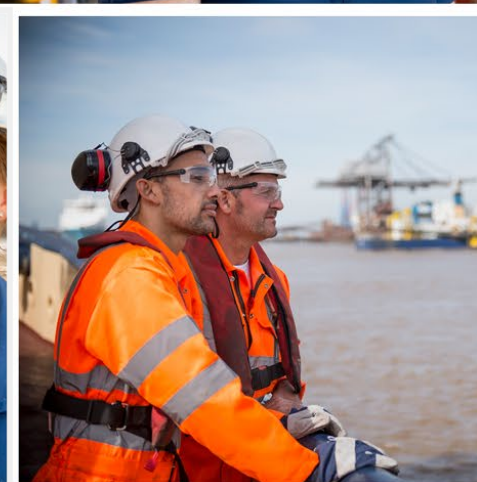
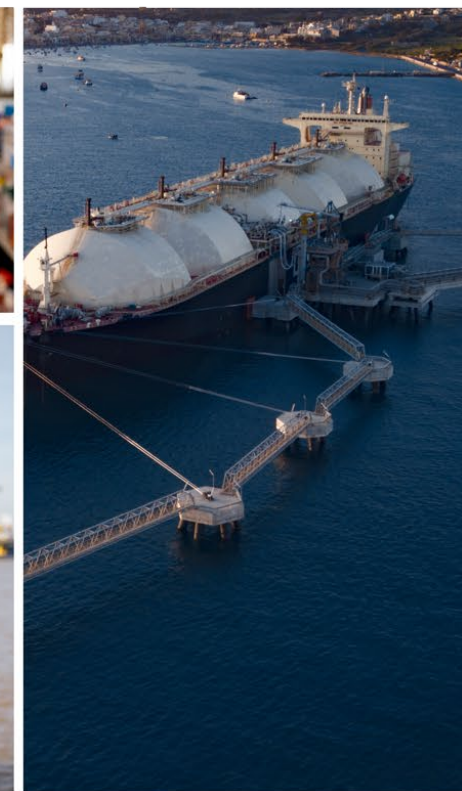


The Consequences of a Leasing and Development Ban on Federal Lands and Waters

Prepared for the American Petroleum Institute
Prepared By OnLocation, Inc.

September 2020



Executive Summary

Modeled impacts of stopping oil and gas development offshore and on federal lands

The goal of this analysis is to project the impact that stopping leasing and development on federal lands and offshore would have on oil and gas production, energy prices, the economy, employment and the American consumer through 2030

Energy Security Impacts

- Net Imports Of Crude Oil Rise by 2 MMB/D by 2030
- Net Exports Of Natural Gas Decrease by 0.8 Tcf by 2030
- U.S. Pays A Cumulative Extra \$0.5 Trillion (\$2018) To Foreign Energy Suppliers
- Offshore Oil And Gas Production Are Down By 44 And 68 Percent in 2030, Respectively

Economic Impacts

- GDP Cumulative Decline Totals \$0.7 Trillion (\$2018)
- Relative to the Reference Case in 2022, Job Losses Peak Around 1 Million And Average 416,000 jobs
- Relative to the Reference Case in 2022, Wyoming And New Mexico Lose Over 5 Percent Of The *Total* Jobs In Each State.
- Relative to the Reference Case Texas Loses Almost 120,000 Jobs In 2022

Environmental Impacts

- Hold On To (Do Not Retire) 31 GWe of Coal Capacity
- Coal Generation Initially Increases by 6 Percent and continues to increase by 15 Percent In 2030
- CO2 Emissions Increase by an Average of 58 MMT And Keep Rising to Represent a 5.5 Percent Increase by 2030

- **This *analysis*** follows the one released in February that addressed the impact of a ban on fracking and federal leasing
- **The goal** of this analysis is to project the impact that stopping leasing and development on federal lands and offshore would have on oil and gas production, energy prices, the economy, employment and the American consumer
- **By modifying assumptions** going into the Energy Information Administration's National Energy Modeling System (NEMS), which is a well-known and vetted model, we can develop an objective assessment of the potential impacts on the US
 - To distinguish the model and analysis from that conducted by EIA, the model is referred to as NFS-NEMS, see Caveats and Assumptions at the end of the report
 - EIA Caveats on NEMS and the Reference Case are provided at the back of the presentation and can be found here <https://www.eia.gov/outlooks/aeo/pdf/aeo2019.pdf>

