

Implications of Changes to MarketSim Baseline

The baseline for the Market Simulation Model (MarketSim) runs and associated greenhouse gas (GHG) analyses supporting the National Program and individual lease sales has historically been based on a modified version of the Annual Energy Outlook (AEO) reference case, provided to the Bureau of Ocean Energy Management (BOEM) by the Energy Information Administration (EIA). This modified version of the AEO reference case assumes no new lease sales on the Outer Continental Shelf (OCS). However, due to changes in energy policy, conditions in energy markets, or other factors, the modified AEO data that BOEM uses for its MarketSim baseline can, in some cases, be outdated by the time policy decisions are made regarding the National Program or individual lease sales. Due to these changes relative to the modeling baseline, questions may arise regarding the validity of the energy substitute displacement effects estimated by MarketSim and the corresponding GHG emissions (carbon dioxide [CO₂], methane [CH₄], and nitrous oxide [N₂O]) impacts.

BOEM's current MarketSim modeling baseline was derived from a special version of the AEO 2023 reference case, constrained to reflect no additional OCS lease sales.^{1,2} In the time since this baseline was developed, U.S. energy policy has changed in several ways, including promulgation of regulations limiting CO₂ emissions from motor vehicles and the electric power sector and various policy shifts since the change in administration in January 2025. Many, though not all, of these changes are reflected in the AEO 2025, which was released in April 2025 and reflects energy policies in place as of December 2024.³

The purpose of this document is threefold. First, this document examines how changes in the baseline are likely to affect MarketSim's projected energy substitute displacement effects and the associated GHG impacts, drawing on the findings of MarketSim sensitivity analyses previously conducted by BOEM. Second, this document assesses the differences between the reference case projections in the AEO 2025 and the current MarketSim baseline used in the various GHG analyses BOEM conducts which support the National OCS Oil and Gas Leasing Program and its underlying lease sales. Third, this document considers energy policy changes by the current Administration not reflected in the AEO 2025 and their potential impacts on the current, 2023 version of MarketSim's projected displacement patterns and supported analyses.

¹ All citations to the constrained AEO 2023 in this document refer to the following source: U.S. Energy Information Administration (EIA), Annual Energy Outlook 2023: special constrained National Energy Modeling System (NEMS) run by EIA for BOEM [dataset], April 2023.

² BOEM requests the constrained AEO reference cases from the Energy Information Administration (EIA). These model runs are based on a constrained NEMS run by EIA's in which all OCS production from as yet unleased OCS tracts is removed from their model. The NEMS then produces a new 'constrained' reference case that BOEM uses as its baseline.

³ The source of all AEO 2025 data described in this document is as follows: U.S. Energy Information Administration, *Annual Energy Outlook 2025*, released April 15, 2025.

1. Impacts of Baseline Changes - Insights from Past Sensitivity Analyses

For insight into the degree to which changes in the baseline relative to the constrained AEO 2023 projections are likely to affect MarketSim's displacement patterns for BOEM's various GHG analyses, BOEM consulted the sensitivity analyses included in the documentation for the 2023 version of MarketSim.⁴ One set of sensitivities included in the documentation focuses specifically on how changes to the model's baseline forecast affect MarketSim's energy displacement impacts. The primary baseline and alternative baselines examined in the analysis included the following:⁵

- **Primary Baseline - 2020 Special National Energy Modeling System (NEMS):** The primary baseline against which the alternative baselines were compared was a constrained version of the AEO 2020 baseline that assumed no new leasing on the OCS.⁶
- **Alternative 1 - AEO 2020:** This baseline scenario relies on the AEO 2020 reference case projection, which includes the new OCS leasing reflected in the AEO 2020 (i.e., the scenario does not constrain new leasing on the OCS).
- **Alternative 2 - 10% increase in demand and supply:** Under this baseline, all categories of demand and supply are 10% greater than under the primary baseline.
- **Alternative 3 - 10% reduction in demand and supply:** Under this baseline, all categories of demand and supply are 10% less than under the primary baseline.
- **Alternative 4 - High electrification and efficiency:** This alternative baseline reflects increased electrification for building heating, vehicle use, and other applications, as well as more rapid improvements in energy efficiency. Unlike the 10% increase and decrease scenarios above, this scenario's deviations from the primary baseline are not uniform across energy sources and change in different directions (e.g., electricity supply and demand increase while oil and gas decline).

Overall, the sensitivity analysis found that MarketSim's estimated displacement of substitute energy effects were relatively insensitive to these changes in the model's baseline projection. Focusing first on the displacement of substitute energy sources when using the AEO 2020 baseline (Alternative 1) versus the primary baseline, the pattern of displacement is quite similar between the two scenarios, as shown in Figure 1. Changes in oil imports make up the largest portion of the projected displacement effect: 55.9% of total displacement when using the primary baseline versus 57.4% when using the AEO 2020 baseline (Alternative 1). This was followed by domestic onshore oil production (12.1% of displacement effects using the primary baseline versus 13.2% using Alternative 1—the AEO 2020 baseline), and domestic onshore natural gas production (11.7% of displacement effects using the primary baseline versus 13.3% using Alternative 1—the AEO 2020 baseline). These similarities highlight that BOEM's use of a constrained AEO case (i.e., with no new OCS leasing) rather than an unconstrained AEO baseline has little impact on MarketSim's projected energy displacement pattern.

⁴ The source for all references to MarketSim throughout this document is as follows: Industrial Economics, Inc. 2023. Consumer surplus and energy substitutes for OCS oil and gas production: the 2023 revised Market Simulation Model (MarketSim). Sterling (VA): US Department of the Interior, Bureau of Ocean Energy Management. 93 p. Report No.: OCS Study BOEM 2023-055.

⁵ The baseline data summarized here are described in detail in Industrial Economics, Inc. 2023, *op cit*.

⁶ The primary baseline is based on a constrained version of AEO 2020 rather than AEO 2023 because the sensitivity analysis was developed prior to the release of the AEO 2023.

