

# U.S. Supply Forecast and Potential Jobs and Economic Impacts (2012-2030)

Released – September 7, 2011

Wood Mackenzie  
energy consulting



## Study Background

API has requested Wood Mackenzie undertake a study which examines the energy supply, job and government revenue implications at the state and federal levels of enacting policies in the U.S. that encourage the development of North American hydrocarbon resources. Given the high level of unemployment and budgetary stress facing the nation, the findings of this study should be of interest to policy makers as they move forward to craft solutions to these problems.

This study examines the impacts of opening access to key U.S. regions which are currently closed to development, as well as assessing a return to historical levels of development on existing U.S. producing areas (including onshore U.S., the Gulf of Mexico and Alaska). The economic impacts of the Keystone XL pipeline and other potential Canada to U.S. oil pipelines are also considered.

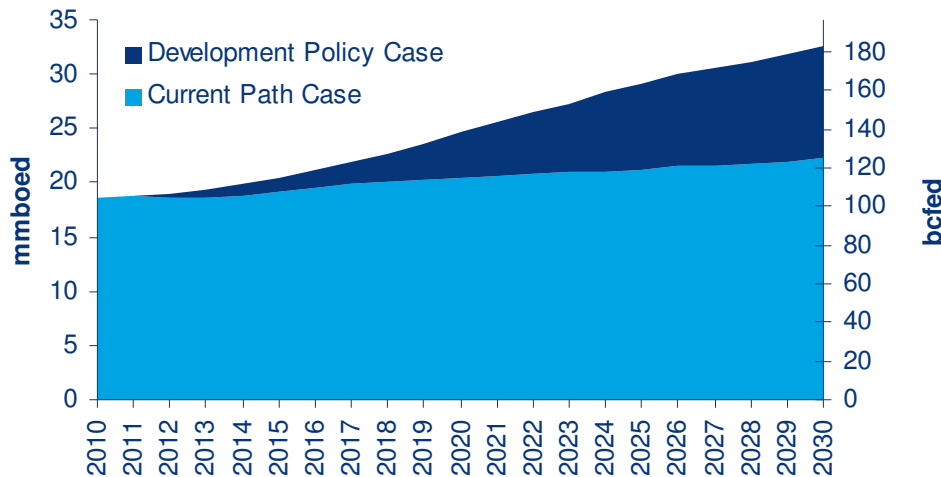
Additionally this report looks at the potential threats to production, jobs and government revenues associated with a continuation on the current path of an increased regulatory burden and slower permitting relative to historical levels.

## Key National Results

Wood Mackenzie’s analysis found that U.S. policies which encourage the development of new and existing resources could, by 2030, increase domestic oil and natural gas production by over 10 million boed, support an additional 1.4 million jobs, and raise over \$800 billion of cumulative additional government revenue. Whereas increasing regulatory burdens on the oil and gas upstream sector will result in higher development costs, which can potentially hinder the growth of production, tax revenues, and job creation.

Continuing the current path of policies which slow down the issuance of leases and drilling permits, increase the cost of hydraulic fracturing through duplicative water or air quality regulations, or delay the construction of oil sands export pipelines such as Keystone XL, will have a detrimental effect on production, jobs, and government revenues.

Total U.S. Oil and Natural Gas Production (Projected)



Development Policy Case Incremental Impacts:  
(Change from the Current Path Case)

| U.S. IMPACTS                 | 2015    | 2020      | 2025      | 2030      |
|------------------------------|---------|-----------|-----------|-----------|
| Production (000's boed)      | 1,267   | 4,189     | 7,937     | 10,371    |
| Jobs                         | 668,462 | 1,138,567 | 1,262,035 | 1,403,877 |
| Annual Revenues (\$Millions) | 10,165  | 27,796    | 67,613    | 99,769    |

**Total Potential Jobs Impact:**  
Approximately 1.0 million jobs by 2018 and over 1.4 million by 2030

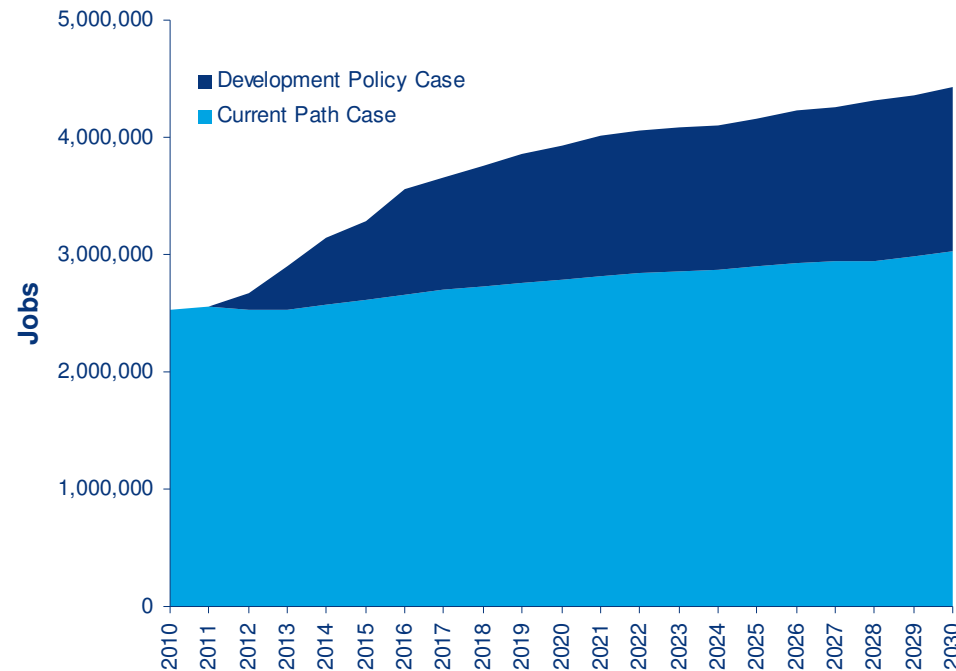
**Total cumulative potential government revenue:**  
Additional \$36 billion by 2015 and nearly \$803 billion by 2030

**Total Potential Production impact:**  
By 2015, an additional 1.27 million boed could be produced, rising to 10.4 million boed by 2030. Over the period 2012 to 2030, it is estimated an additional cumulative 35.4 billion boe of reserves could be produced through development policies

# U.S. Employment Impacts of Oil and Natural Gas Development (Projected)

- Wood Mackenzie estimates 1.4 million new jobs could be added through policies which encourage the development of U.S. and Canadian resources by 2030
- Jobs added could exceed 1.0 million by 2018
- Policies that increase access to currently undeveloped regions have the largest potential to create jobs in the U.S.. An estimated 690,000 new jobs by 2030

## U.S. Employment Impacts of Oil and Natural Gas Development (Projected)



Total U.S. employment supported by the upstream oil and natural gas sector

## Key State Results (Projected)

|   | Annual Production (mboed) |       |       |       | Total Jobs Supported |           |           |           | Annual Gov't Revenue (\$M) |        |        |        |
|---|---------------------------|-------|-------|-------|----------------------|-----------|-----------|-----------|----------------------------|--------|--------|--------|
|   | 2010                      | 2015  | 2020  | 2030  | 2010                 | 2015      | 2020      | 2030      | 2010                       | 2015   | 2020   | 2030   |
| <b>TEXAS - Current Path Case</b>          | 5,110                     | 5,365 | 5,521 | 5,880 | 939,167              | 1,008,652 | 1,059,378 | 1,122,682 | 9,728                      | 11,884 | 16,018 | 22,030 |
| Development Policy Case                   | 5,110                     | 5,713 | 6,438 | 7,655 | 939,167              | 1,118,785 | 1,211,604 | 1,297,352 | 9,728                      | 13,980 | 20,698 | 38,213 |
| Difference                                | -                         | 348   | 917   | 1,775 | -                    | 110,133   | 152,225   | 174,670   | -                          | 2,096  | 4,679  | 16,183 |
| <b>ALASKA - Current Path Case</b>         | 711                       | 641   | 601   | 844   | 35,568               | 32,809    | 31,375    | 43,857    | 8,602                      | 8,593  | 9,002  | 10,381 |
| Development Policy Case                   | 711                       | 655   | 1,174 | 2,467 | 35,568               | 85,783    | 135,164   | 167,074   | 8,602                      | 8,641  | 13,096 | 32,237 |
| Difference                                | -                         | 14    | 573   | 1,623 | -                    | 52,974    | 103,789   | 123,217   | -                          | 1,703  | 5,968  | 21,856 |
| <b>FLORIDA - Current Path Case</b>        | -                         | -     | -     | -     | 27,719               | 27,719    | 27,719    | 27,719    | -                          | -      | -      | -      |
| Development Policy Case                   | -                         | -     | 621   | 1,620 | 27,719               | 112,328   | 159,465   | 197,795   | -                          | -      | 4,798  | 16,629 |
| Difference                                | -                         | -     | 621   | 1,620 | -                    | 84,609    | 131,746   | 170,076   | -                          | 1,134  | 6,407  | 17,465 |
| <b>CALIFORNIA - Current Path Case</b>     | 887                       | 647   | 516   | 410   | 104,217              | 97,167    | 93,231    | 90,206    | 5,631                      | 5,361  | 3,908  | 3,801  |
| Development Policy Case                   | 887                       | 650   | 620   | 1,459 | 104,217              | 123,501   | 179,429   | 241,022   | 5,631                      | 5,837  | 4,759  | 16,261 |
| Difference                                | -                         | 3     | 105   | 1,050 | -                    | 26,333    | 86,197    | 150,816   | -                          | 476    | 851    | 12,460 |
| <b>LOUISIANA - Current Path Case</b>      | 882                       | 951   | 1,097 | 1,040 | 281,625              | 310,905   | 365,819   | 345,022   | 1,066                      | 1,771  | 2,764  | 3,128  |
| Development Policy Case                   | 882                       | 1,133 | 1,605 | 1,985 | 281,625              | 376,540   | 453,482   | 433,836   | 1,066                      | 2,991  | 5,480  | 12,805 |
| Difference                                | -                         | 182   | 508   | 946   | -                    | 65,635    | 87,663    | 88,814    | -                          | 1,221  | 2,716  | 9,678  |
| <b>NEW YORK - Current Path Case</b>       | 31                        | 9     | 7     | 2     | 14,811               | 14,811    | 14,811    | 14,811    | 12                         | 14     | 16     | 6      |
| Development Policy Case                   | 31                        | 328   | 529   | 791   | 14,811               | 47,052    | 62,628    | 64,883    | 12                         | 203    | 1,177  | 2,899  |
| Difference                                | -                         | 319   | 522   | 789   | -                    | 32,241    | 47,817    | 50,072    | -                          | 189    | 1,161  | 2,893  |
| <b>NORTH CAROLINA - Current Path Case</b> | -                         | -     | -     | -     | 4,834                | 4,834     | 4,834     | 4,834     | -                          | -      | -      | -      |
| Development Policy Case                   | -                         | -     | 45    | 382   | 4,834                | 12,479    | 45,407    | 45,231    | -                          | -      | 101    | 3,554  |
| Difference                                | -                         | -     | 45    | 382   | -                    | 7,646     | 40,573    | 40,398    | -                          | -      | 101    | 3,554  |
| <b>UTAH - Current Path Case</b>           | 341                       | 320   | 419   | 465   | 27,043               | 25,960    | 34,687    | 38,280    | 927                        | 1,170  | 1,888  | 2,679  |
| Development Policy Case                   | 341                       | 379   | 586   | 707   | 27,043               | 52,514    | 83,991    | 80,528    | 927                        | 1,431  | 2,698  | 4,088  |
| Difference                                | -                         | 59    | 167   | 242   | -                    | 26,554    | 49,304    | 42,248    | -                          | 261    | 810    | 1,409  |
| <b>COLORADO - Current Path Case</b>       | 1,111                     | 1,065 | 1,192 | 1,359 | 118,879              | 116,539   | 133,132   | 151,055   | 3,020                      | 3,891  | 5,369  | 7,834  |
| Development Policy Case                   | 1,111                     | 1,133 | 1,333 | 1,567 | 118,879              | 177,669   | 221,416   | 236,087   | 3,020                      | 4,420  | 6,359  | 9,119  |
| Difference                                | -                         | 68    | 141   | 208   | -                    | 61,131    | 88,283    | 85,032    | -                          | 528    | 990    | 1,285  |
| <b>MAINE - Current Path Case</b>          | -                         | -     | -     | -     | 638                  | 638       | 638       | 638       | -                          | -      | -      | -      |
| Development Policy Case                   | -                         | -     | 24    | 201   | 638                  | 4,211     | 21,018    | 20,074    | -                          | 74     | 137    | 1,864  |
| Difference                                | -                         | -     | 24    | 201   | -                    | 3,573     | 20,380    | 19,436    | -                          | 74     | 137    | 1,864  |
| <b>WYOMING - Current Path Case</b>        | 1,455                     | 1,452 | 1,627 | 1,731 | 68,944               | 70,383    | 80,493    | 85,228    | 3,954                      | 5,306  | 7,329  | 9,980  |
| Development Policy Case                   | 1,455                     | 1,521 | 1,753 | 1,912 | 68,944               | 131,672   | 147,603   | 152,090   | 3,954                      | 6,362  | 8,905  | 11,263 |
| Difference                                | -                         | 69    | 125   | 180   | -                    | 61,289    | 67,110    | 66,862    | -                          | 1,056  | 1,576  | 1,283  |
| <b>MASSACHUSETTS - Current Path Case</b>  | -                         | -     | -     | -     | 2,111                | 2,111     | 2,111     | 2,111     | -                          | -      | -      | -      |
| Development Policy Case                   | -                         | -     | 20    | 169   | 2,111                | 5,917     | 20,936    | 21,825    | -                          | 63     | 116    | 1,570  |
| Difference                                | -                         | -     | 20    | 169   | -                    | 3,806     | 18,826    | 19,715    | -                          | 63     | 116    | 1,570  |