Background

Starting Point

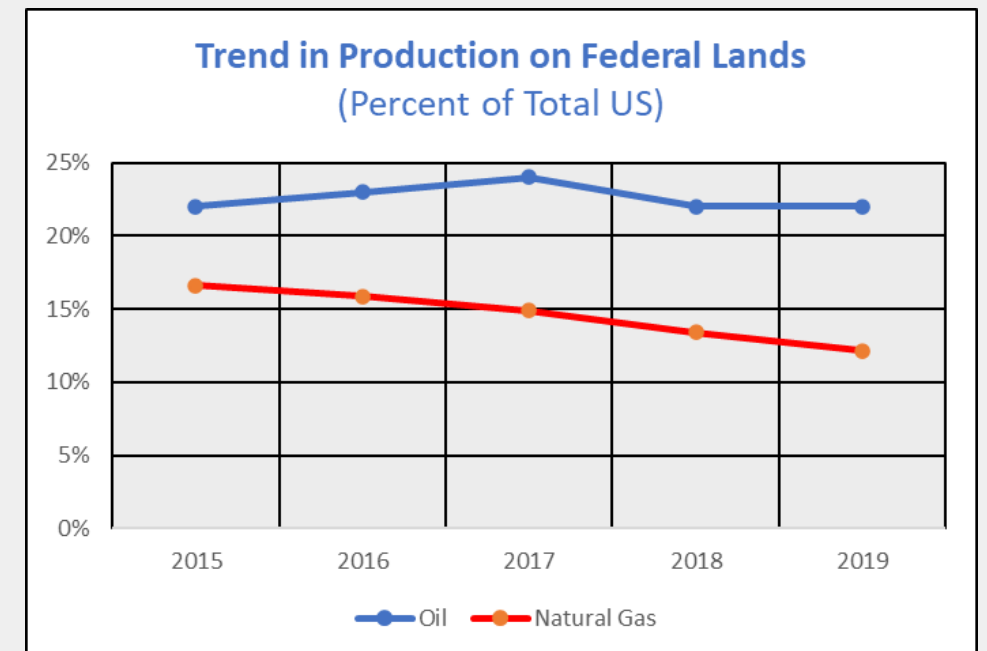
- In 2019, Federal lands accounted for 22% and 12% of total oil and gas production, respectively
- Offshore production represented 71.5% and 24.3% of Federal Production in 2019
- The graph shows the trend in federal lands and waters production over the last 5 years

This Analysis Assumed No Further Development on Federal Lands or Offshore

- All New development offshore was stopped
- Development of onshore federal lands was stopped
- No further development in the North Slope of Alaska

2019				
	Oil (MMB/Day)		Natural Gas (TCF)	
Federal Production *	2.67		4.37	
<i>Offshore</i>	1.91	71.5%	1.06	24.3%
<i>Onshore</i>	0.76	28.5%	3.31	75.7%
Total Production **	11.99		36.20	
Federal % of Total	22%		12.1%	
<i>Offshore</i>	15.9%		2.9%	
<i>Onshore</i>	6.4%		9.2%	

* From DOI/BLM: <https://revenue.data.doi.gov/downloads/production-by-month/>
 ** EIA



Approach

Starting Point

- We assumed stopping federal leasing would reduce future production and development at the state level by its historical 2017 share
- The reduction was applied to each state's future oil and gas production is shown in the table
 - For example, production from oil fields in Utah were assumed to produce only 72.3% of what they otherwise would have ($1 - .277 = .723$)
- The states shown represent the vast majority of the total production from onshore federal leased lands
 - Wyoming, New Mexico, and Colorado accounted for 88% of total onshore natural gas produced on federal land in 2017
 - The six states listed with oil production account for 96% of onshore oil production on federal land

2017 Federal Lands Share %

Excluded Amount

	Oil	NG
California	5.6%	
Colorado	4.1%	41.6%
New Mexico	51.9%	66.8%
North Dakota	9.0%	14.2%
Texas		9.0%
Utah	27.7%	63.2%
Wyoming	51.0%	92.1%

Source: U.S. Crude Oil and Natural Gas Production in Federal and Nonfederal Areas, Updated October 23, 2018, Congressional Research Service:

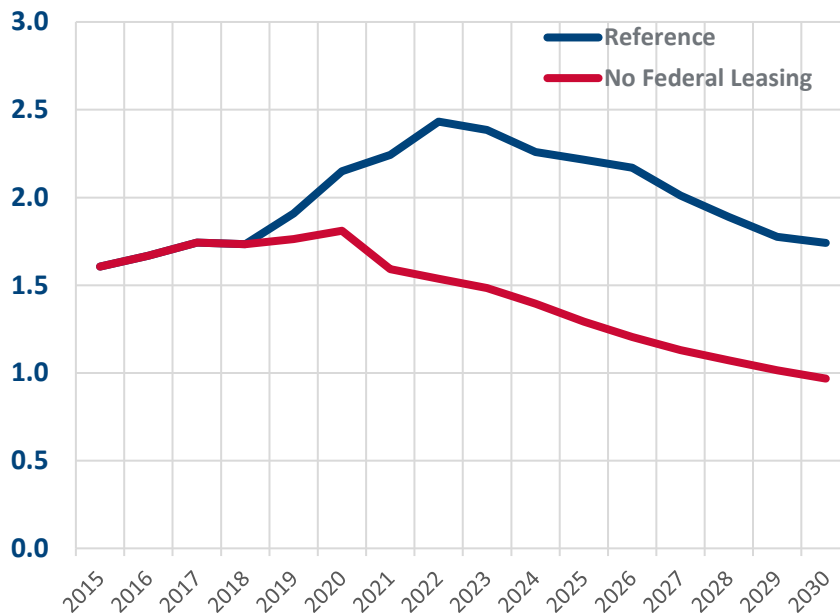
<https://crsreports.congress.gov/product/pdf/R/R42432>