Figure 1 also shows that use of the alternative baselines reflecting a 10% increase or decrease in energy demand and supply (Alternative 2 and Alternative 3, respectively) has a minimal effect on MarketSim’s energy displacement projections. The displacement patterns when using these two baselines are nearly identical to those when using the primary baseline and the AEO 2020 baseline (Alternative 1). When applying the high electrification and efficiency baseline (Alternative 4), however, MarketSim’s projected displacement pattern differs somewhat from the pattern projected when using the primary baseline. Although oil imports make up a similar share of displaced energy, domestic onshore oil production accounts for a slightly smaller share of energy substitute displacement (8.6% using this baseline versus 12.1% when using the primary baseline), and reduced demand makes up a larger share of displacement (12.5% versus 9.6%). Electricity produced from sources other than coal, oil and natural gas also makes up a larger, though still small, portion of displacement (5.2% using this baseline versus 1.6% for the primary baseline).

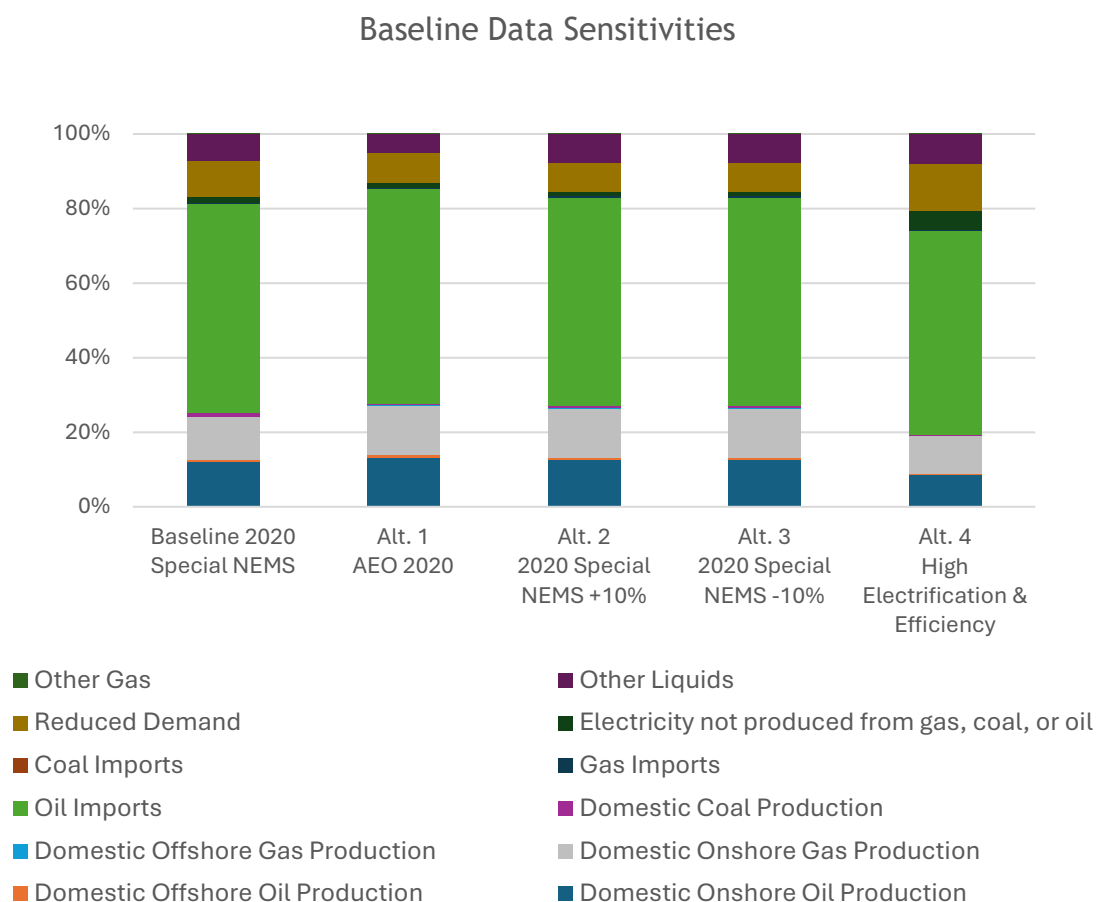


Figure 1. Baseline Sensitivities Substitution Effects Results⁷

⁷ Source: Derived from Figure A-15 and Table A-36 of Industrial Economics, Inc. 2023. Consumer surplus and energy substitutes for OCS oil and gas production: the 2023 revised Market Simulation Model (MarketSim). Sterling (VA): US Department of the Interior, Bureau of Ocean Energy Management. 93 p. Report No.: OCS Study BOEM 2023-055. See Table 2 at the end of this document for the numerical values represented in this figure.

Because the changes in the baseline reflected in these sensitivities are similar to or larger than many of the key changes between the constrained AEO 2023 projection and the AEO 2025 reference case (see discussion in the [Comparison of Baselines](#) section below), this suggests that MarketSim displacement rates using the AEO 2025 baseline would likely be similar to the displacement rates of the current model using the constrained AEO 2023 baseline. In other words, if BOEM were to update the baseline used in the GHG analyses, to the AEO 2025, the estimated displacement effects would likely be similar to any estimates when using the constrained AEO 2023 baseline.

The baseline sensitivity analysis in the MarketSim documentation also takes the sensitivity results one step further by examining the change in GHG emissions impacts estimated by BOEM's Offshore Environmental Cost Model (OECM) for each sensitivity case. The OECM estimates upstream GHG emissions. Although the OECM does not estimate full life cycle GHG emissions examined by BOEM, the OECM results still serve as an indicator of the proportional difference in emissions results when comparing across analyses that rely on different baselines.

Table 1 summarizes these results. The values in the table represent the percent change in estimated GHG emissions under a given baseline relative to the corresponding GHG emissions impact estimated when using the primary baseline. For example, when using the baseline in which energy supply and demand are 10 percent higher (Alternative 2), the estimated CO₂ emissions impact for the displaced energy substitutes is 1.4% higher than when estimated using the primary baseline.