## Key State Results (continued)

|   | Annual Production (mboed) |        |        |        |  | Total Jobs Supported |           |           |           |  | Annual Gov't Revenue (\$M) |        |        |         |
|---|---------------------------|--------|--------|--------|--|----------------------|-----------|-----------|-----------|--|----------------------------|--------|--------|---------|
|   | 2010                      | 2015   | 2020   | 2030   |  | 2010                 | 2015      | 2020      | 2030      |  | 2010                       | 2015   | 2020   | 2030    |
| VIRGINIA - Current Path Case                  | 112                       | 58     | 53     | 91     |  | 15,456               | 15,456    | 15,456    | 15,456    |  | 42                         | 80     | 118    | 252     |
| Development Policy Case                       | 112                       | 58     | 71     | 237    |  | 15,456               | 19,062    | 31,857    | 33,641    |  | 42                         | 133    | 218    | 1,584   |
| Difference                                    | -                         | 1      | 18     | 146    |  | -                    | 3,606     | 16,401    | 18,185    |  | -                          | 53     | 100    | 1,332   |
| NEW JERSEY - Current Path Case                | -                         | -      | -      | -      |  | 5,359                | 5,359     | 5,359     | 5,359     |  | -                          | -      | -      | -       |
| Development Policy Case                       | -                         | -      | 14     | 114    |  | 5,359                | 8,407     | 19,212    | 21,322    |  | -                          | 42     | 78     | 1,063   |
| Difference                                    | -                         | -      | 14     | 114    |  | -                    | 3,049     | 13,853    | 15,964    |  | -                          | 42     | 78     | 1,063   |
| PENNSYLVANIA - Current Path Case              | 441                       | 1,771  | 2,271  | 2,848  |  | 121,783              | 184,719   | 236,870   | 296,217   |  | 167                        | 2,438  | 5,051  | 7,862   |
| Development Policy Case                       | 441                       | 1,824  | 2,351  | 2,961  |  | 121,783              | 200,630   | 257,499   | 322,042   |  | 167                        | 2,510  | 5,229  | 8,172   |
| Difference                                    | -                         | 52     | 80     | 112    |  | -                    | 15,912    | 20,629    | 25,824    |  | -                          | 72     | 178    | 310     |
| OKLAHOMA - Current Path Case                  | 1,211                     | 1,122  | 1,065  | 1,264  |  | 239,883              | 227,378   | 220,403   | 260,264   |  | 1,692                      | 2,204  | 2,720  | 4,051   |
| Development Policy Case                       | 1,211                     | 1,157  | 1,125  | 1,373  |  | 239,883              | 234,959   | 231,975   | 277,100   |  | 1,692                      | 2,273  | 2,872  | 4,398   |
| Difference                                    | -                         | 35     | 59     | 108    |  | -                    | 7,581     | 11,572    | 16,836    |  | -                          | 69     | 152    | 347     |
| MONTANA - Current Path Case                   | 112                       | 95     | 88     | 93     |  | 10,832               | 9,335     | 8,877     | 9,316     |  | 305                        | 345    | 397    | 535     |
| Development Policy Case                       | 112                       | 128    | 149    | 188    |  | 10,832               | 35,080    | 38,851    | 46,554    |  | 305                        | 750    | 1,024  | 1,169   |
| Difference                                    | -                         | 34     | 61     | 95     |  | -                    | 25,745    | 29,975    | 37,239    |  | -                          | 405    | 628    | 634     |
| CONNECTICUT - Current Path Case               | -                         | -      | -      | -      |  | 3,005                | 3,005     | 3,005     | 3,005     |  | -                          | -      | -      | -       |
| Development Policy Case                       | -                         | -      | 10     | 84     |  | 3,005                | 4,958     | 12,545    | 13,220    |  | -                          | 31     | 58     | 785     |
| Difference                                    | -                         | -      | 10     | 84     |  | -                    | 1,953     | 9,540     | 10,215    |  | -                          | 31     | 58     | 785     |
| WEST VIRGINIA - Current Path Case             | 198                       | 195    | 232    | 300    |  | 45,378               | 45,697    | 55,462    | 71,284    |  | 75                         | 269    | 516    | 827     |
| Development Policy Case                       | 198                       | 220    | 280    | 379    |  | 45,378               | 51,185    | 62,499    | 79,269    |  | 75                         | 303    | 622    | 1,047   |
| Difference                                    | -                         | 25     | 48     | 80     |  | -                    | 5,487     | 7,037     | 7,986     |  | -                          | 34     | 106    | 220     |
| ARKANSAS - Current Path Case                  | 692                       | 856    | 1,072  | 1,234  |  | 46,611               | 58,974    | 75,361    | 86,275    |  | 967                        | 1,683  | 2,738  | 3,952   |
| Development Policy Case                       | 692                       | 873    | 1,106  | 1,281  |  | 46,611               | 63,197    | 83,281    | 94,145    |  | 967                        | 1,715  | 2,823  | 4,105   |
| Difference                                    | -                         | 17     | 33     | 48     |  | -                    | 4,223     | 7,920     | 7,870     |  | -                          | 32     | 85     | 152     |
| NEW MEXICO - Current Path Case                | 885                       | 668    | 565    | 603    |  | 58,535               | 45,182    | 38,970    | 41,421    |  | 3,132                      | 2,810  | 2,886  | 3,901   |
| Development Policy Case                       | 885                       | 682    | 589    | 654    |  | 58,535               | 59,785    | 54,955    | 57,013    |  | 3,132                      | 3,049  | 3,232  | 4,265   |
| Difference                                    | -                         | 14     | 25     | 51     |  | -                    | 14,603    | 15,986    | 15,592    |  | -                          | 239    | 346    | 365     |
| SOUTH CAROLINA - Current Path Case            | -                         | -      | -      | -      |  | 2,811                | 2,811     | 2,811     | 2,811     |  | -                          | -      | -      | -       |
| Development Policy Case                       | -                         | -      | 6      | 52     |  | 2,811                | 4,200     | 9,030     | 9,610     |  | -                          | 19     | 27     | 481     |
| Difference                                    | -                         | -      | 6      | 52     |  | -                    | 1,390     | 6,220     | 6,799     |  | -                          | 19     | 27     | 481     |
| Other States and Offshore - Current Path Case | 4,344                     | 3,958  | 4,123  | 4,064  |  | 347,979              | 301,026   | 277,517   | 309,558   |  | 1,776                      | 2,317  | 4,549  | 6,940   |
| Development Policy Case                       | 4,344                     | 3,986  | 4,190  | 4,361  |  | 347,979              | 350,016   | 383,036   | 519,570   |  | 1,776                      | 3,775  | 6,637  | 10,355  |
| Difference                                    | -                         | 28     | 67     | 297    |  | -                    | 48,990    | 105,519   | 210,011   |  | -                          | 366    | 527    | 2,579   |
| Total - Current Path Case                     | 18,526                    | 19,174 | 20,450 | 22,228 |  | 2,523,186            | 2,611,468 | 2,788,316 | 3,027,406 |  | 41,095                     | 50,135 | 65,270 | 88,159  |
| Development Policy Case                       | 18,526                    | 20,441 | 24,639 | 32,599 |  | 2,523,186            | 3,279,930 | 3,926,882 | 4,431,282 |  | 41,095                     | 58,602 | 91,146 | 187,929 |
| Difference                                    | -                         | 1,267  | 4,189  | 10,371 |  | -                    | 668,462   | 1,138,567 | 1,403,877 |  | -                          | 10,165 | 27,796 | 99,769  |

# Contents

|   |   |
|---|---|
| 1 | <b>Scenarios:</b><br>Scenario descriptions, assumptions and methodology |
| 2 | <b>Results:</b><br>Scenario impacts; production, jobs and revenues      |
| 3 | <b>Appendix</b>   |

## Case Development

- The objective of the study was to evaluate the impact on production, jobs and government revenues of implementing U.S. oil and natural gas regulatory policies which support the development of North America's oil and natural gas resources
- To achieve this, Wood Mackenzie has developed two scenarios reflecting different regulatory policy with respect to North American hydrocarbon resources
- The base case will be referred to throughout this report as the “**Current Path Case**”
  - The case assumes that current policy and regulatory environment continue into the future
  - In essence, the policies in this case hinder the development of North America's oil and gas resources. Resource development increases in this case but at a relatively modest pace
- The alternative to the Current Path Case is referred to throughout this report as the “**Development Policy Case**”
  - This case evaluates the impact of policies that encourage development of the U.S. upstream oil and natural gas sector

## Current Path Case - Assumptions

- The “**Current Path Case**” assumes the following policy and regulatory initiatives:
- Continued “slow walk” of Federal permitting for offshore Gulf of Mexico
  - The case assumes an increase from current offshore exploration and development activity levels, but not back to pre-Moratorium rates
- Tighter Federal hydraulic fracturing and water disposal regulations which are beyond the current state regulations
  - Slow down of onshore drilling due to increased cost of well completions. Results in a negative impact on development economics
- No opening of new areas for exploration and development
  - No new exploration and development in frontier areas of Alaska, Eastern Gulf of Mexico, Atlantic and Pacific offshore, and Federal Rockies
- Restrictions on new pipeline development from Canada
  - Curtailment of oil sands pipeline infrastructure into the U.S.. No development of the Keystone XL pipeline or other future Canada to U.S. pipelines

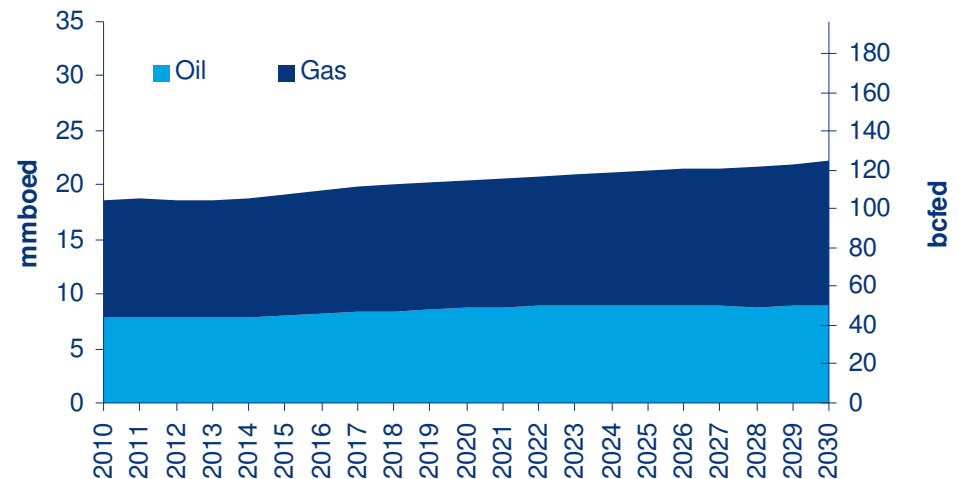
## Current Path Case – Assumptions (continued)