Production and Energy Security Impacts

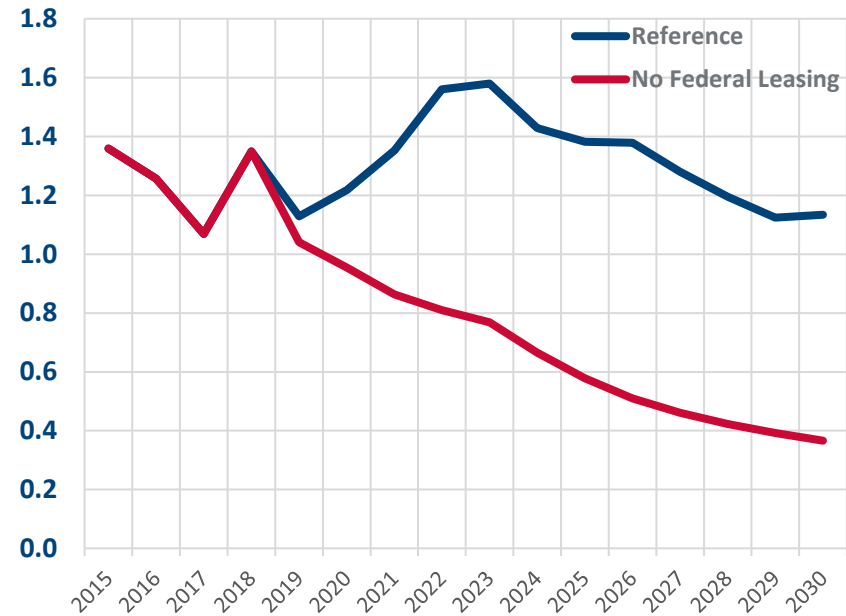
Impact on Energy Security:

Significantly Reduced Offshore Production

Crude Oil Production - Lower 48 Offshore
(MMb/d)



Natural Gas Dry Production - Lower 48
Offshore (Tcf)