Table 1. Baseline Sensitivities OECM GHG Emissions Percentage Change from Primary Baseline (1,000s of tons)⁸

OCS or Displaced Energy Substitutes	Baseline	CO ₂	CH ₄	N ₂ O
OCS Oil and Gas	Alternative 1 - AEO 2020	-0.1%	-0.1%	-0.1%
	Alternative 2 - 2020 NEMS +10%	-0.4%	-0.2%	-0.4%
	Alternative 3 - 2020 NEMS -10%	-0.4%	-0.2%	-0.4%
	Alternative 4 - High electrification and efficiency	0.5%	0.3%	0.6%
Displaced Energy Substitutes	Alternative 1 - AEO 2020	3.9%	4.8%	3.5%
	Alternative 2 - 2020 NEMS +10%	1.4%	2.0%	0.8%
	Alternative 3 - 2020 NEMS -10%	1.4%	2.0%	0.8%
	Alternative 4 - High electrification and efficiency	-4.1%	-8.9%	-9.1%

As shown in Table 1, the GHG emissions from production of OCS oil and gas, as well as those of substitute energy sources displaced by OCS production, do not change significantly when using the first three of the four alternative baselines modeled in the sensitivity analysis. There are moderate differences between the estimated GHG emissions when using the high electrification and efficiency baseline scenario (Alternative 4) rather than the primary baseline. However, the total amount of energy produced and consumed, and the energy mix across different energy sources differ more significantly from the primary baseline under this baseline scenario than under the other alternative scenarios considered here.

⁸ Source: Adapted from Table A-32 of Industrial Economics, Inc. 2023. Consumer surplus and energy substitutes for OCS oil and gas production: the 2023 revised Market Simulation Model (MarketSim). Sterling (VA): US Department of the Interior, Bureau of Ocean Energy Management. 93 p. Report No.: OCS Study BOEM 2023-055.

In addition, the differences between the high electrification & efficiency scenario (Alternative 4) and the primary baseline are much more significant than the differences between the primary baseline and the AEO 2025 baseline. The high electrification and efficiency baseline (Alternative 4) also reflects shifts in the U.S. energy system that do not align with recent federal policy actions (see discussion of these actions below). Due to these considerations, for the purposes of understanding the potential implications of using the AEO 2025 baseline rather than the current MarketSim constrained AEO 2023 baseline, the sensitivity results based on the first three of the alternative baselines are more relevant than results associated with the high electrification and efficiency baseline (Alternative 4). Thus, these results suggest that the results of BOEM's various GHG analyses performed using the current 2023 version of MarketSim would also not change significantly if BOEM were to use the more recent AEO 2025 baseline data for the MarketSim runs, rather than the constrained AEO 2023 baseline.

2. Comparison of Baselines

To provide insight into the magnitude of the changes between MarketSim runs using the constrained AEO 2023 baseline and the reference case in the AEO 2025, Figure 2 through Figure 6 show both sets of projections for oil, gas, electricity, and coal, respectively. Figure 4 through Figure 6 present the baseline totals for gas, electricity and coal using both sets of data; demand and supply are not shown separately since they are the same for each year. Figure 2, however, shows separate trajectories for domestic oil demand, demand for U.S. oil exports, and U.S. oil production. Because the AEO 2025 (unlike the constrained AEO 2023 baseline) does not include non-U.S. oil production and total non-U.S. demand, it was not possible to show the total size of the global oil market under each baseline scenario.⁹

As shown in Figure 2, U.S. oil production is similar between the two baseline scenarios, with the AEO 2025 baseline showing slightly higher production than the constrained AEO 2023 baseline. For U.S. oil demand, the AEO 2025 trajectory is similar to oil demand from the constrained AEO 2023 baseline from 2025 through 2032, after which time the AEO 2025 shows lower demand than the constrained AEO 2023 baseline. The AEO 2025 baseline for non-U.S. demand of U.S. oil exports is also similar to the constrained AEO 2023 baseline through the early 2030s but exceeds the AEO 2023 trajectory by a growing margin from the early 2030s through 2050. Overall, the patterns in Figure 2 suggest that non-U.S. oil demand may increase in the AEO 2025 relative to the constrained AEO 2023 as U.S. demand declines, allowing U.S. oil production to remain fairly consistent between the two scenarios.

⁹ MarketSim models oil as a global market, in contrast to gas, coal, and electricity, which is models as the U.S. market with exports and imports.

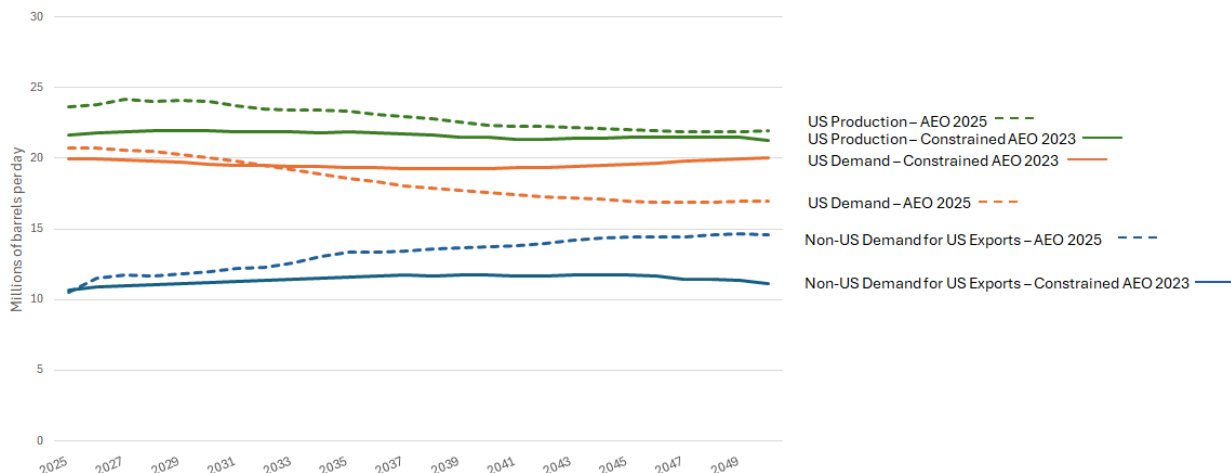


Figure 2. U.S. oil market – differences between AEO 2025 and constrained AEO 2023 baselines