- In developing the “**Current Path Case**” Wood Mackenzie has made the following assumptions:
  - Onshore U.S.
    - Slowdown of the development of onshore plays to a rate below current company plans. This is due to increased cost resulting from slower permitting and a heavier regulatory burden. Key assumptions are that leasing and permitting continues at a slower pace relative to historical trends as borne out by a time series of BLM leasing and permitting data, and a heavier regulatory burden adds to drilling and completion costs
    - The impact of increasing costs is to increase the breakeven economics of all U.S. wells by 30 cents per mcf relative to the Development Policy Case. This has two effects:
      - A number of marginal plays become sub-economic (primarily gas plays), i.e. their economics fall below a 15% hurdle rate. It is therefore assumed that no further drilling will occur in these plays
      - A U.S.-wide slowdown in drilling activity. This results in a 4% decline in drilling across all remaining oil and natural gas plays which have not become sub-economic as a result of increased cost
    - No lifting of moratorium on shale gas development in New York
  - Gulf of Mexico
    - In the future the leasing of deep water acreage will continue, but at 50% of the pre-Moratorium rates
    - Exploration activity picks-up from current level, but only recovers to 50% of the pre-Moratorium drilling rates, approximately 20 wells per year
  - Alaska
    - No drilling activity offshore Alaska, ANWR or the NPRA
  - No future development activity in the currently closed areas

## Current Path Case Production Projection

- If the current U.S. policy and regulatory environment continues (the Current Path Case), Wood Mackenzie predicts U.S. production will grow from 18.5 mmboed in 2010 to 22.2 mmboed in 2030, a 20% increase
- We expect to see significant production growth from the Rockies, Northeast and Gulf Coast regions
- Primarily driven by unconventional plays, development activity will more than offset declines from the conventional regions

Total U.S. Production - Current Path Case



| Production     | 2010 | 2030 | Difference |
|----------------|------|------|------------|
| Liquids (mmbd) | 7.8  | 9.0  | 1.2        |
| Gas (Bcfd)     | 60.1 | 74.5 | 14.4       |

## Development Policy Case – Assumptions

- The “**Development Policy Case**” assumes the following policy and regulatory initiatives:
- Opening of Federal areas that are currently “off limits” to exploration and development
  - Commencement of leasing, drilling and development activity in currently closed regions. Regions to be opened include: Eastern Gulf of Mexico, portions of the Rocky Mountains, Atlantic OCS, Pacific OCS, Alaska National Wildlife Refuge (ANWR) – 1002 Area, National Petroleum Reserve, Alaska (NPRA) and Alaska offshore
- Lifting of drilling moratorium in New York State
  - Commencement of drilling and development of Marcellus shale in New York State
- Increased rate of permitting in the offshore Gulf of Mexico
  - Allows for a return to pre-Moratorium exploration and development activity
- Approval of the Keystone XL and other future Canada to U.S. oil pipelines
  - Facilitates additional Canadian oil sands development, thereby increasing the demand for U.S. supplied equipment and infrastructure
- Regulation of shale resources remains predominately at the State level
  - Environmental regulation of shale gas and tight oil plays are not duplicative or unduly burdensome. Permitting levels are at sufficient rates to develop resources in a timely manner

## Development Policy Case – Assumptions (continued)

- In developing the “**Development Policy Case**” Wood Mackenzie has made the following assumptions:
  - Onshore U.S.
    - Development of onshore plays as per company plans. Includes tight oil, shale gas and tight gas plays
    - Leasing and permitting rates do not significantly hinder current company plans
    - No restrictions of shale development in New York state
  - Gulf of Mexico
    - Leasing of deep water acreage returns to pre-Moratorium rates
    - Exploration activity recovers to pre-Moratorium drilling rates, approximately 40 wildcat wells per year
  - Alaska
    - Resources offshore Alaska and NPRA are developed
  - Access is allowed in current and previously restricted areas
    - Atlantic Coast – Production begins 2019
    - Pacific Coast – Production begins 2019
    - Eastern Gulf of Mexico – Production begins 2016
    - ANWR – Production begins 2017
    - Portions of the Rocky Mountains – Production begins 2012

# New Resource Areas – Development Policy Case



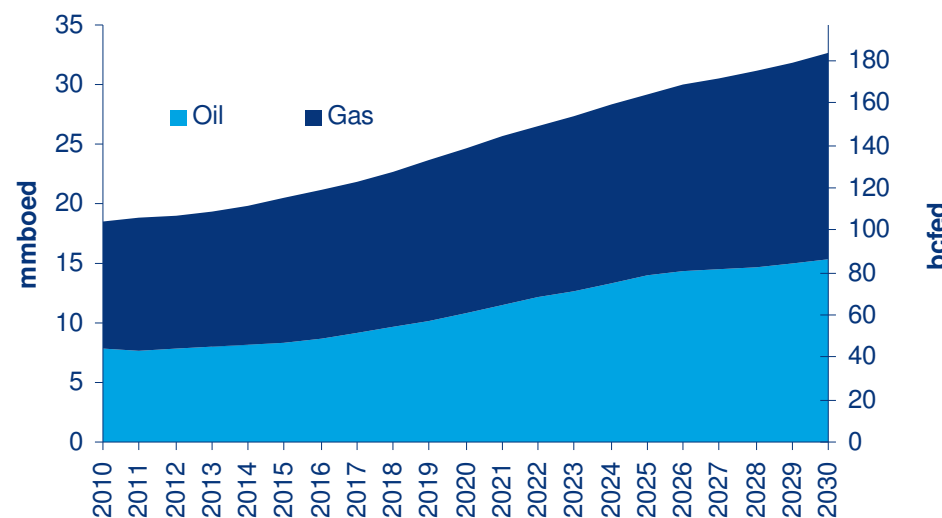
- Under the Development Policy Case, it is assumed that a number of new Federal areas become open for exploration drilling and field development. These are:
  - Pacific, Atlantic, Eastern GoM, portions of the Rockies, ANWR, NPRA and the Chukchi Sea
  - Also Wood Mackenzie has assumed that New York lifts its drilling moratorium
- Under this case, the permit and regulatory policies encourage the development of currently permitted onshore areas
- Permit and regulatory policies allow for relatively faster development of the Gulf of Mexico
- Canadian oil sands pipelines into the U.S. are fully developed (e.g., Keystone XL)

| Region              | Resources added (bnboe) |
|---------------------|-------------------------|
| Atlantic OCS        | 13.5                    |
| Pacific OCS         | 11.3                    |
| Eastern GoM         | 14.5                    |
| Rockies Federal     | 2.0                     |
| Alaska ANWR         | 10.8                    |
| Alaska NPRA/Chukchi | 2.1                     |
| New York            | 5.3                     |
| <b>Total</b>        | <b>59.5</b>             |

## Development Policy Case Production Projection

- If the U.S. enacts policies that encourage domestic oil and natural gas development (the Development Policy Case), Wood Mackenzie expects production to grow from 18.5 mmboed in 2010 to 32.6 mmboed by 2030, a 76% increase from 2010 levels
- The opening of restricted Federal areas would add over 6.7 mmboed
- The remaining production growth comes from New York, and accelerated drilling across the onshore U.S. and the Gulf of Mexico

Development Policy Case – Production Projection



| Production     | Development Policy Case |      | Difference<br>2010-2030 | Current Path Difference |      |
|----------------|-------------------------|------|-------------------------|-------------------------|------|
|                | 2010                    | 2030 |                         | Case 2030               | 2030 |
| Liquids (mmbd) | 7.8                     | 15.4 | 7.6                     | 9                       | 6.4  |
| Gas (Bcfd)     | 60.1                    | 96.9 | 36.8                    | 74.5                    | 22.4 |

## Scenario Modeling

- For the two scenarios described, Wood Mackenzie has developed an activity outlook based upon the expected impact of the respective policies on oil and natural gas development activity levels
- Policy impacts on production and tax revenue are estimated by contrasting the results of Wood Mackenzie's proprietary economic model (GEM) for the two stated scenarios
- The GEM (Global Economic Model) is an Excel based tool which Wood Mackenzie has developed to forecast capex, opex, production and taxation at the asset level across the whole of North America. Wood Mackenzie defines an asset as a stand-alone field or distinct play which has a distinct development scenario. GEM is capable of generating full economic analysis for each asset modeled in North America. Outputs include Internal Rates of Return, Net Present Values and \$/boe estimates
- Data inputs and tax assumptions are based upon publicly available state and federal information, public and private disclosures by oil and gas operating companies, and information referenced in the appendix of this report and other public sources (industry journals, independent agencies, etc.)
- Where no such information is available, Wood Mackenzie has made assumptions based on its in-depth technical knowledge of the U.S. industry, supplemented by its many years of experience studying the activity in the North American oil and gas sector

## Methodology – Production and Revenues

- The basic methodology that was developed to assess the impacts of two cases and associated production, and revenues was as follows:
  - Build individual asset models as described in the previous slide to represent each scenario
  - Generate cash flow and production information from the asset models
  - Assign assets to regions and states, then consolidate the assets to generate cash flow and production information at the state level
  - Tag each asset to a particular policy to generate the impact of each individual policy either at the national or state level, i.e. consolidation of all new Access areas
  - Consolidation of assets to generate regional impacts
  - Tax assumptions
    - Royalties from new OCS areas were split with the states (see appendix)
    - Potential state income taxes which could be generated from new OCS areas were not included

## Methodology – Employment Estimation Base (2010) Level

- Wood Mackenzie has derived the base count for the Current Path Case jobs numbers from the 2008 Implan database
- Wood Mackenzie took these direct employment numbers for the upstream sector, then added a multiplier of 2.5 for indirect and induced (income related) jobs per direct job. This multiplier is likely conservative given that total employment multipliers for the oil and natural gas sector estimated by BEA are in the range of 5 to 7 total jobs per 1 direct jobs
- The combined direct, indirect and induced job counts gives the total economic impact for the upstream sector across the U.S.
- Since these numbers were calculated for 2008, Wood Mackenzie used a production ratio to derive the 2010 base job count per state
- The production ratio is defined as a ratio of 2010 production in boed divided by 2008 production
- Future base job counts for the Current Path Case are derived by using future production ratios generated from dividing future production by 2010 production levels

## Methodology – Employment Estimation – New Activity

- For each new project being developed in the future Wood Mackenzie has developed associated employment levels
- The number of jobs generated is dependent on a number of factors, including:
  - Type of project - onshore drilling, offshore field development
  - Location of project – onshore, offshore, shallow or deep water, Alaska
- Potential employment associated with OCS production was allocated to each state based upon the percentage of the state's coastline in the region's total
- Jobs were also attributed to exploration activity
  - Relevant to new access areas and the Gulf of Mexico
- For each activity a direct job count was estimated
- Multiplying the number of each discrete activity per annum by the number of direct jobs per activity gave an overall job count
- Indirect and induced jobs which were calculated using an indirect jobs multiplier
  - A multiplier of 2.5 indirect and induced jobs per every 1.0 direct jobs was used  
(Note: this is conservative relative to other estimates, e.g. BEA estimated multipliers are typically in the 5 to 7 range)

## Methodology – Employment Estimation – New Activity (continued)

- For estimating the jobs impact for the opening of the Marcellus play in New York State, Wood Mackenzie utilized supporting material from the Timothy J. Considine study entitled “The Economic Impacts of the Marcellus Shale: Implications for New York, Pennsylvania, and West Virginia”
- For estimating the U.S. jobs impact from Canadian Oil Sands pipeline development, Wood Mackenzie has utilized outputs from the Canadian Energy Research Institute study entitled “Economic Impacts of New Oil Sands Projects in Alberta (2010-2035)”
- These two studies provided job impact data for development scenarios in the Marcellus Play and Keystone XL and other related Canada to U.S. oil pipelines