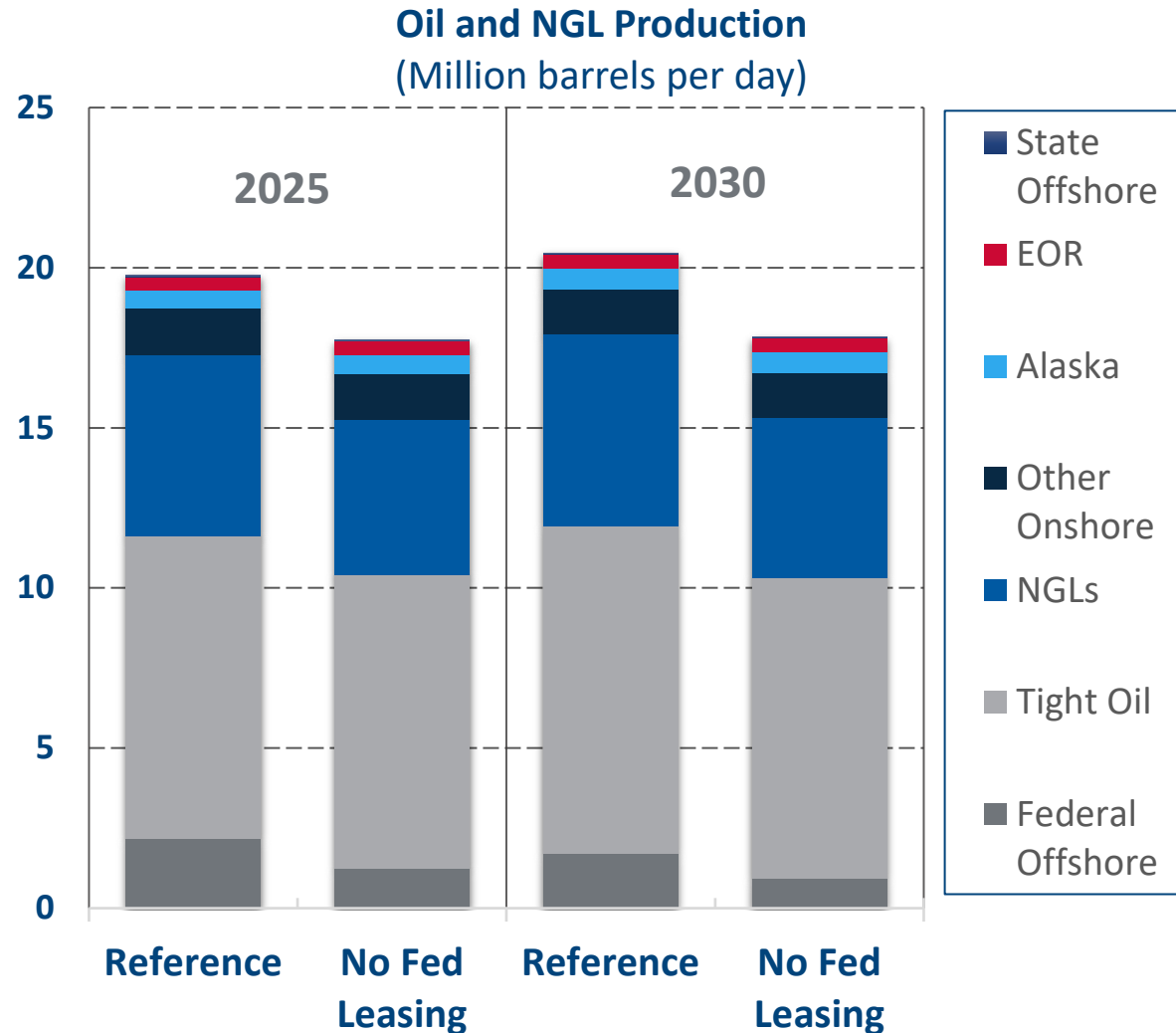


All new development offshore was stopped giving rise to a significant reduction in the oil and gas supplies from the Gulf of Mexico

- Oil production is down 44 percent by 2030
- Natural gas production is down 68 percent by 2030

Impact on Energy Security:

Oil Production Declines by Nearly 13%

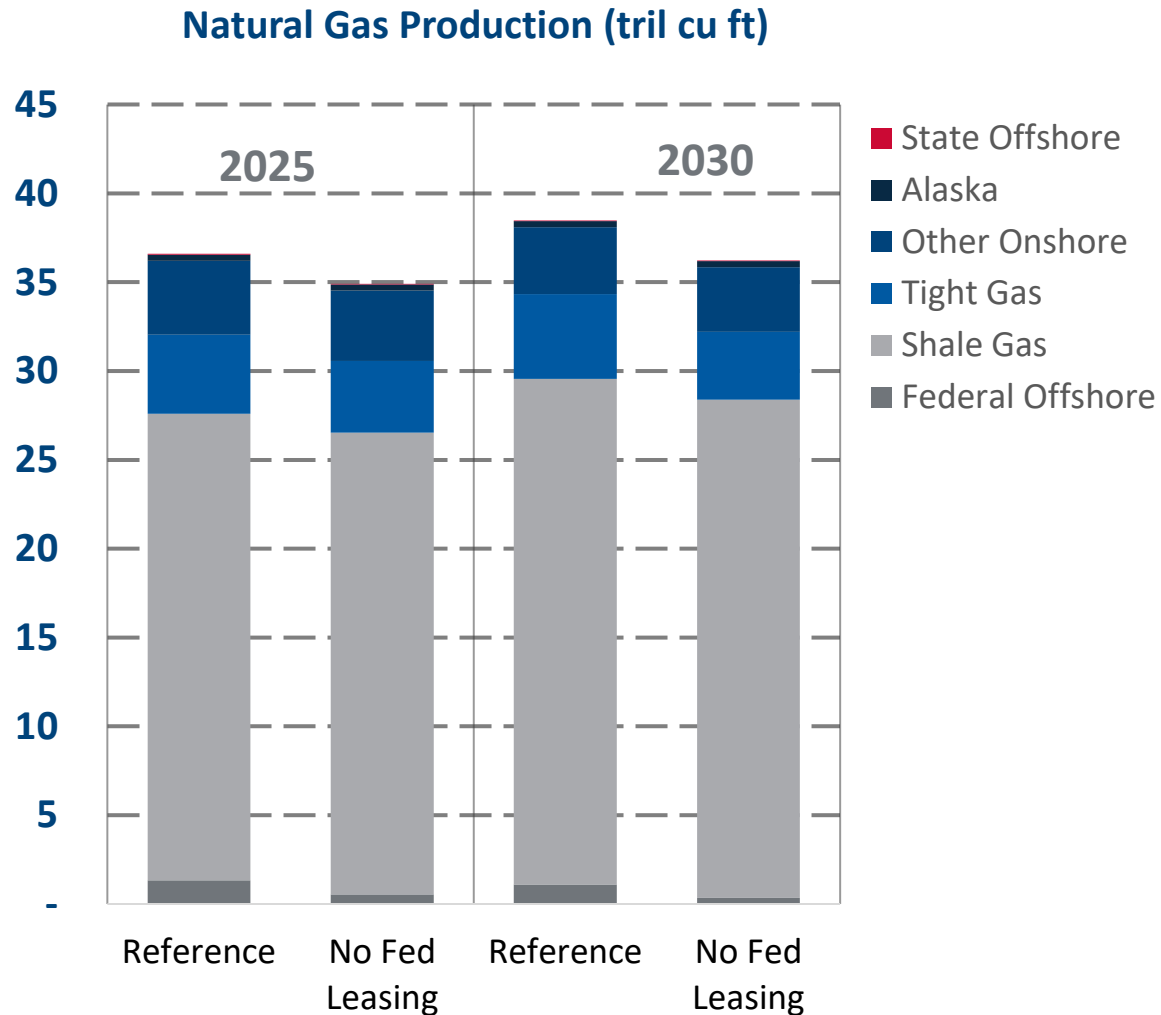


Losing access to federal lands and offshore waters reduces total oil production by 2.62 MMB/D in 2030, a 12.8% reduction from Reference case