For insight into the degree to which the small difference in U.S. oil production between the AEO 2025 and constrained AEO 2023 baselines reflects the constraint on new OCS leasing rather than other factors, Figure 3 presents projected U.S. oil production from both the AEO 2023 and the constrained AEO 2023 projection. For reference, the figure also presents U.S. oil demand and non-U.S. demand for U.S. oil exports under both scenarios. As shown in the figure, the constraint has virtually no effect on U.S. oil production through the mid-2030s, after which time U.S. production in the (unconstrained) AEO 2023 projection slightly exceeds the constrained AEO 2023 projection. This pattern likely reflects the lag between the issuance of new OCS leases and production from those leases. In order for production to occur on new leases issued between 2025 and the mid-2030s, leaseholders would engage in exploration and development activities to identify viable resources and commence drilling wells for production. These activities are capital-intensive and often require several years to complete before production begins. Because the difference between oil production under the AEO 2025 baseline and constrained AEO 2023 baseline shown above in Figure 2 follows a different pattern (i.e., a narrowing gap over time instead of a widening gap), the difference in production between those two scenarios likely reflects other factors related to each specific baseline scenario.

Figure 3 also shows that U.S. oil demand and non-U.S. demand for U.S. oil exports (crude and refined products combined) are nearly identical between the two AEO 2023 scenarios (constrained and unconstrained).¹⁰ This is consistent with the substitution patterns in Figure 1 that show reduced demand accounts for a relatively small portion of the substitution effects associated with changes in OCS production.

¹⁰ All citations to the unconstrained AEO 2023 in this document are referring to the following source: U.S. Energy Information Administration (EIA), Annual energy outlook 2023, March 16, 2023.

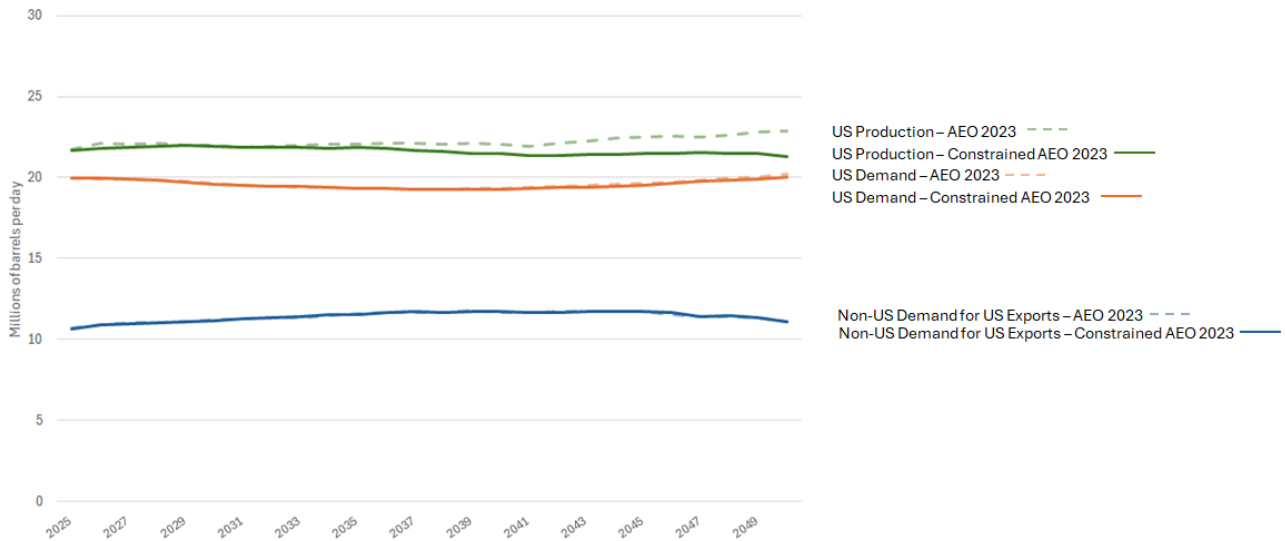


Figure 3. U.S. oil market – differences between constrained and primary AEO 2023 baselines

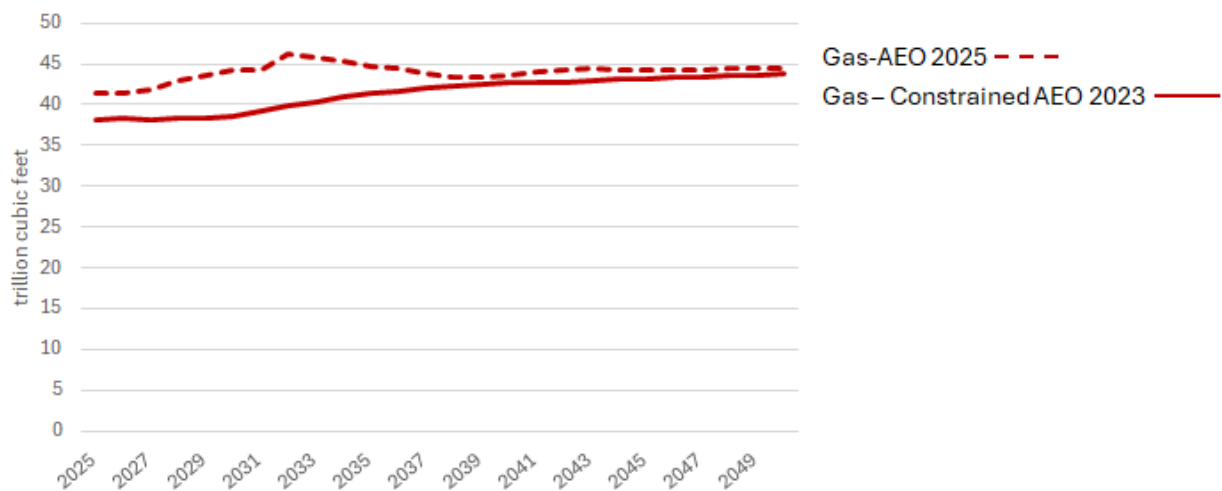


Figure 4. U.S. gas supply – differences between AEO 2025 and constrained AEO 2023 baselines