## Access Areas Resource Assumptions – Development Policy Case

- The following table details the assumptions Wood Mackenzie used for developing the resource base for each of the new Access areas in the Development Policy Case
  - These assumptions form the basis of the economic models which generate the production and revenue forecasts
  - Each discovery for each of the new Access areas has its own cash flow and production profile
  - Consolidation of each model generates the forecasts for each region

| Access Areas*                         | Atlantic   | Pacific    | ANWR      | NPRA/Chukchi | Eastern GoM | New York  | Rockies    |
|---------------------------------------|------------|------------|-----------|--------------|-------------|-----------|------------|
| <b>Acreage</b>                        | 40,000,000 | 20,000,000 | 1,500,000 | 1,500,000    | 16,000,000  | 2,560,000 | 10,000,000 |
| <b>Lease Revenue (\$Billion)</b>      | 8          | 7          | 15        | N/A          | 16          | N/A       | 15         |
| <b>Exploration Wells</b>              | 290        | 157        | 70        | 10           | 198         | N/A       | N/A        |
| <b>Discovery Rate</b>                 | 20%        | 30%        | 50%       | 60%          | 33%         | N/A       | N/A        |
| <b>Commercial Discoveries</b>         | 58         | 47         | 35        | 24           | 65          | N/A       | N/A        |
| <b>Average Discovery Size (mmboe)</b> | 386        | 239        | 309       | 90           | 222         | N/A       | N/A        |
| <b>Resource (bnboe)</b>               | 14         | 11         | 11        | 2            | 15          | 3         | 2          |

\* Source:

- Wood Mackenzie report January 2011 "Energy Policy at a Crossroads: An Assessment of the Impacts of Increased Access versus Higher Taxes on U.S. Oil and Natural Gas Production, Government Revenue, and Employment"

- ICF International, 2008, "Strengthening Our Economy: The Untapped U.S. Oil and Gas Resources"

## Gulf of Mexico and Onshore Areas Resource Assumptions – Development Policy Case

- In the Development Policy Case, Wood Mackenzie made specific assumptions surrounding development activity in the onshore regions and the Gulf of Mexico
- These assumptions have a direct impact on production, jobs, and government revenues
- Onshore regions assumptions
  - Addition of production from any play which becomes economic after removing the well cost of 30 cents/mcf (environmental policy costs)
  - Increase in activity across all onshore plays of 4% as marginal wells in all regions become economic
- › Gulf of Mexico
  - Increasing leasing and permit rates back to pre-Macondo levels raises production relative to the Current Path Case

| Production Impact (000's boed) | 2015 | 2020  | 2025  | 2030  |
|--------------------------------|------|-------|-------|-------|
| Onshore Lower 48*              | 851  | 1,447 | 1,678 | 1,887 |
| Gulf of Mexico                 | 0    | 1,183 | 2,401 | 3,150 |

\*excluding New York State - Marcellus Shale

Production – Development Policy Case less Current Path Case

## Jobs Assumptions – Development Policy Case

- For each discovery and field development in the Development Policy Case, Wood Mackenzie has assigned a direct job count
- The following table details the assumptions Wood Mackenzie used for developing the job impacts for onshore and offshore new access and existing production areas
  - The indirect multiplier stated in the table is taken from a recent PriceWaterhouse Coopers study and used to assess the impact of the upstream oil and gas sector activity on employment in other sectors

| Job Category               | Offshore              | Onshore               |
|----------------------------|-----------------------|-----------------------|
| Landmen (jobs)             | 400 per million acres | 200 per million acres |
| E&A Drilling (jobs)        | 280 per rig           | 60 per rig            |
| Associated Drilling (jobs) | 5 per rig             | 3 per rig             |
| Wells per rig per year     | 2                     | 9                     |
| Construction (jobs)        | 2,000 per field       | 2 per rig worker      |
| Operations (jobs)          | 200 per field         | 100 per 10,000 boed   |
| Indirect Multiplier        | 2.5                   | 2.5                   |

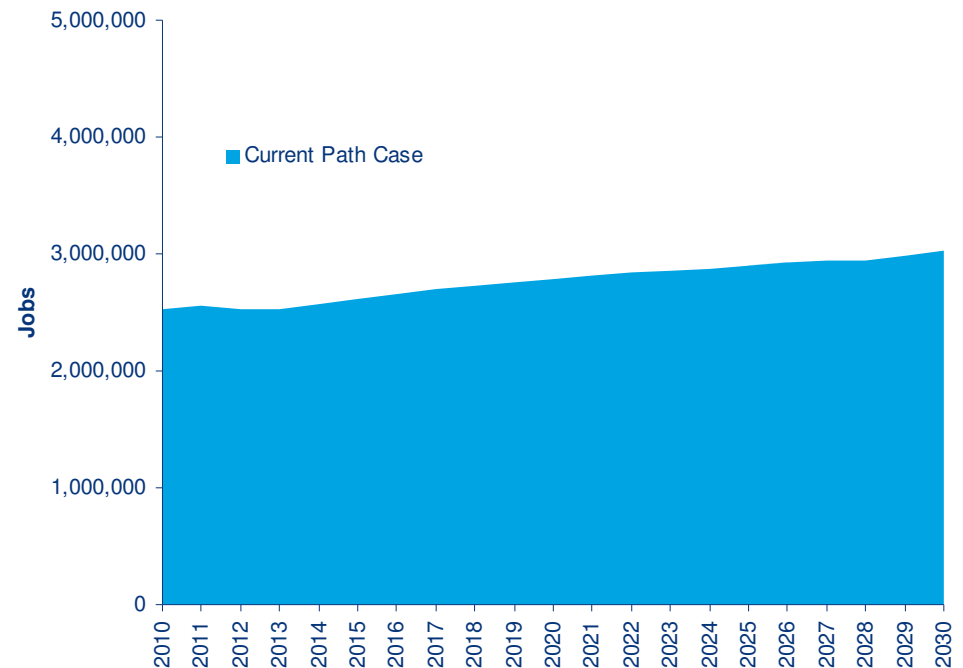
# Contents

|   |   |
|---|---|
| 1 | Scenarios:<br>Scenario descriptions, assumptions and methodology    |
| 2 | <b>Results:<br/>Scenario impacts; production, jobs and revenues</b> |
| 3 | Appendix  |

## Current Path Case – Employment Forecast

- Wood Mackenzie estimates that 2010 U.S. employment supported by the upstream sector was 2,523,000
- This consists of 631,000 direct jobs and 1,892,000 indirect and induced jobs
- By 2030 Wood Mackenzie projects the total U.S. employment in the Current Path Case will be 3,027,000
- The assumption used to generate this jobs forecast, is that jobs will grow in direct proportion to the production growth over the period analyzed

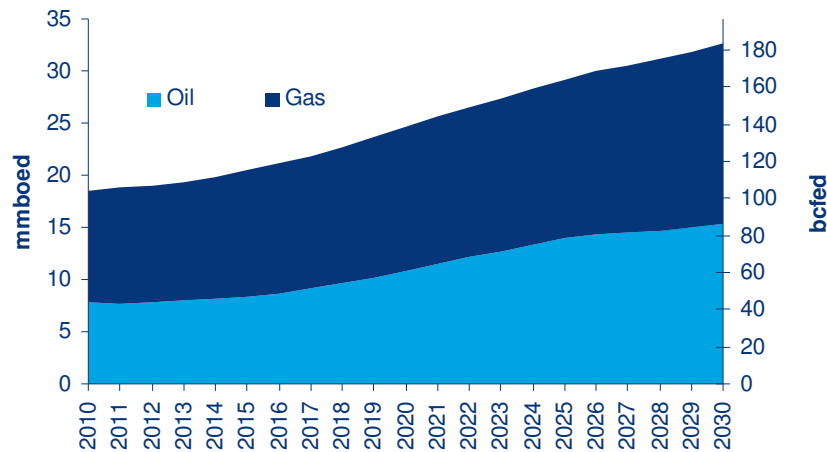
### U.S. Jobs Forecast – Current Path Case



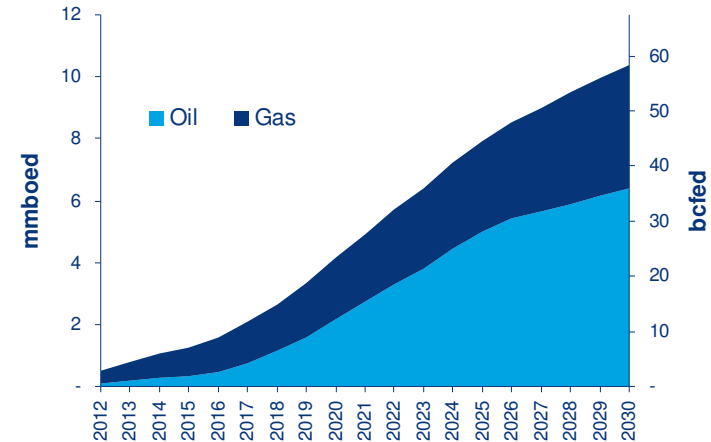
## Added U.S. Production from Development Policy Case

- Wood Mackenzie projects that by 2030, an estimated 10.4 mmboed of incremental domestic production could be added through policies which encourage the development of U.S. resources
- This is a 47% increase over the estimated 2030 production levels in the Current Path Case

Total U.S. Production – Development Policy Case



Potential U.S. Production Impact

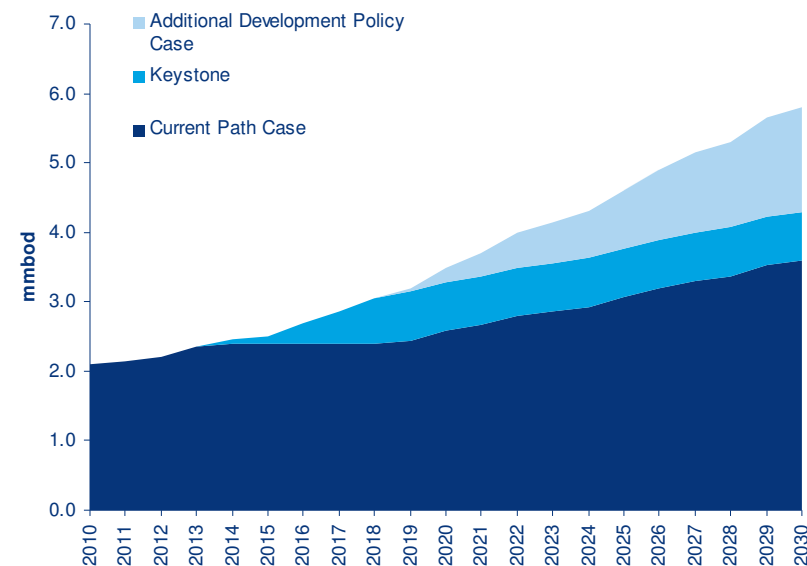


Total U.S. Production : Development Policy Case less Current Path Case

## Oil Sands Production Impacts – Current Path Case vs. Development Policy Case

- Total Alberta oil production, both conventional and oil sands, is limited by the 3.5 mmbod of oil pipeline capacity out of the region. Oil sands production is expected to increase from 2.10 mmbod in 2010 to 2.40 mmbod in 2014. Further production growth will not happen without the Keystone XL or other pipelines that can export oil out of Alberta
- Most of the incremental oil production is expected to be exported to the U.S. although the oil could also be exported to other countries with additional pipelines being built to the Canadian West coast
- The Keystone XL pipeline has a potential to import 700,000 bod into the U.S. and can be expanded to 900,000 bod
- Building sufficient oil pipeline capacity into the U.S. should allow Canadian oil sands production to increase from 2.10 mmbod in 2010 to 5.80 mmbod by 2030, an increase of 3.70 mmbod or 280%. This is 2.20 mmbod greater than the level in the Current Path Case, which assumes no additional oil pipeline capacity into the U.S.