	Federal Offshore	EOR	Alaska	NGLs	Other Onshore	State Offshore	Tight Oil	Grand Total
2025								
Reference	2.18	0.42	0.58	5.67	1.45	0.04	9.42	19.76
No Fed Leasing	1.25	0.42	0.58	4.86	1.44	0.04	9.15	17.74
DELTA	-0.92	0.01	0.00	-0.81	-0.01	0.00	-0.28	-2.02
2030								
Reference	1.71	0.45	0.63	6.00	1.41	0.03	10.22	20.45
No Fed Leasing	0.94	0.46	0.63	5.03	1.39	0.03	9.36	17.84
DELTA	-0.77	0.01	0.00	-0.97	-0.02	0.00	-0.86	-2.62

Impact on Energy Security:

Natural Gas Production Decreases By 6%



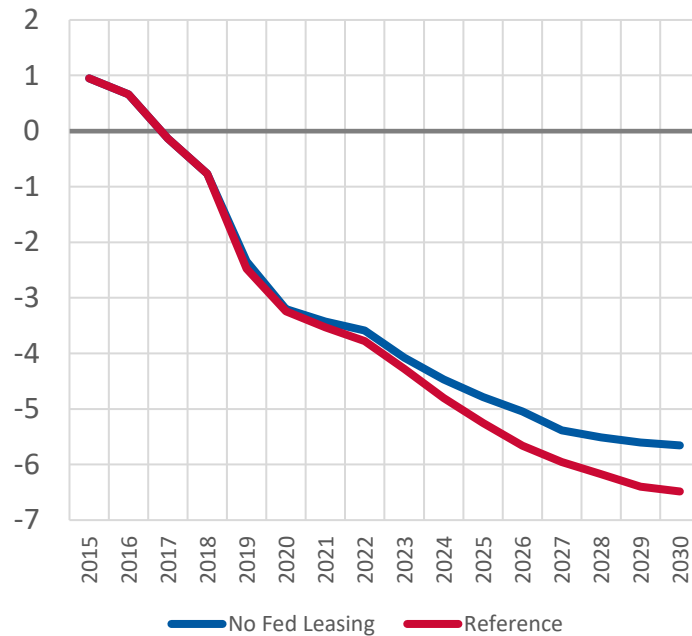
Losing access to federal lands and offshore reduces total dry natural gas production by 2.26 TCF in 2030, a 5.9% reduction from Reference Case

	Federal Offshore	Shale Gas	Tight Gas	Other Onshore	Alaska	State Offshore	Grand Total
2025							
Reference	1.34	26.26	4.45	4.17	0.34	0.04	36.59
No Fed Leasing	0.53	25.99	4.05	3.96	0.34	0.04	34.91
Delta	(0.80)	(0.27)	(0.40)	(0.21)	0.00	(0.00)	(1.68)
2030							
Reference	1.10	28.45	4.77	3.77	0.35	0.03	38.47
No Fed Leasing	0.34	28.06	3.82	3.63	0.35	0.03	36.21
Delta	(0.77)	(0.39)	(0.95)	(0.15)	(0.00)	(0.00)	(2.26)

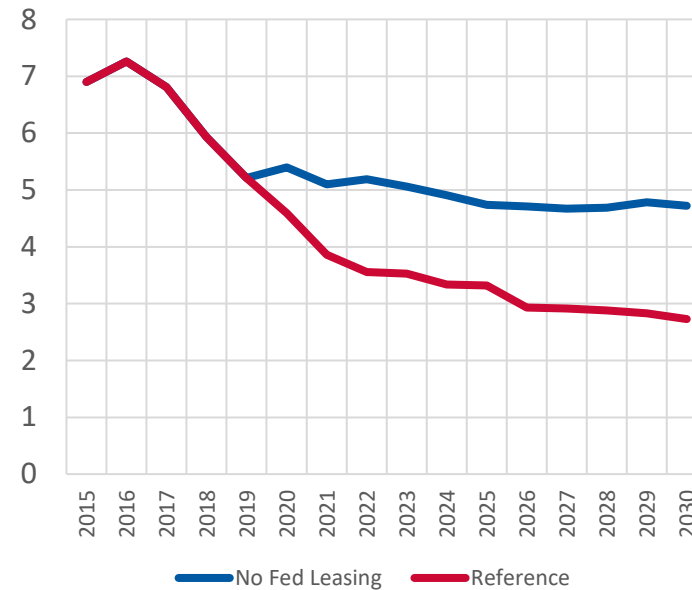
Impact on Energy Security:

Increased Reliance on Foreign Energy

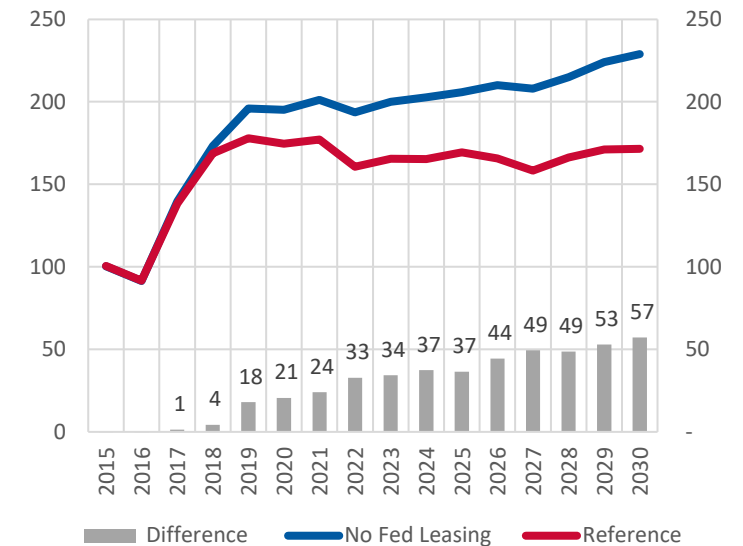
Natural Gas Net Imports (tril cu ft)



Crude Oil Net Imports (Million barrels per day)



Expenditures on Net Imports of Crude Oil & Petroleum Products (billion 2018 \$)



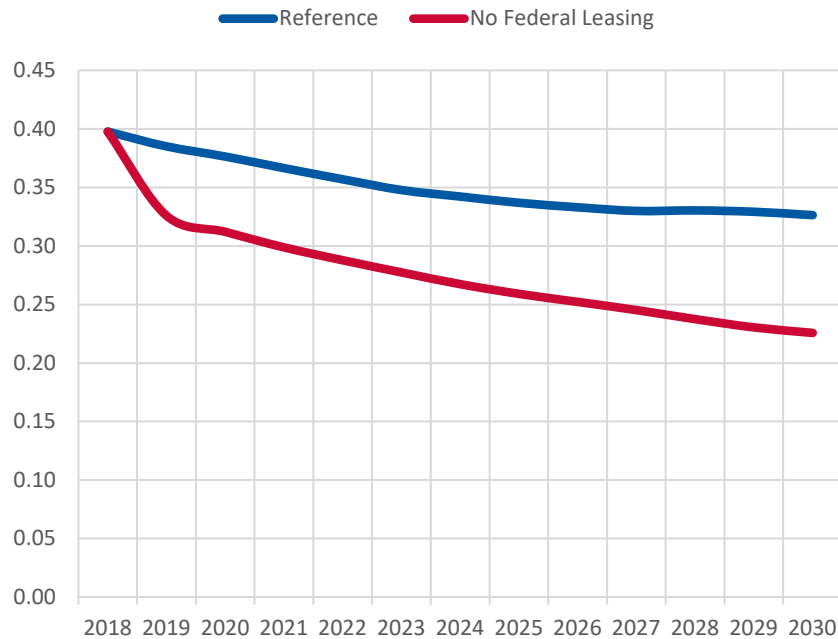
Stopping new oil and gas development on federal lands results in lower oil and natural gas production and a corresponding impact on exports

Expenditures on net imports of oil paid to foreign energy suppliers rise to over \$500 billion

Impact on Energy Security:

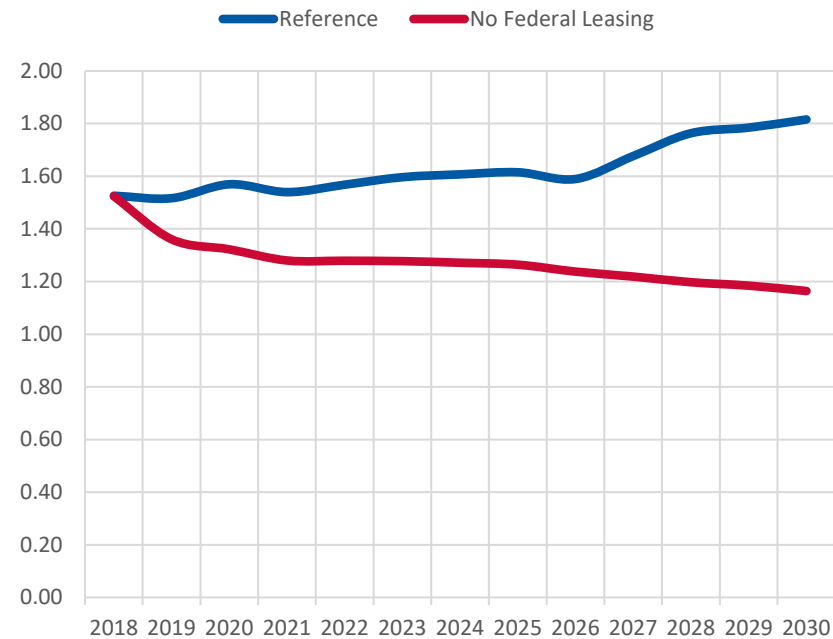
New Mexico and Wyoming See Largest Production Decrease

Wyoming Crude Oil Production (MMb/d)



Total state oil production is **down 31 percent** from what it otherwise would have been

Wyoming Dry Natural Gas Production (Tcf)