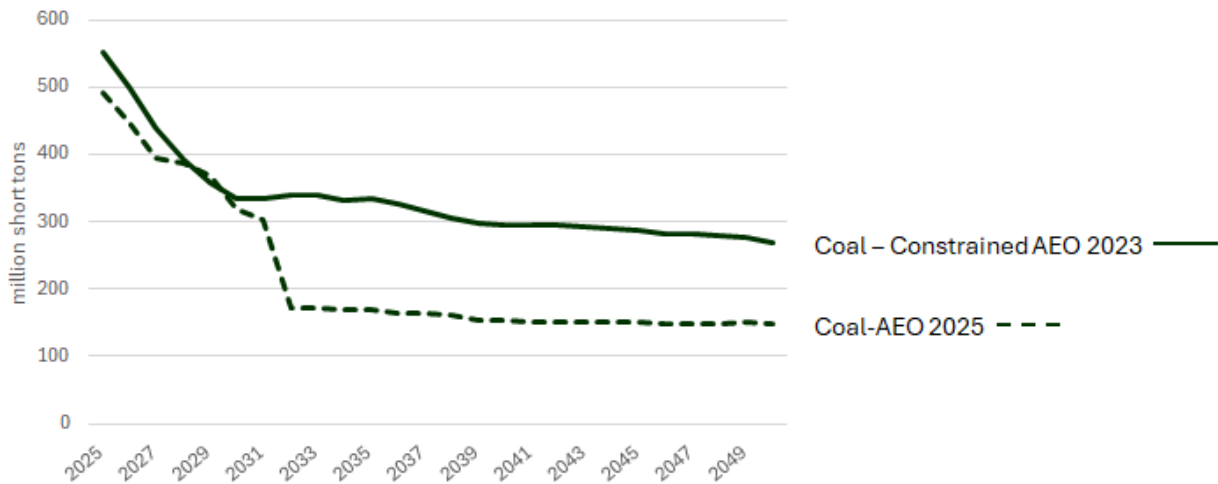


Figure 5. U.S. coal supply – differences between AEO 2025 and constrained AEO 2023 baselines

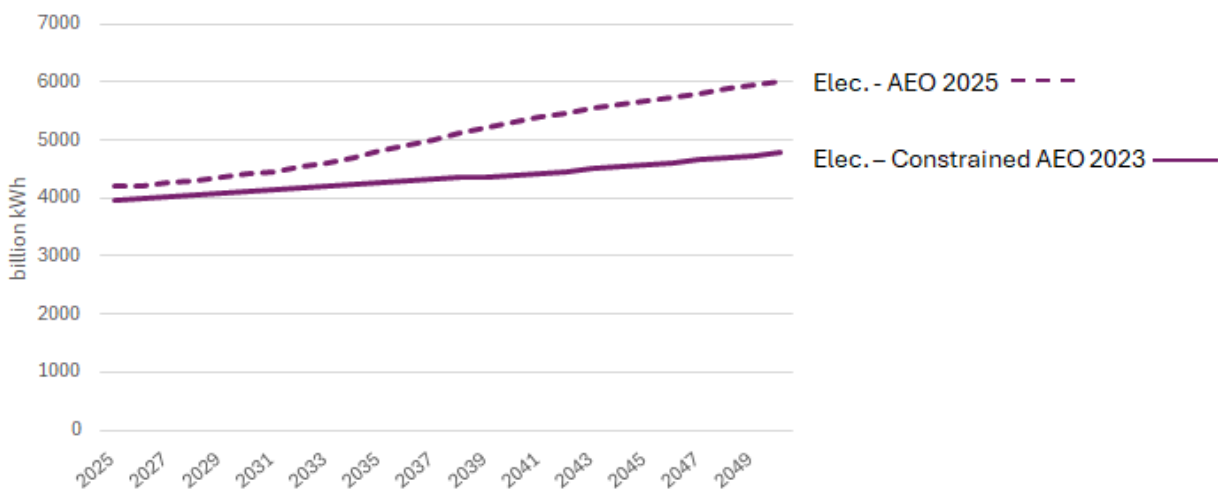


Figure 6. U.S. electricity supply – differences between AEO 2025 and constrained AEO 2023 baselines

Figure 4 shows that the natural gas baseline in the AEO 2025 is similar to the gas baseline in the constrained AEO 2023 data, particularly between the mid-2030s and 2050. For the U.S. coal market, Figure 5 shows that the two sets of baseline data are similar through 2031 but then diverge thereafter, with the AEO 2025 showing a much smaller coal market from the early 2030s through 2050. The size of the U.S. electricity market is also similar between the two baselines through the early 2030s but then grows more rapidly in the AEO 2025 baseline data than in the constrained AEO 2023 baseline, as shown in Figure 6.