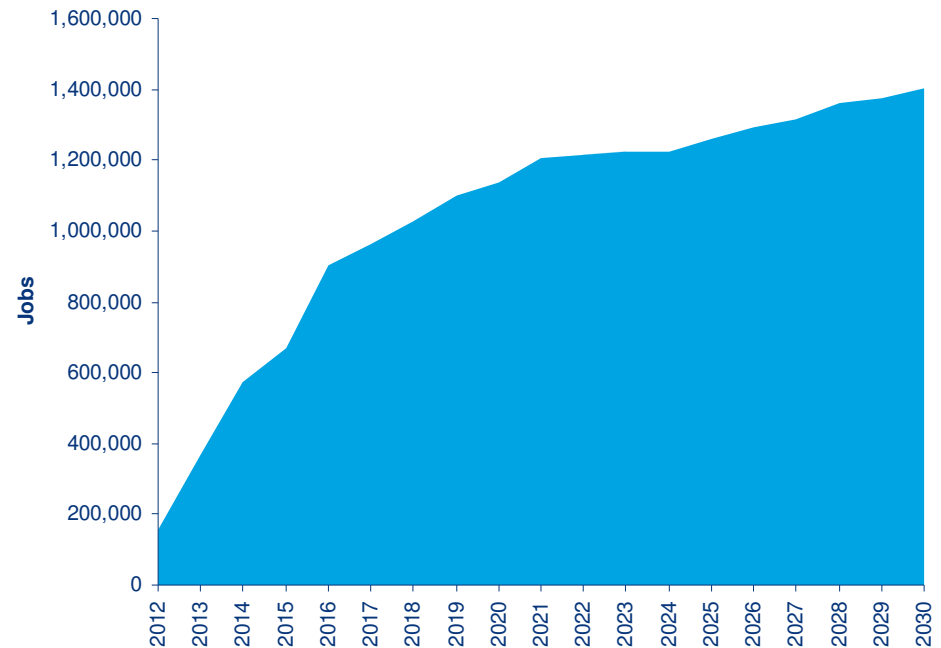
### Potential Canadian Production Impact



## Added U.S. Jobs from Development Policy Case

- Wood Mackenzie estimates that by 2030, 1.4 million new jobs could be added through policies which encourage the development of U.S. oil and natural gas resources and facilitate Canadian oil sands production through the development of the Keystone XL and other related U.S. pipelines
- Jobs added have the potential to exceed 1.0 million by 2018

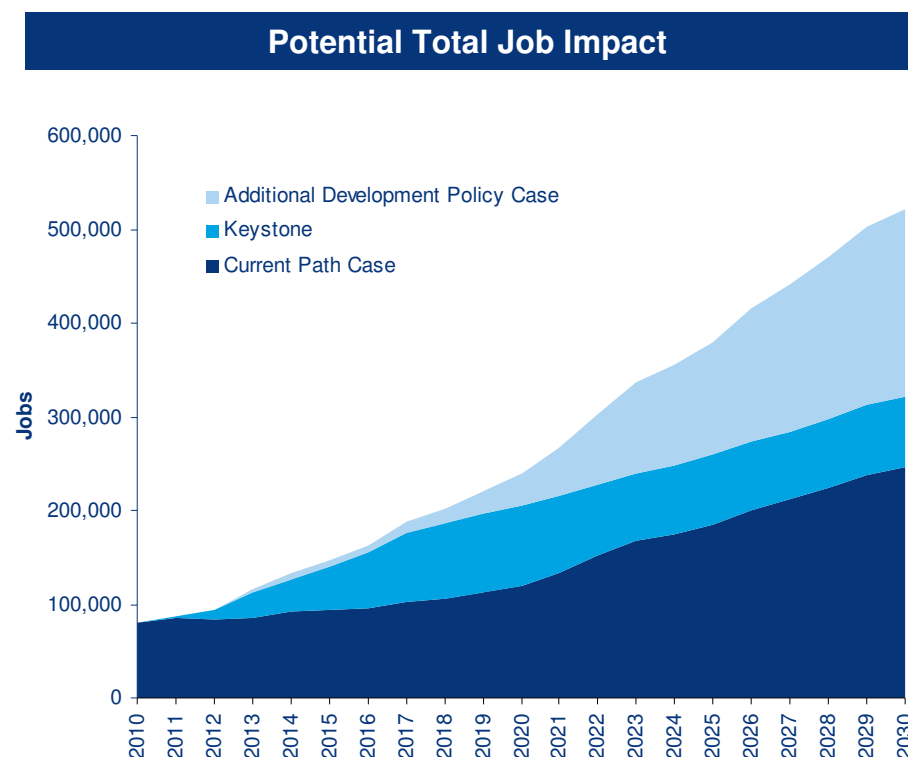
### Potential U.S. Job Impact



Total U.S. Employment: Development Policy Case less Current Path Case

## Added U.S. Jobs Canadian Oil Sands Pipelines

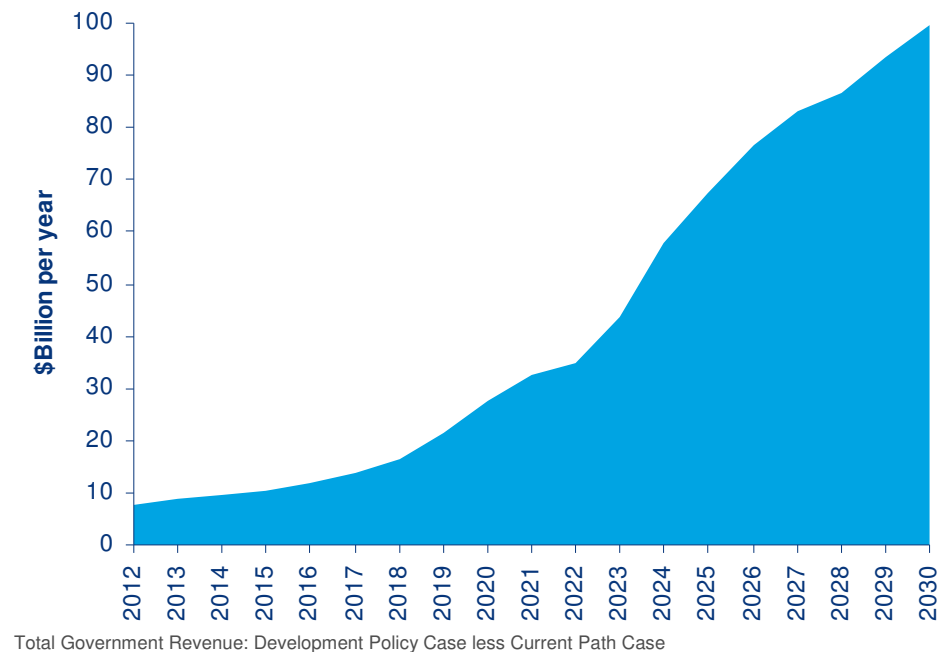
- Canadian oil sands production stimulates demand for U.S. produced services and equipment (e.g., large trucks and related infrastructure) and hence an increase in U.S. jobs
- U.S. employment associated with Canadian oil sands production that is expected to fill the initial phase of the Keystone XL pipeline should reach nearly 85,000 new jobs by 2020
- By 2030, U.S. employment associated with Canadian oil sands production that could fill new Canada to U.S. pipeline capacity could reach 270,000
- If 3.50 mmbod of additional oil pipeline export capacity is built out of Alberta (either to the U.S. or Canadian West Coast), the U.S. employment associated with Canadian oil sands production has the potential to reach 520,000 by 2030 (inclusive of jobs in the Current Path Case)



## Added U.S. Government Revenue from Development Policy Case

- Wood Mackenzie estimates over \$99 billion per year of new U.S. government revenue could be added by 2030 under the current taxation regime through policies which encourage the development of U.S. oil and natural gas resources
- Furthermore, Wood Mackenzie estimates total additional cumulative government revenues of \$803 billion could be generated by 2030 under policies assumed in the Development Policy Case.

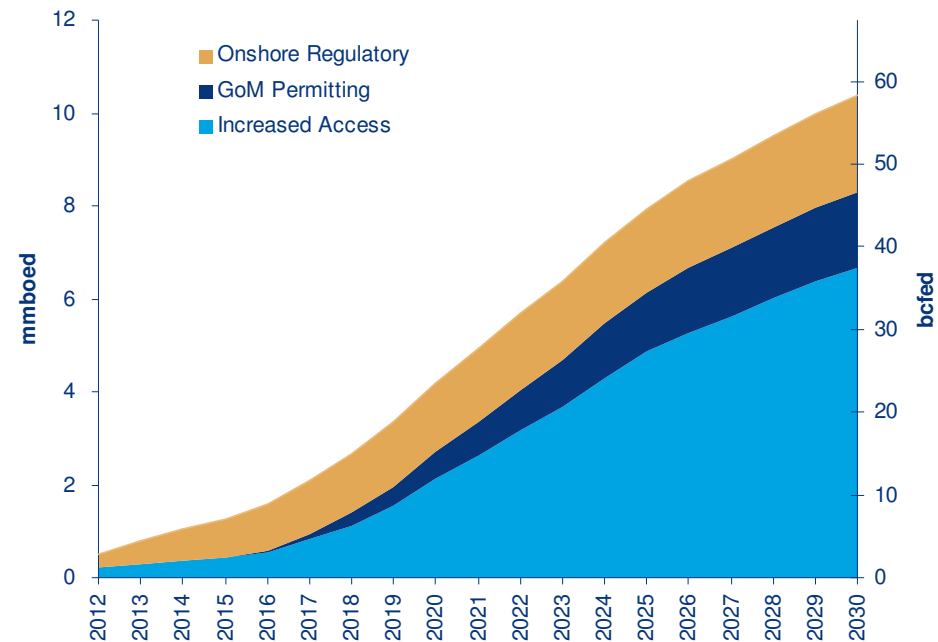
### Potential Annual Government Revenue Impact



## Oil and Natural Gas Production Impacts by Policy

- Opening access to areas which are currently closed to development has the largest incremental impact on production between 2012 and 2030
- Wood Mackenzie estimates these new access areas could add up to 6.7 mmboed by 2030
- Regulations which permit timely development of GoM and the U.S. onshore would add a further 3.7 mmboed by 2030
- Total incremental production could increase by 10.4 mmboed by 2030

### Potential U.S. Production Impact

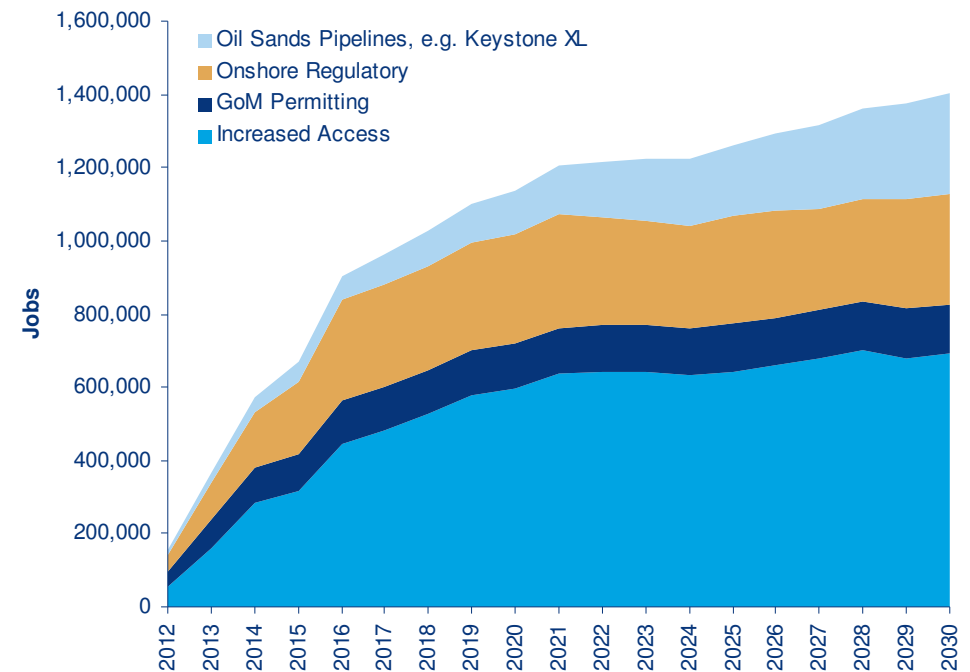


Total Production: Development Policy Case less Current Path Case

## Employment Impacts by Policy

- Opening access to new areas for oil and natural gas development could add 690,000 jobs by 2030, approximately half of the total potential jobs added
- Wood Mackenzie estimates that a more favourable policy to develop pipelines from the Canadian oil sands to the U.S. would add over 270,000 U.S. jobs by 2030
- These jobs are primarily a result of U.S. services and the production of capital and intermediate goods exported to Canada for the development of the oil sands
- The impact on jobs from the GoM and onshore regions is more immediate as companies are already active in these regions with portfolios of opportunities to develop

