NRDC-NEMS Analysis of a Moratorium on New Offshore Leasing in the Gulf of Mexico

Prepared for the Natural Resources Defense Council (NRDC)

March 04, 2022
Project Overview and Goal

• Context:
  – In January 2021, President Biden signed an executive order to “pause new oil and natural gas leases on public lands or in offshore waters pending completion of a comprehensive review of federal oil and gas program.” The targeted pause did not impact existing leases. Implementation of the pause was enjoined by court order in June 2021.
  – In January 2022, a federal district court for the District of Columbia invalidated Lease Sale 257, the Gulf of Mexico (GOM) lease sale occurring in 2021.
  – The Department of Interior is drafting a 2022-2027 leasing program.

• Objective:
  For the period through 2035, assess the impact of stopping new offshore oil and gas leasing after January 2021 in the GOM, while continuing onshore and offshore leases prior to January 2021 on:
  (1) Production and price of crude oil and natural gas;
  (2) Price of gasoline, diesel; and
  (3) Emissions of carbon dioxide (CO₂) and methane (CH₄).

Source: 1, 2, 3, 4, 5
Project Approach

• Used the U.S. Energy Information Administration (EIA) National Energy Modeling System (NEMS) and ran the following scenarios:
  1- Reference Scenario
  2- No New Offshore Leasing Scenario

• Metrics of interest for the analysis include:
  – Crude oil and natural gas production
  – Domestic price of oil and natural gas
  – Carbon dioxide and methane emissions from oil and gas production, distribution, and consumption

• Analysis time frame is from 2021 to 2035.
Description of Scenarios

1. Reference Scenario (Ref)
   Business-as-usual, given known technological and demographic trends as well as policies and regulations used in the *Annual Energy Outlook 2021 (AEO2021)* Reference case, while including the international feedback to crude oil and natural gas imports, exports, and prices.

2. No New Offshore Leasing Scenario
   Build off the ‘Reference Scenario’ and include an issuance of no new offshore leases in the GOM after January 2021, while allowing onshore and offshore drilling to continue for leases before January 2021.
Crude Oil Domestic Production Changes

• Domestic production of crude oil starts to decrease from 2027 (41,000 b/d (barrels/day)) to 2035 (310,000 b/d) in ‘No new leasing’ scenario.
• Total U.S. crude oil production is 1.3% and 2.3% lower in 2030 and 2035 in ‘No new leasing’ scenario relative to the Reference case, respectively.

U.S. Production Under Business As Usual Versus No New Leasing

- Reference Case
- No new leasing
Natural Gas Domestic Production Changes

- Increase in domestic production of natural gas in the ‘No new leasing’ scenario in 2024 and 2025 is due to shifting from offshore gas to onshore shale gas and tight oil. That shift produces greater volumes of associated-dissolved gas and results in an incremental increase in natural gas production.
- Natural gas production starts to decrease in 2026 by 76 MMcf/d (Million ft³/day) through 2035 to a reduction of 1.2 Bcf/d (Billion ft³/day) in the ‘No new leasing’ scenario.
- Total U.S. natural gas production is 0.7% and 1.1% lower in 2030 and 2035 in ‘No new leasing’ relative to the Reference case, respectively.
Crude Oil and Natural Gas Domestic Production from Gulf of Mexico

- Crude oil production in GOM starts to decrease from 2027 (40,000 b/d) to 2035 (320,000 b/d) in ‘No new leasing’ scenario.
- Crude oil production from GOM is 8% and 15% lower in 2030 and 2035 in ‘No new leasing’ scenario relative to the Reference case, respectively.
- Natural gas production in GOM starts to decrease in 2025 by 50 (thousand ft³/day) through 2035 to a reduction of 1350 MMcf/d in ‘No new leasing’ scenario.
- Natural gas production from GOM is 22% and 38% lower in 2030 and 2035 in ‘No new leasing’ scenario relative to the Reference case, respectively.
Brent crude oil prices:
  • Reference: Rises from $46.6/b in 2021 and steadily increases to $81/b
  • No new leasing: crude price increase by $0.90/b by 2035

Henry Hub natural gas prices:
  • Reference: Price decreases from $3.22/MMBtu in 2022 to $2.80/MMBtu in 2024 then rises to $3.53/MMBtu in 2035
    ▪ Follows projected production and demand trends
  • No new leasing: Prices increase slightly by $0.06/MMBtu
Gasoline and diesel prices are $2.36/gallon and $2.51/gallon in 2021, respectively and gradually increase until 2035 in Reference and ‘No new leasing’ scenarios.

• Annual price increase from 2021 to 2035 for gasoline is 0.7% and diesel is 0.9% in both scenarios.
• Gasoline and diesel prices reach $3.01/gallon and $3.45/gallon in 2035 in ‘No new leasing’ scenario and are 2 cents/gallon higher than those prices in Reference case in 2035.
Summary of Findings

<table>
<thead>
<tr>
<th>Emissions (Oil&amp;gas)</th>
<th>Unit</th>
<th>2021</th>
<th>2030</th>
<th>2035</th>
<th>Change (2035-2021)</th>
<th>% Change relative to 2021</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO2 *</td>
<td>Million metric ton</td>
<td>3,699</td>
<td>3,837</td>
<td>3,858</td>
<td>159</td>
<td>4.3%</td>
</tr>
<tr>
<td>CH4 *</td>
<td>Thousand metric ton</td>
<td>7,587</td>
<td>8,854</td>
<td>8,978</td>
<td>1,391</td>
<td>18.3%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Domestic Production</th>
<th>Unit</th>
<th>2021</th>
<th>2030</th>
<th>2035</th>
<th>Change (2035-2021)</th>
<th>% Change relative to 2021</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oil</td>
<td>Thousand barrels per day</td>
<td>11,165</td>
<td>13,763</td>
<td>13,775</td>
<td>2,610</td>
<td>23.4%</td>
</tr>
<tr>
<td>Natural gas</td>
<td>Million cubic feet per day</td>
<td>88,518</td>
<td>103,719</td>
<td>105,845</td>
<td>17,326</td>
<td>19.6%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Price</th>
<th>Unit</th>
<th>2021</th>
<th>2030</th>
<th>2035</th>
<th>Change (2035-2021)</th>
<th>% Change relative to 2021</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oil (Brent)</td>
<td>2020$/barrel</td>
<td>46.6</td>
<td>73.1</td>
<td>81.0</td>
<td>34.4</td>
<td>74.0%</td>
</tr>
<tr>
<td>Natural gas (Henry Hub)</td>
<td>2020$/million btu</td>
<td>3.10</td>
<td>3.33</td>
<td>3.53</td>
<td>0.43</td>
<td>13.9%</td>
</tr>
<tr>
<td>Gasoline</td>
<td>2020$/gallon</td>
<td>2.36</td>
<td>2.81</td>
<td>2.99</td>
<td>0.64</td>
<td>27.0%</td>
</tr>
<tr>
<td>Diesel</td>
<td>2020$/gallon</td>
<td>2.51</td>
<td>3.29</td>
<td>3.43</td>
<td>0.92</td>
<td>36.6%</td>
</tr>
</tbody>
</table>

From 2021 through 2035 and compared to the Reference case, ‘No new leasing’ scenario results in cumulative reductions of:

- 660 MMb domestic oil production
- 2.3 Tcf domestic natural gas production
- 97 million metric ton CO₂
- 470 thousand metric ton CH₄

* Due to the relevant data being unavailable, CO2 and CH4 emissions from oil/gas exploration and production outside U.S. associated with imported oil and gas are not included in this analysis.