Overall, the differences between the AEO 2025 and the constrained AEO 2023 data, considered along with the sensitivity results summarized in the previous section, suggest that updating MarketSim to use the AEO 2025 baseline would not have a significant impact on the model's projected displacement

patterns and the associated GHG emissions impacts. Several of the key metrics of U.S. energy markets shown above change little between the two baselines, and the sensitivity runs summarized above suggest that baseline changes of this magnitude are unlikely to have a significant impact on MarketSim's results. For example, the data in Figure 2 through Figure 4 show that U.S. oil production and U.S. gas production & demand differ little between the two baselines. Although U.S. oil demand declines more rapidly in the AEO 2025 baseline than in the constrained AEO 2023 baseline, non-U.S. demand for U.S. oil exports grows at a higher rate in the AEO 2025. Considering these two effects together (the reduction in U.S. oil demand between the two scenarios and the increase in non-U.S. demand for U.S. oil exports), the overall global demand for U.S. oil changes minimally between the two scenarios. Finally, although the baselines for coal and electricity diverge more significantly after the early 2030s, these differences are unlikely to affect MarketSim's projected displacement patterns, as neither coal nor electricity account for a large share of the displacement effects associated with OCS oil and gas. As shown in Figure 1 above, coal and electricity make up only a minute fraction of the displacement effects estimated by MarketSim across all the scenarios examined in the baseline sensitivity analysis.¹¹

3. Implications of Recent Policy Changes

The AEO 2025 data presented above reflect policies that were in place as of December 2024. Since that time, there has been a change in presidential administrations, resulting in several U.S. energy policy changes. These changes and their potential impacts on the displacement effects estimated by BOEM for various GHG analyses using the current constrained AEO 2023 baseline, include the following:

- **Liquefied natural gas (LNG) exports:** The new administration is prioritizing growth in U.S. LNG exports and recently approved Venture Global's export permit for its proposed CP2 LNG export project in Louisiana. The Delfin LNG deepwater port license offshore Louisiana was also approved in March 2025 and once operational will be the nation's first deepwater port to export LNG. The Department of Energy has also rescinded a policy implemented by the previous administration that had required LNG terminal developers to meet certain requirements before DOE would consider a request to extend the deadline to commence exports. The likely increase in LNG exports associated with these and related policy changes are unlikely to have a significant impact on MarketSim's projected displacement effects. Although increased LNG exports may put upward pressure on U.S. gas prices and dampen U.S. gas consumption, the sensitivity results presented in Figure 1 above suggest that even a 10 percent reduction in the demand for natural gas (and other fuels) may have little impact on MarketSim's projected displacement effects.¹²
- **Promotion of domestic oil and gas production:** Shortly after the change in administration in January 2025, the President issued executive orders¹³ prioritizing domestic oil and gas production. Key provisions of these executive orders include declaring a national energy emergency, directing department and agency heads to facilitate energy development and production on federal and non-federal land, directing departments and agencies to accelerate the issuance of permits for energy and mining projects, rescinding regulations under the National

¹¹ Although the displacement effects related to electricity shown in Figure 1 do not reflect electricity produced from natural gas, coal, or oil, these displacement effects are reflected in the results for gas, coal, and oil shown in the figure. Therefore, the conclusions presented here regarding gas, coal, and oil would apply to electricity produced from these fuels.

¹² As noted above, one caveat to this conclusion is that sensitivity test results are not readily available for any alternative baselines that reflect moderate changes from the primary baseline that move in opposite directions for different energy sources (e.g., moderate increase in oil supply and demand and moderate reduction in supply and demand of natural gas).

¹³ Declaring a National Energy Emergency (EO 14156), Unleashing American Energy (EO 14154)

Environmental Policy Act, and directing departments and agencies that regulate energy activities to incorporate a five-year sunset clause into new regulations issued under certain statutes. Given that the initiatives outlined in the executive orders have only begun to be implemented, at this time it would be difficult and uncertain to determine how these will affect the AEO 2025 baseline relative to the baseline included in the constrained AEO 2023 data summarized above. However, based on the alternative baseline sensitivity analysis results shown in Figure 1 above for the constrained AEO 2020 versus the unconstrained AEO 2020, the addition of a moderate amount of oil and gas production resulting from these policies to the baseline (e.g., the oil and gas production associated with all new OCS leases) is unlikely to affect the displacement patterns projected by MarketSim.

- **Promotion of coal:** To promote increased U.S. production of coal, the President issued Executive Order (E.O.) 14261, which directs the Department of the Interior, Department of Energy, and the Department of Agriculture to identify coal resources on federal lands and prioritize coal leasing. Among other measures, the E.O. also directs DOI to process applications for reductions in federal coal lease royalty rates. Taken together, these initiatives are likely to increase U.S. coal production relative to the downward shift shown in the AEO 2025 (see Figure 5). The extent to which the E.O. will result in increased coal production is uncertain at this time. However, because coal makes up only a small fraction of the displacement effects estimated by MarketSim (see Figure 1 above), an increase in baseline coal production and use is unlikely to affect the displacement pattern projected by MarketSim.
- **Rollback of decarbonization efforts:** Since the change in administration in January 2025, federal policies with respect to decarbonization have changed significantly, with many federal decarbonization initiatives suspended or cancelled. This includes the U.S. withdrawal from the Paris Climate Agreement, the withdrawal of all areas from new offshore wind leasing and prohibiting agencies from issuing new or renewed approvals and permits pending completion of a comprehensive assessment, the revocation of an Executive Order from the previous administration (E.O. 14057) that had encouraged the development of renewable energy, the rollback of certain energy efficiency regulations, and the cancellation of certain grants issued under the Inflation Reduction Act to promote various decarbonization-related projects. In addition, the recent changes in policy include a de-prioritization of building and vehicle electrification, which will at least partially offset the increase in electrification reflected between the constrained AEO 2023 baseline and the AEO 2025 baseline.

Overall, this policy shift may lead to increased U.S. energy consumption and production over time and affect the composition of U.S. energy production (e.g., increased fossil fuel production and reduced renewable energy production). The degree to which these policy changes will cause a deviation from the displacement effects estimated by MarketSim when using the constrained AEO 2023 baseline is uncertain, as a number of other factors will continue to increase the adoption of renewables and more efficient energy technologies. These include state policies that require or encourage the adoption of these technologies (e.g., incentives for heat pump adoption), local building codes requiring the use of more energy-efficient equipment, and cost reductions for energy efficient technologies and renewable technologies (e.g., rooftop solar) as producers of these technologies continue to innovate and produce at larger scales.