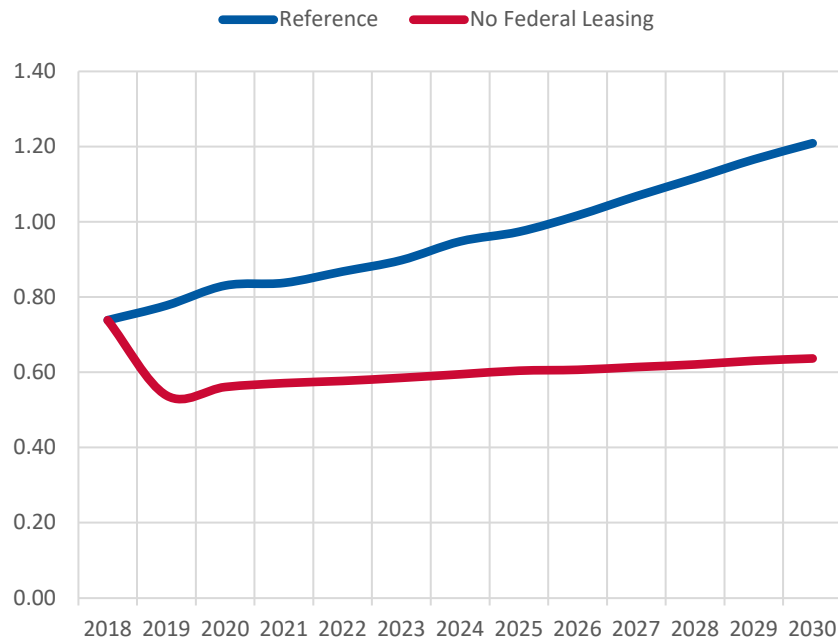


Total state natural gas production is **down 36 percent** from what it otherwise would have been

Impact on Energy Security:

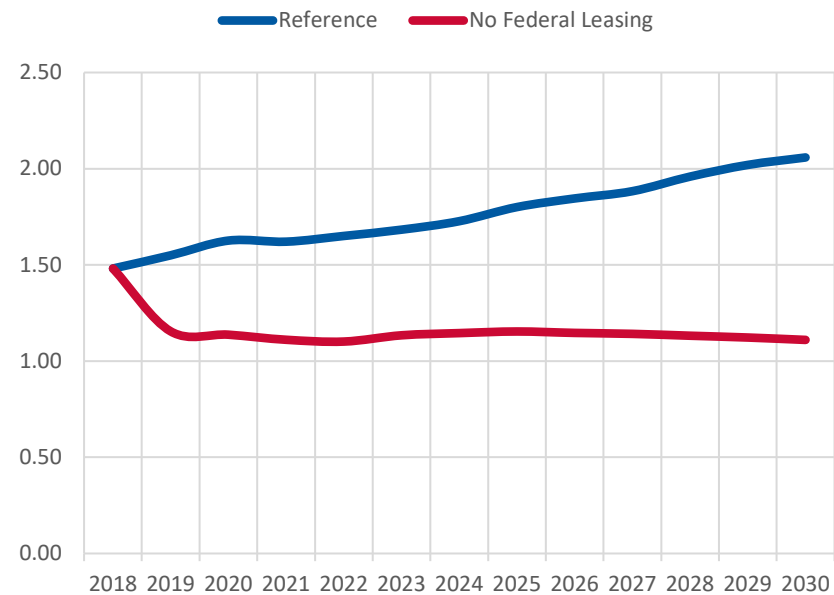
New Mexico and Wyoming See Largest Production Decrease

New Mexico Crude Oil Production (MMb/d)



Total state oil production is **down 47 percent** from what it otherwise would have been

New Mexico Dry Natural Gas Production (Tcf)

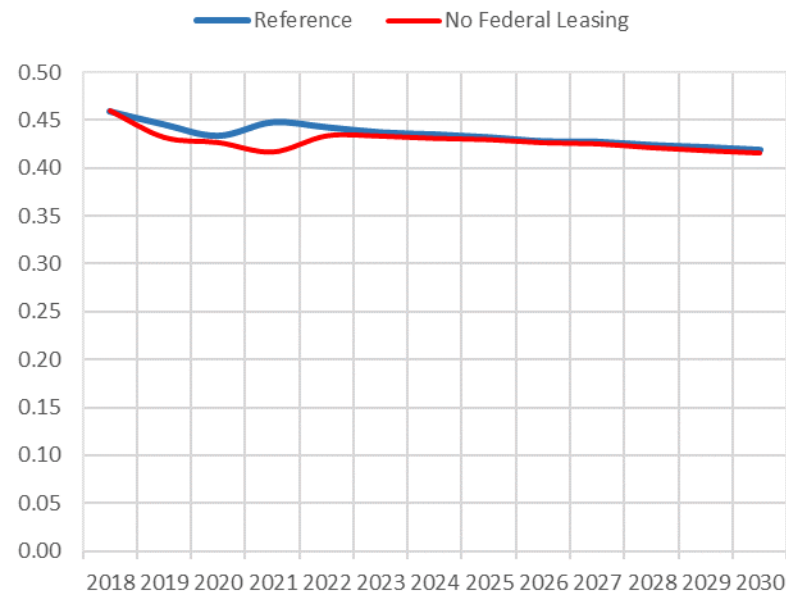


Total state natural gas production is **down 46 percent** from what it otherwise would have been