### Potential Total Job Impact

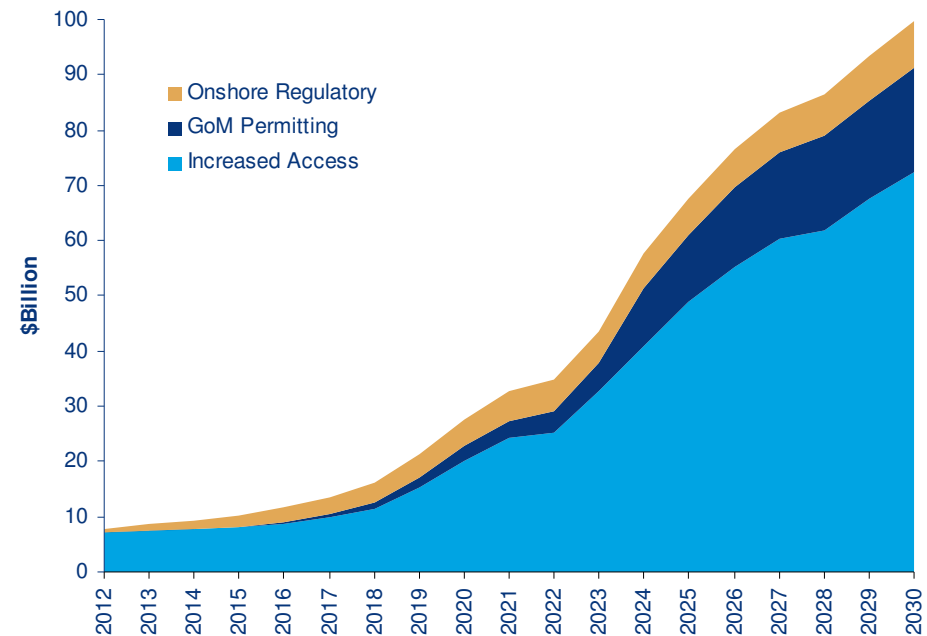


Total Employment: Development Policy Case less Current Path Case

## Added Revenue by Policy

- Increasing access to areas currently off-limits to oil and natural gas development has the greatest potential to increase government revenues
- Cumulative government revenue (inclusive of leases, state and local taxes) due to increased access, has the potential to reach a cumulative \$127 billion by 2020 and \$803 billion by 2030
- New lease sales drive the majority of revenues derived from the access policies in the short term
- From 2020 onwards, the impact of new production from these access areas drives the majority of revenue growth
- More timely development of existing oil and natural gas regions, both on and offshore, will also create additional government revenue

### Potential U.S. Government Revenue Impact



Total Revenue: Development Policy Case less Current Path Case

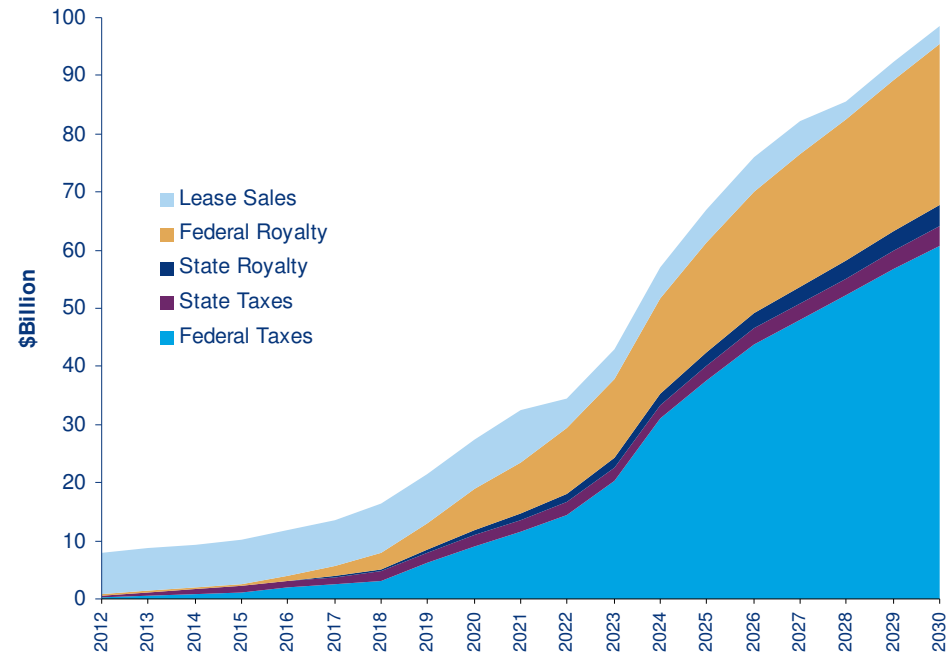
## Added Revenue by Type

- Of the cumulative \$803 billion of government revenues which could be generated through the Development Policy Case by 2030, \$618 billion will be paid as Federal royalties and taxes. The states will generate a further \$63 billion in royalties and taxes, with the remainder being new lease sales
- Revenue from both lease sales in new areas and from incremental lease sales in existing areas could reach \$29 billion by 2015 and \$122 billion by 2030
- Policies that encourage U.S. oil and gas development have the greatest potential to increase Federal income tax and royalty revenue

Cumulative Revenue Impact (\$ Billion)

|                 | 2015 | 2020 | 2025  | 2030  |
|-----------------|------|------|-------|-------|
| State Royalty   | 0.0  | 1.8  | 10.8  | 26.7  |
| Federal Royalty | 0.9  | 18.0 | 87.7  | 211.5 |
| State Taxes     | 2.6  | 10.0 | 21.4  | 36.3  |
| Federal Taxes   | 3.1  | 26.1 | 142.2 | 406.1 |
| Lease Sales     | 29.5 | 70.8 | 101.1 | 122.0 |

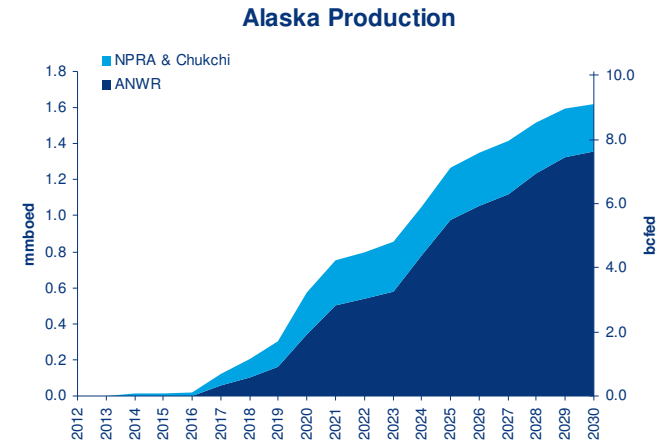
## Potential U.S. Government Revenue Impact



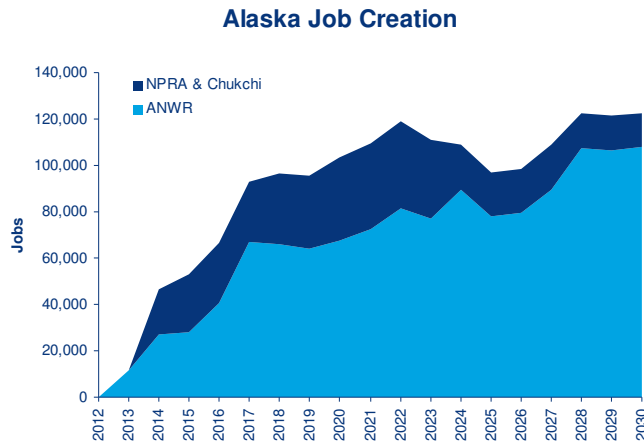
Total Revenue: Development Policy Case less Current Path Case

# Development Policy Case Projected Regional Impacts\* - Alaska

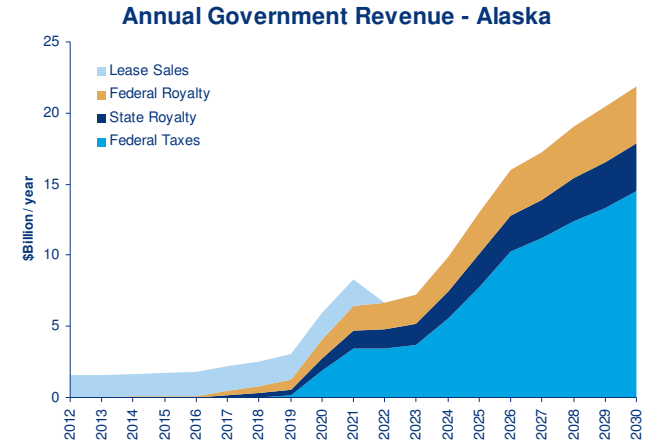
- Alaska new development production could reach over 1.6 mmbod by 2030, with up to \$22 billion of government revenue, and over 120,000 jobs being created
- Creating access to new federal areas and more efficient regulatory policies have the biggest impact on the future development of Alaska's oil and gas industry
- ANWR provides the main growth opportunity in Alaska, supplemented by development of the Chukchi and NPRA
- Wood Mackenzie has assumed that the State of Alaska and the Federal Government will share royalties from these areas



All production from Federal lands



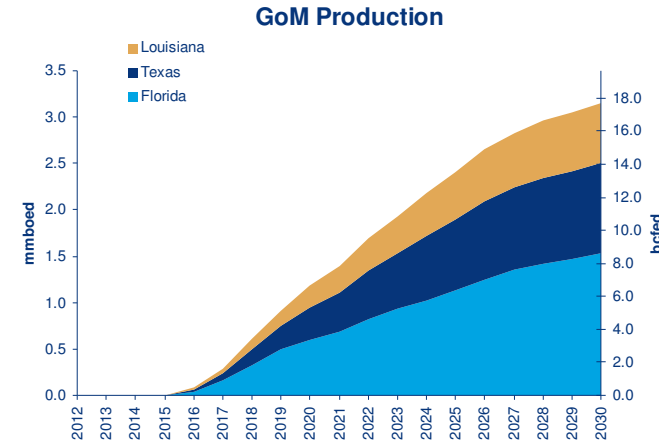
\* Relative to the Current Path Case



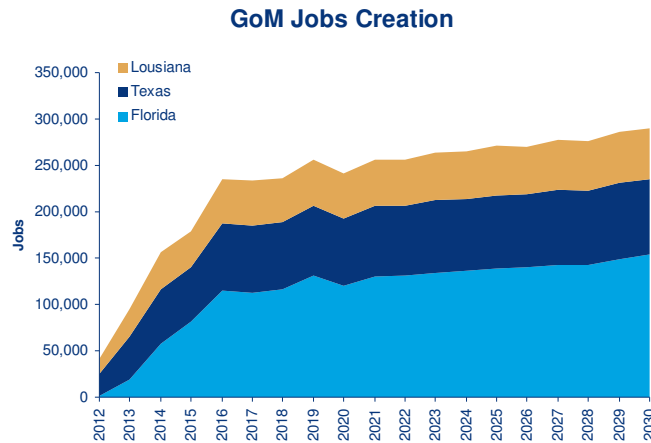
OCS and Federal BLM Royalties split with state

# Development Policy Case Projected Regional Impacts\* – Gulf of Mexico

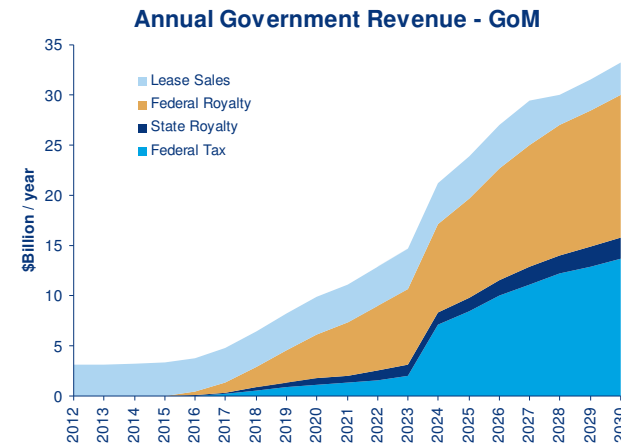
- Gulf of Mexico production could reach 3.1 mmboed by 2030, with up to \$33 billion of government revenue, and 290,000 jobs being created as a result
- The opening of currently off-limits areas off the coast of Florida to exploration and development has the largest potential impact on the Gulf of Mexico’s oil and gas industry
- Up to 100,000 new Florida jobs could be created by 2016
- More timely and efficient permitting for the offshore can increase production, government revenue, and jobs from Gulf of Mexico oil and natural gas development