- **Effects of tariffs:** As of the time of this writing, the U.S. had imposed tariffs on imports from nearly every country, ranging from as low as 10% to as high as 145%. In response, several countries imposed retaliatory tariffs on U.S. goods and services. Due to these changes in trade

policy, the global economic outlook has become more uncertain, and economic forecasts have shifted relative to forecasts published in early 2025. The overall effect of these developments on the displacement patterns estimated by MarketSim is not clear. In this uncertain economic environment, energy consumers and producers may respond to changes in energy prices differently than currently represented in MarketSim, and these changes may not be uniform across energy sources.

The recent changes in federal policy are a significant departure from the policy assumptions reflected in the AEO 2025 (which includes assumptions and policies as of December 2024). The AEO 2025 reflected a policy-related shift in emphasis from fossil fuels to a less carbon-intensive energy system compared to the AEO 2023. If the current policy and guidance remains in place and is fully implemented over time, BOEM expects some of the differences between the AEO 2025 and the constrained AEO 2023 to narrow over time. The implications of these policy changes for the displacement rates estimated by MarketSim using the constrained AEO 2023 baseline and the corresponding emissions estimates are outlined below. This information is presented separately by energy source.

- Oil:** Recent policy changes encouraging increased U.S. oil production coupled with the increase in U.S. oil production in the AEO 2025 relative to the constrained AEO 2023 suggest that baseline oil production in the coming years will be higher than reflected in the constrained AEO 2023. The magnitude of this shift is uncertain, though the increase in production may take several years to materialize since exploration and development activity (e.g., drilling wells and constructing gathering pipelines) will precede production and these steps require substantial time to complete. The implications of the increase in baseline oil production for the displacement pattern projected by MarketSim and the associated GHG impacts are also uncertain. The baseline sensitivity results presented in Figure 1 and Table 1, however, suggest that a moderate increase in baseline oil production is unlikely to have a significant effect on the displacement patterns projected by MarketSim. For example, adding the oil production associated with all future OCS leases into the baseline (i.e., Alternative 1 in Figure 1 compared to the Primary Baseline) had little impact on MarketSim's displacement pattern. The results in Figure 1 and Table 1 also suggest that up to a 10% increase in baseline oil production will not have a significant impact on estimated displacement patterns and GHG impacts.
- Gas:** The current policy changes include some policies that will lead to increased domestic gas production relative to the constrained AEO 2023 baseline and others that may drive production downward. With respect to the former, increased fossil fuel leasing on federal lands and an increase in the number of approvals for LNG export terminals are likely to lead to increased gas production. Regarding the latter, shifts in policy away from decarbonization and electrification of the buildings and motor vehicle sectors may reduce electricity demand, which would in turn reduce demand for natural gas used to produce electricity. On balance, BOEM expects the current policy changes, when fully implemented, to lead to an increase in gas production relative to the constrained AEO 2023 baseline. Although the de-emphasis on electrification in current policy will likely shift the electricity trajectory downward (i.e., closer to the constrained AEO 2023 trajectory in Figure 6 rather than the AEO 2025 trajectory), the shift in current policy away from renewable power generation would suggest that reductions in electricity production are likely to affect renewable power generation more than gas-fired generation.

The overall magnitude of the potential increase in baseline gas production is uncertain. Similarly, the implications of this increase for the displacement pattern projected by MarketSim and the associated GHG impacts are also uncertain. The baseline sensitivity results presented in Figure 1

and Table 1, however, suggest that a moderate increase in baseline gas production is unlikely to have a significant effect on the displacement patterns projected by MarketSim. For example, adding the gas production associated with all future OCS leases into the baseline (i.e., Alternative 1 in Figure 1 compared to the Primary Baseline) had little impact on MarketSim's displacement pattern. The results in Figure 1 and Table 1 also suggest that up to a 10% increase in baseline gas production will not have a significant impact on estimated displacement patterns and GHG impacts.

- Coal:** The current policies encouraging increased coal production and de-emphasizing renewable power generation will likely increase baseline coal production relative to the projection in the AEO 2025, thereby closing the gap between coal production in the constrained AEO 2023 and the AEO 2025 (see Figure 5, which shows higher coal production under the constrained AEO 2023 baseline than under the AEO 2025 baseline). Thus, to the extent that the recent changes in policy reverse the policy-related downward shift in coal production between the constrained AEO 2023 and the AEO 2025, the former may be a more accurate representation of future coal production under current policy than the AEO 2025. Regardless of which baseline is the more accurate representation of coal markets going forward, the recent policy changes related to coal are unlikely to have a significant impact on MarketSim's projected displacement rates or the associated GHG impacts since coal makes up just a small fraction of the substitution effects estimated by MarketSim when using a range of baselines (see Figure 1 above).
- Electricity:** The current policy changes include some measures that may put upward pressure on electricity consumption and production (e.g., the elimination of the Environmental Protection Agency's EnergyStar program and policies to promote data center development) and others that are likely to reduce electricity demand (e.g., reducing incentives for vehicle electrification). In addition, policies that emphasize dispatchable fossil fuel power resources over renewables may shift the composition of electricity generation toward the former. Based on the available information, it is unclear whether the net effect of recent policy changes will be an increase or decrease in electricity production relative to the constrained AEO 2023 baseline. In either case, BOEM does not expect that the change in baseline electricity production will have an appreciable effect on the displacement pattern projected by MarketSim or the associated GHG impacts. As shown in Figure 1 above, electricity accounts for a small portion of the substitution effects projected by MarketSim across the sensitivity analyses performed by BOEM. Even when using the high electrification and efficiency baseline (Alternative 4), which as noted above is less relevant than the other alternative baselines, electricity represents just 5% of MarketSim's projected displacement effects.

