$3.5 billion. This could be in addition to an estimated \$7 billion over that same period without OCS development. The OCS revenues could serve to offset the decline in revenues associated with falling onshore oil production. The estimated cumulative OCS-related property tax revenues available to the Aleutians region could be \$1 billion. Currently, the tax base of that region is quite modest and so the OCS development would represent a large increase in potential revenue generating capacity.

Given these estimates, directly impacted local governments could have sufficient revenues from property taxes to cover any costs associated with OCS development. However, their ability to adequately fund public services ultimately depends on the specific public costs associated with OCS. Greater sharing of federal lease revenues with the state and local governments, higher prices, and higher production all make it more likely that local costs can be fully offset by OCS revenues.

Much of the population impact from OCS development would be outside the directly impacted regions, and local governments throughout the state would be faced with additional costs associated with that additional population. Most of the population impact would be in urban Alaska where the existing tax base, primarily a combination of local sales and property taxes, is responsive to population growth. Based on the assumptions outlined in this study, the expanded state fiscal capacity (under the OCS development scenarios presented here) should be sufficient to cover these costs.

Finally, as with any other large industrial development, there could be social and environmental effects associated with offshore oil and gas development, and industry as well as state and local governments should continue efforts in developing and implementing programs or regulations designed to mitigate the potential effects of oil and gas development on the environment and social institutions.