All production from Federal lands



\* Relative to the Current Path Case

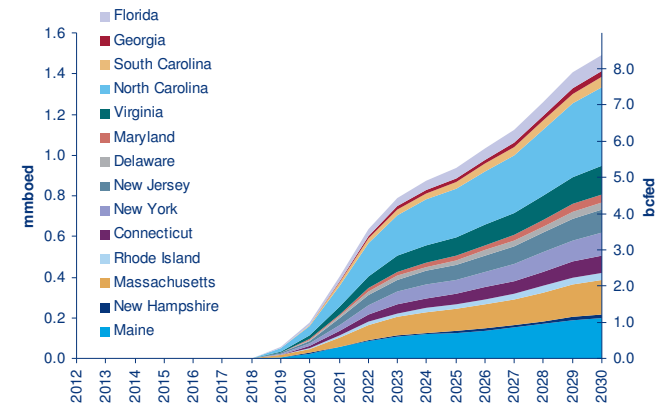


GoM royalties 100% Federal allocation

# Development Policy Case Projected Regional Impacts\* – Atlantic OCS

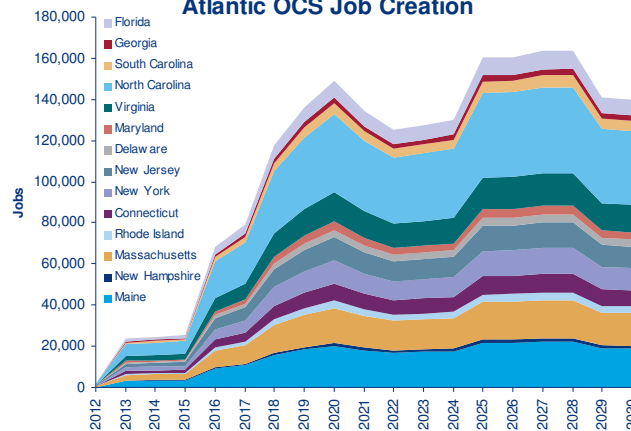
- Atlantic OCS production could reach nearly 1.6 mmoed by 2030, with up to \$14 billion of government revenue per year, and 140,000 jobs being created as a result
- Cumulative government revenue for the region has the potential to reach \$95 billion by 2030 (inclusive of lease bonuses)
- Wood Mackenzie assumes that states will be impacted on a proportionate basis of their coastline length

Atlantic OCS Production



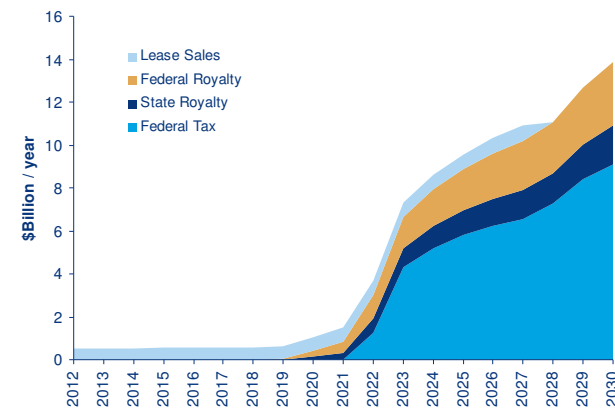
All production from Federal lands

Atlantic OCS Job Creation



\* Relative to the Current Path Case

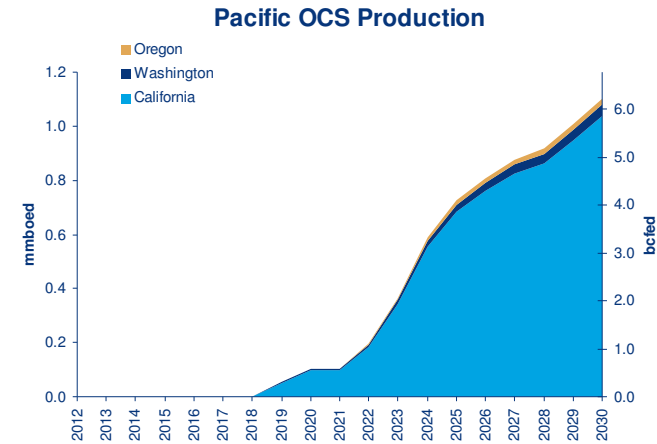
Annual Government Revenue - Atlantic OCS



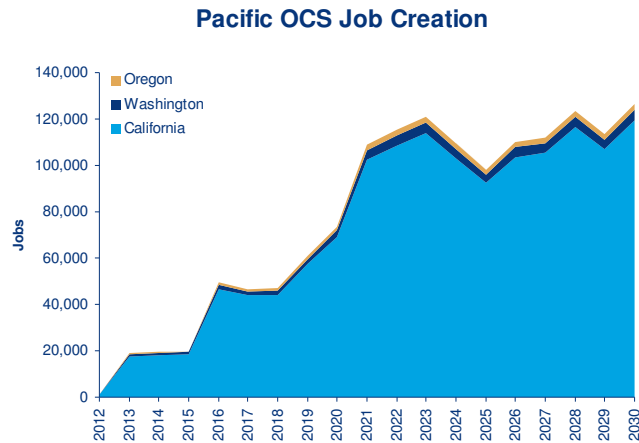
OCS royalties split with states

# Development Policy Case Projected Regional Impacts\* – Pacific OCS

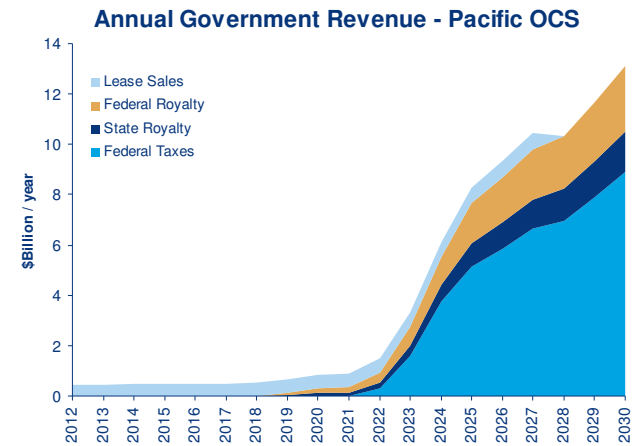
- Pacific OCS production could reach 1.1 mmoed by 2030, with up to \$13 billion of government revenue, and over 120,000 jobs being created as a result
- Creating access to new federal areas and more efficient regulatory policies have the biggest impact on the future development of the Pacific OCS’ oil and gas industry
- Wood Mackenzie projects that California would account for over 94% of production and job creation if the Pacific OCS were open for oil and gas development



All production from Federal lands



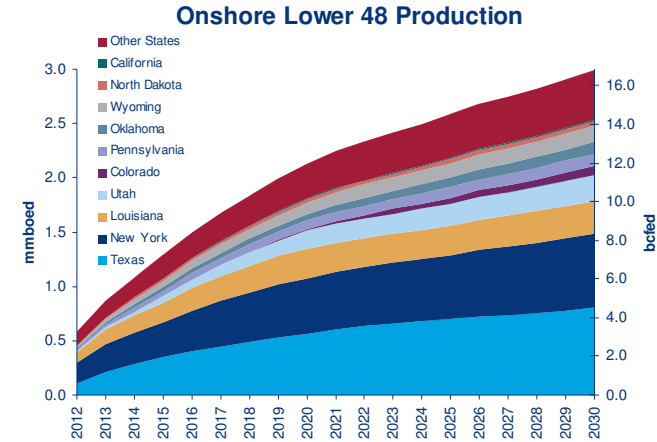
\* Relative to the Current Path Case



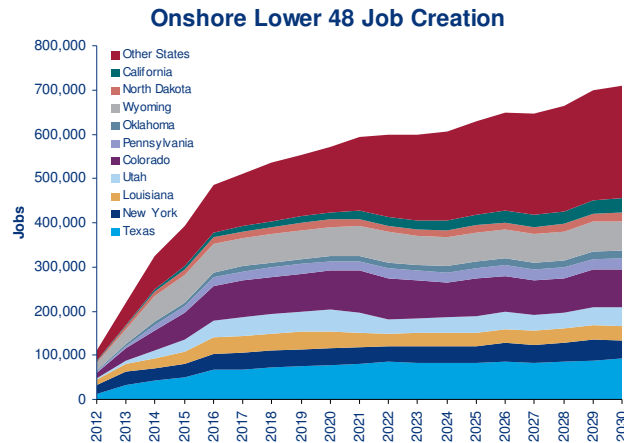
OCS royalties split with states

# Development Policy Case Projected Regional Impacts\* – Onshore U.S.

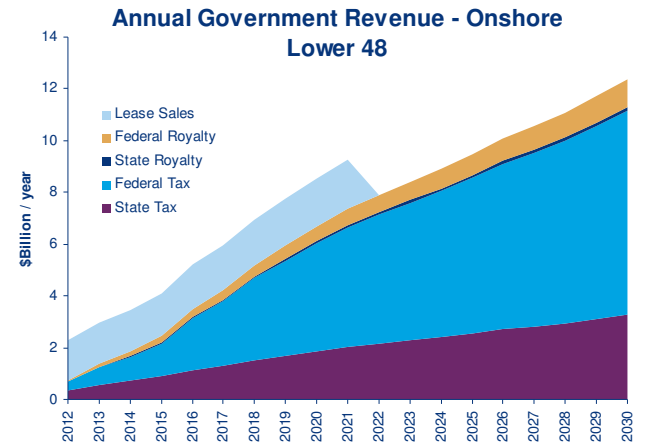
- Onshore new development production could reach 3.0 mmoled by 2030, with over \$12 billion of government revenue, and over 700,000 jobs being created
- Creating greater access to portions of the Rocky Mountains, removing the moratorium on shale development in New York State, and supporting efficient onshore regulatory policies will all have a positive impact on the future development of U.S. domestic onshore oil and natural gas resources. The development of Canadian oil sands associated with Canada to U.S. pipelines will also create jobs in the U.S.