Taken together, policy-related deviations from the constrained AEO 2023 baseline will have an uncertain impact on the energy displacement pattern projected by MarketSim and the associated GHG emissions effects. Considering these potential changes to the baseline in conjunction with the sensitivity tests presented above, however, it does not appear likely that these baseline changes would appreciably affect MarketSim's projected energy displacement pattern. Although the exact magnitude of the changes in baseline energy production is uncertain, the sensitivity analyses summarized in Figure 1 suggest that the substitution patterns projected by MarketSim would not be highly sensitive to these changes. For oil and gas, the sensitivity analysis involving the constrained versus unconstrained AEO (Alternative 1) showed that augmenting the baseline with all oil and gas production associated with future OCS leases has minimal effect on the substitution pattern projected by MarketSim. To the degree that the increase in U.S. oil and gas production associated with recent policy changes is of similar magnitude to the oil and gas production on future OCS leases, this result suggests that policy-related changes to the oil and gas

baseline are not likely to have a significant impact on MarketSim’s projected energy displacement patterns. In addition, because both coal and electricity make up only a small fraction of the substitution effects projected by MarketSim regardless of the baseline used, the policy-related changes in baseline coal and electricity production are unlikely to have a significant effect on MarketSim’s projected substitution patterns.

4. Key Findings

The information presented above provides several key insights regarding the MarketSim baseline and the degree to which changes relative to the constrained AEO 2023 baseline currently used in MarketSim are likely to affect the model’s projected energy displacement pattern and the associated GHG impacts. These findings include the following:

- The sensitivity analyses presented in Section 1 suggest that MarketSim’s energy displacement patterns are not highly sensitive to small to moderate changes in the baseline projection included in the model.
- The differences between the AEO 2025 and the constrained AEO 2023 data, coupled with the baseline sensitivity results, suggest that updating MarketSim to use the AEO 2025 baseline would not have a significant impact on the model’s projected displacement patterns and the associated GHG emissions impacts. The baseline comparisons in Figure 2 through Figure 4 show that U.S. oil production and U.S. gas production & demand differ little between the two baselines. Although the baselines for coal and electricity diverge more significantly after the early 2030s between the AEO 2025 and constrained AEO 2023, these differences are unlikely to affect MarketSim’s projected displacement patterns, as neither coal nor electricity account for a large share of the displacement effects associated with OCS oil and gas (as shown in Figure 1).
- Recent policy changes will likely eventually lead to increased domestic production of oil, natural gas, and coal and will have competing (i.e., offsetting) effects on electricity production. While the impact of these changes on MarketSim’s projected energy displacement pattern is uncertain, the information available from the sensitivity analyses presented in Section 1 suggests that major changes in MarketSim’s energy displacement patterns are unlikely. The results of these sensitivity analyses, as summarized in Figure 1, show that MarketSim’s energy displacement pattern does not change significantly with moderate changes in baseline oil and gas production. In addition, because coal and electricity account for only a small fraction of MarketSim’s energy displacement effects, policy-related changes in baseline coal and electricity production are unlikely to have an appreciable impact on the energy substitution pattern projected by MarketSim.

Supplemental Table

Table 2. Numerical Values for Baseline Sensitivities Shown in Figure 1

Substitute Energy Source Displaced	Baseline 2020 Special NEMS	Alt. 1 AEO 2020	Alt. 2 2020 Special NEMS +10%	Alt. 3 2020 Special NEMS 10%	Alt. 4 High Electrification & Efficiency
Onshore Oil & Gas Production	23.7%	26.5%	25.9%	25.9%	18.8%
Domestic Onshore Oil Production	12.1%	13.2%	12.6%	12.6%	8.6%
Domestic Onshore Gas Production	11.7%	13.3%	13.3%	13.3%	10.2%
Offshore Oil & Gas Production	0.5%	0.8%	0.6%	0.6%	0.4%
Domestic Offshore Oil Production	0.5%	0.7%	0.5%	0.5%	0.4%
Domestic Offshore Gas Production	0.1%	0.1%	0.1%	0.1%	0.1%
Imports	56.4%	57.9%	56.4%	56.4%	55.1%
Oil Imports	55.9%	57.4%	55.9%	55.9%	54.7%
Gas Imports	0.5%	0.5%	0.5%	0.5%	0.4%
Coal Imports	*	*	*	*	*
Domestic Coal Production	1.0%	0.6%	0.5%	0.5%	0.1%
Electricity from Sources Other Than Coal, Oil, and Natural Gas**	1.6%	1.3%	1.2%	1.2%	5.2%
Other Energy Sources ***	7.2%	5.0%	7.5%	7.5%	8.0%
Reduced Demand	9.6%	8.1%	7.9%	7.9%	12.5%

Note: The estimates in this table represent the volume of a specific substitute energy source (as the percent of potential OCS production) that is displaced by potential OCS production (or in the case of the last row, energy not displaced which is an increase in demand) modeled to result from the OCS exploration and development scenario used in this sensitivity testing. For example, the volume of onshore natural gas displaced by new OCS production is estimated at 12% of potential production assumed in the scenario. Numbers may not sum due to rounding.

* Value is less than 0.5% and thus rounds to 0%.

** Includes electricity from wind, solar, nuclear, and hydroelectric sources. BOEM does not assign life cycle GHG emissions to these energy sources. For the upstream, BOEM does not currently have the data needed to determine how much renewable energy generation is reduced by either curtailing utilization of existing capacity or building of new capacity on the OCS. For the midstream, only nuclear would have modeled emissions, which would be de minimis. None of these sources would have any downstream emissions.

*** Includes primarily natural gas liquids (roughly 80%), with the balance from biofuels, refinery processing gain, product stock withdrawal, liquids from coal, and “other” natural gas not captured elsewhere. BOEM does not assign upstream, midstream, or downstream GHG emissions with biofuels, which is a very small portion of “Other Energy Sources” that would be de minimis.

References

- Industrial Economics, Inc. 2023. Consumer surplus and energy substitutes for OCS oil and gas production: the 2023 revised Market Simulation Model (MarketSim). Sterling (VA): US Department of the Interior, Bureau of Ocean Energy Management. 93 p. Report No.: OCS Study BOEM 2023-055.
- U.S. Energy Information Administration (EIA), Annual Energy Outlook 2023: special constrained NEMS run by EIA for BOEM [dataset], April 2023.
- U.S. Energy Information Administration, Annual Energy Outlook 2025, released April 15, 2025.