Production from Federal, State and Private lands



\* Relative to the Current Path Case



Royalties allocated 100% to Federal, State or Private depending on ownership rights

# Contents

|   |   |
|---|---|
| 1 | <b>Scenarios:</b><br>Scenario descriptions, assumptions and methodology |
| 2 | <b>Results:</b><br>Scenario impacts; production, jobs and revenues      |
| 3 | <b>Appendix</b>   |

## Development Policy Case - Production Impact Forecasts by State ('000 boed)

|              | 2015 | 2020 | 2025  | 2030  |
|--------------|------|------|-------|-------|
| TEXAS        | 348  | 917  | 1,458 | 1,775 |
| LOUISIANA    | 182  | 508  | 783   | 946   |
| MISSISSIPPI  | 2    | 2    | 2     | 1     |
| ALABAMA      | 1    | 1    | 2     | 2     |
| ARKANSAS     | 17   | 33   | 41    | 48    |
| KANSAS       | 2    | 5    | 17    | 23    |
| OKLAHOMA     | 35   | 59   | 87    | 108   |
| NEW MEXICO   | 14   | 25   | 41    | 51    |
| COLORADO     | 68   | 141  | 184   | 208   |
| N. DAKOTA    | 22   | 32   | 38    | 47    |
| S. DAKOTA    | 0    | 0    | 0     | 0     |
| WYOMING      | 69   | 125  | 160   | 180   |
| UTAH         | 59   | 167  | 204   | 242   |
| MONTANA      | 34   | 61   | 81    | 95    |
| ILLINOIS     | 0    | 0    | 0     | 0     |
| INDIANA      | 0    | 0    | 0     | 0     |
| PENNSYLVANIA | 52   | 80   | 97    | 112   |
| VIRGINIA     | 1    | 18   | 92    | 146   |
| KENTUCKY     | 0    | 1    | 2     | 2     |
| OHIO         | 0    | 0    | 0     | 0     |

|               | 2015         | 2020         | 2025         | 2,030         |
|---------------|--------------|--------------|--------------|---------------|
| MICHIGAN      | 0            | 1            | 2            | 1             |
| NEW YORK      | 319          | 522          | 661          | 789           |
| WEST VIRGINIA | 25           | 48           | 69           | 80            |
| TENNESSEE     | 1            | 1            | 1            | 1             |
| CALIFORNIA    | 3            | 105          | 691          | 1,050         |
| ALASKA        | 14           | 573          | 1,270        | 1,623         |
| WASHINGTON    | 0            | 2            | 15           | 22            |
| OREGON        | 0            | 4            | 28           | 42            |
| NEW HAMPSHIRE | 0            | 2            | 10           | 16            |
| MASSACHUSETTS | 0            | 20           | 106          | 169           |
| S. CAROLINA   | 0            | 6            | 32           | 52            |
| RHODE ISLAND  | 0            | 4            | 22           | 35            |
| GEORGIA       | 0            | 3            | 17           | 28            |
| N. CAROLINA   | 0            | 45           | 240          | 382           |
| NEW JERSEY    | 0            | 14           | 72           | 114           |
| MARYLAND      | 0            | 5            | 25           | 39            |
| DELAWARE      | 0            | 4            | 22           | 36            |
| CONNECTICUT   | 0            | 10           | 53           | 84            |
| MAINE         | 0            | 24           | 126          | 201           |
| FLORIDA       | 0            | 621          | 1,187        | 1,620         |
| <b>TOTAL:</b> | <b>1,267</b> | <b>4,189</b> | <b>7,937</b> | <b>10,371</b> |

## Development Policy Case - Annual Job Creation Forecasts by State

|              | 2015    | 2020    | 2025    | 2030    |
|--------------|---------|---------|---------|---------|
| TEXAS        | 110,133 | 152,225 | 161,539 | 174,670 |
| LOUISIANA    | 65,635  | 87,663  | 83,884  | 88,814  |
| MISSISSIPPI  | 815     | 1,278   | 1,438   | 1,564   |
| ALABAMA      | 922     | 1,438   | 2,460   | 2,249   |
| ARKANSAS     | 4,223   | 7,920   | 7,464   | 7,870   |
| KANSAS       | 3,224   | 6,832   | 20,411  | 19,820  |
| OKLAHOMA     | 7,581   | 11,572  | 14,826  | 16,836  |
| NEW MEXICO   | 14,603  | 15,986  | 15,561  | 15,592  |
| COLORADO     | 61,131  | 88,283  | 83,817  | 85,032  |
| N. DAKOTA    | 13,144  | 15,840  | 16,093  | 19,119  |
| S. DAKOTA    | 125     | 240     | 363     | 466     |
| WYOMING      | 61,289  | 67,110  | 66,054  | 66,862  |
| UTAH         | 26,554  | 49,304  | 38,132  | 42,248  |
| MONTANA      | 25,745  | 29,975  | 33,017  | 37,239  |
| ILLINOIS     | 6,914   | 17,670  | 32,899  | 49,237  |
| INDIANA      | 1,179   | 2,037   | 3,177   | 4,059   |
| PENNSYLVANIA | 15,912  | 20,629  | 23,512  | 25,824  |
| VIRGINIA     | 3,606   | 16,401  | 19,163  | 18,185  |
| KENTUCKY     | 876     | 2,071   | 2,823   | 3,043   |
| OHIO         | 2,751   | 6,437   | 10,986  | 15,585  |

|               | 2015           | 2020             | 2025             | 2030             |
|---------------|----------------|------------------|------------------|------------------|
| MICHIGAN      | 2,428          | 4,426            | 7,766            | 9,797            |
| NEW YORK      | 32,241         | 47,817           | 50,823           | 50,072           |
| WEST VIRGINIA | 5,487          | 7,037            | 8,683            | 7,986            |
| TENNESSEE     | 1,534          | 1,848            | 3,245            | 3,808            |
| CALIFORNIA    | 26,333         | 86,197           | 116,582          | 150,816          |
| ALASKA        | 52,974         | 103,789          | 97,592           | 123,217          |
| WASHINGTON    | 2,110          | 5,708            | 9,496            | 13,601           |
| OREGON        | 1,400          | 4,034            | 5,390            | 6,866            |
| NEW HAMPSHIRE | 453            | 1,956            | 2,242            | 2,181            |
| MASSACHUSETTS | 3,806          | 18,826           | 21,097           | 19,715           |
| S. CAROLINA   | 1,390          | 6,220            | 7,075            | 6,799            |
| RHODE ISLAND  | 723            | 3,782            | 4,192            | 3,841            |
| GEORGIA       | 1,540          | 5,066            | 6,451            | 7,247            |
| N. CAROLINA   | 7,646          | 40,573           | 44,628           | 40,398           |
| NEW JERSEY    | 3,049          | 13,853           | 16,126           | 15,964           |
| MARYLAND      | 1,320          | 5,344            | 6,417            | 6,652            |
| DELAWARE      | 732            | 3,841            | 4,296            | 3,989            |
| CONNECTICUT   | 1,953          | 9,540            | 10,786           | 10,215           |
| MAINE         | 3,573          | 20,380           | 22,079           | 19,436           |
| FLORIDA       | 84,609         | 131,746          | 153,428          | 170,076          |
| OTHER STATES  | 6,800          | 15,671           | 26,022           | 36,886           |
| <b>TOTAL:</b> | <b>668,462</b> | <b>1,138,567</b> | <b>1,262,035</b> | <b>1,403,877</b> |

## Development Policy Case – Annual Gov't Revenue Impact by State (US\$M)

|              | 2015  | 2020  | 2025   | 2030   |
|--------------|-------|-------|--------|--------|
| TEXAS        | 2,096 | 4,679 | 11,325 | 16,183 |
| LOUISIANA    | 1,221 | 2,716 | 6,782  | 9,678  |
| MISSISSIPPI  | 8     | 7     | 6      | 4      |
| ALABAMA      | 1     | 3     | 6      | 6      |
| ARKANSAS     | 32    | 85    | 116    | 152    |
| KANSAS       | 4     | 12    | 49     | 75     |
| OKLAHOMA     | 69    | 152   | 249    | 347    |
| NEW MEXICO   | 239   | 346   | 260    | 365    |
| COLORADO     | 528   | 990   | 995    | 1,285  |
| N. DAKOTA    | 125   | 201   | 203    | 285    |
| S. DAKOTA    | 0     | 0     | 0      | 1      |
| WYOMING      | 1,056 | 1,576 | 992    | 1,283  |
| UTAH         | 261   | 810   | 1,043  | 1,409  |
| MONTANA      | 405   | 610   | 472    | 634    |
| ILLINOIS     | 0     | 0     | 0      | 1      |
| INDIANA      | 0     | 0     | 0      | 1      |
| PENNSYLVANIA | 72    | 178   | 242    | 310    |
| VIRGINIA     | 53    | 100   | 919    | 1,332  |
| KENTUCKY     | 0     | 2     | 4      | 5      |
| OHIO         | 0.0   | 0.1   | 0.3    | 0      |

|               | 2015          | 2020          | 2025          | 2,030         |
|---------------|---------------|---------------|---------------|---------------|
| MICHIGAN      | 1             | 1             | 4             | 4             |
| NEW YORK      | 189           | 1,161         | 2,182         | 2,893         |
| WEST VIRGINIA | 34            | 106           | 172           | 220           |
| TENNESSEE     | 1             | 1             | 3             | 4             |
| CALIFORNIA    | 476           | 851           | 7,868         | 12,460        |
| ALASKA        | 1,703         | 5,968         | 13,045        | 21,856        |
| WASHINGTON    | 10            | 17            | 168           | 266           |
| OREGON        | 18            | 33            | 316           | 501           |
| NEW HAMPSHIRE | 6             | 11            | 102           | 147           |
| MASSACHUSETTS | 63            | 116           | 1,084         | 1,570         |
| S. CAROLINA   | 19            | 27            | 332           | 481           |
| RHODE ISLAND  | 13            | 24            | 226           | 327           |
| GEORGIA       | 10            | 19            | 178           | 257           |
| N. CAROLINA   | 142           | 262           | 2,454         | 3,554         |
| NEW JERSEY    | 42            | 78            | 734           | 1,063         |
| MARYLAND      | 15            | 27            | 253           | 366           |
| DELAWARE      | 13            | 24            | 228           | 331           |
| CONNECTICUT   | 31            | 58            | 542           | 785           |
| MAINE         | 74            | 137           | 1,287         | 1,864         |
| FLORIDA       | 1,134         | 6,407         | 12,772        | 17,465        |
| <b>TOTAL:</b> | <b>10,165</b> | <b>27,796</b> | <b>67,613</b> | <b>99,769</b> |

| Lease Sales by Region (\$M)     | 2015  | 2020  | 2025  | 2030  |
|---------------------------------|-------|-------|-------|-------|
| Rockies                         | 1,656 | 1,873 | 0     | 0     |
| ANWR                            | 1,656 | 1,873 | 0     | 0     |
| Atlantic OCS                    | 552   | 624   | 706   | 0     |
| East Gulf of Mexico             | 1,104 | 1,249 | 1,413 | 0     |
| Pacific OCS                     | 483   | 546   | 618   | 0     |
| Central and West Gulf of Mexico | 2,208 | 2,498 | 2,826 | 3,197 |

## GEM Tool Description

The Global Economic Model (GEM) is Wood Mackenzie's proprietary economic modeling software

- GEM combines Wood Mackenzie's unique and proprietary data, both historic and forecast, with company interests, price decks and fiscal models to produce cash flow and valuation reports. It contains more than 190 fiscal regimes covering the globe
- GEM generates cash flow and production forecasts based on user input development plans. These include drilling forecasts and assumed type well profiles and well costs for onshore U.S. plays. For offshore developments, Alaska and the Canadian oil sands, production facilities and export pipelines are also included
- GEM includes a sensitivity tool to show the economics impact of changes in costs, taxes, production and prices. Outputs include cash flow summaries, IRR, NPV and \$/boe calculations
- Wood Mackenzie has developed cost, tax and production data in the following productive regions:
  - Alaska – 57 fields
  - Gulf of Mexico – 212 fields
  - Canadian oil sands – 25 projects
  - Onshore U.S. – 245 plays

## Tax Assumptions

- Models included the following assumptions:
  - Federal royalty rates modelled at 12.5%
  - Federal income tax modelled at 35%
- Wood Mackenzie's commodity price forecast was used. For all new Access region models, oil was priced at WTI, gas was priced at Henry Hub (HH). Oil price forecast was \$80/bbl in 2012 inflating at 2.50%. Gas price forecast was \$6.00/mcf in 2012 inflating at 2.50%
- In the Atlantic and Pacific OCS regions royalties were split with 37.5/62.5 between the states and the federal government respectively. In Alaska federal areas the royalty split with the state was 50/50.
- Production and revenue from new access regions were split by state according to the following:
  - Atlantic OCS – Maine 13%, New Hampshire 1%, Massachusetts 11%, Rhode Island 2%, Connecticut 6%, New York 7%, New Jersey 8%, Delaware 2%, Maryland 3%, Virginia 10%, North Carolina 26%, South Carolina 3%, Georgia 2%, Florida 5%
  - Pacific OCS – California 94%, Oregon 4%, Washington 2%
  - East Gulf of Mexico – Florida 100%
  - Rockies – Colorado 27.0%, North Dakota 19.4%, South Dakota 0.1%, Wyoming 31.7%, Utah 12.4%, New Mexico 6.8%, Montana 2.6%
- For the existing producing areas; Gulf of Mexico, Alaska and onshore U.S., Wood Mackenzie has modeled each producing field or play by its applicable state and federal royalty
- Other state taxes, such as Ad Valorem, Severance Taxes, and fee royalties have been applied which applicable

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**Global Contact Details**

Europe +44 (0)131 243 4400  
Americas +1 713 470 1600  
Asia Pacific +65 6518 0800  
Email [energy@woodmac.com](mailto:energy@woodmac.com)  
Website [www.woodmac.com](http://www.woodmac.com)

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