Impact on Energy Security:

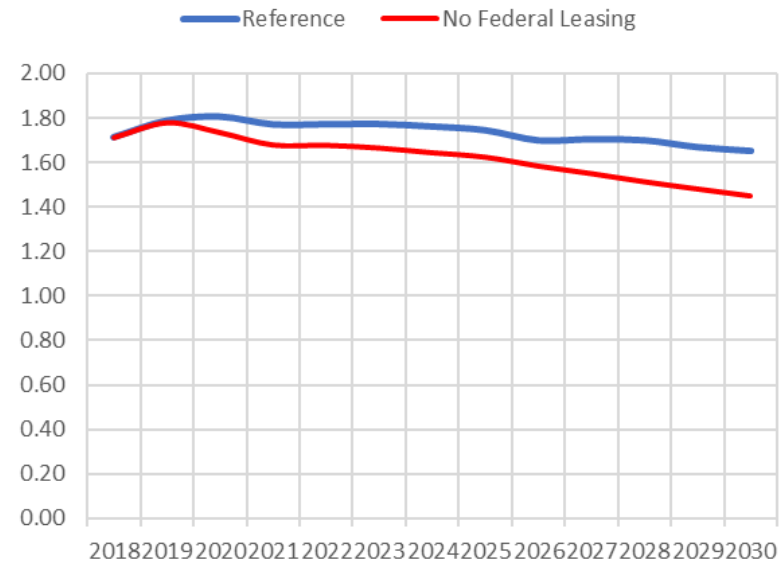
Total Colorado Production Decreases

Colorado Crude Oil Production (MMb/d)



Total state oil production is **down 7 percent in 2021** and **down 1% by 2030** from what it otherwise would have been

Colorado Dry Natural Gas Production (Tcf)

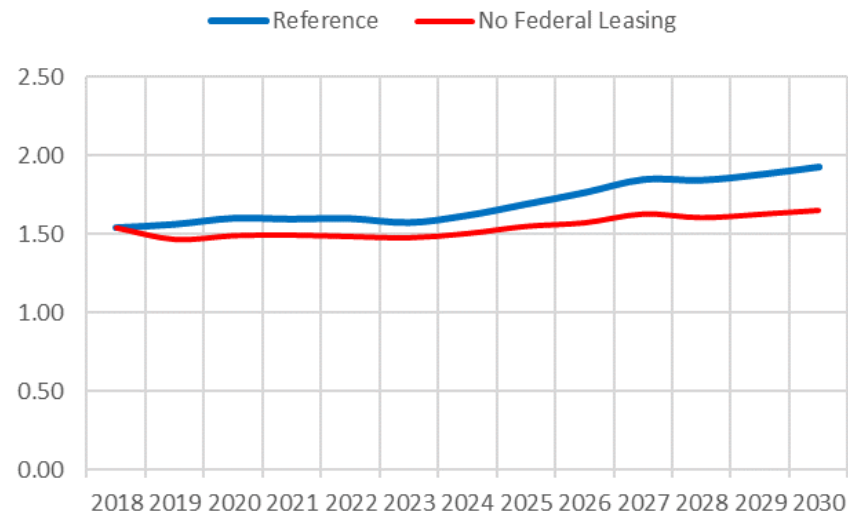


Total state natural gas production is **down 12 percent** from what it otherwise would have been

Impact on Energy Security:

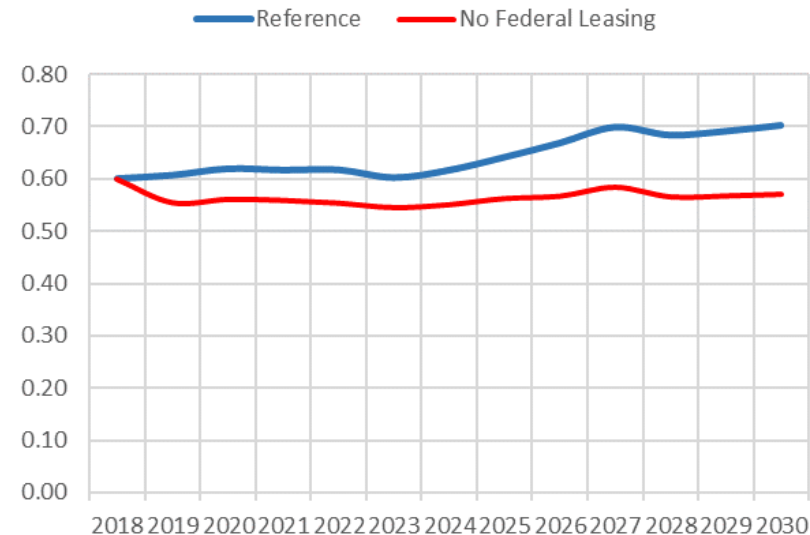
North Dakota Production Decreases

North Dakota Crude Oil Production (MMb/d)



Total state oil production is **down 14 percent** from what it otherwise would have been

North Dakota Dry Natural Gas Production (Tcf)

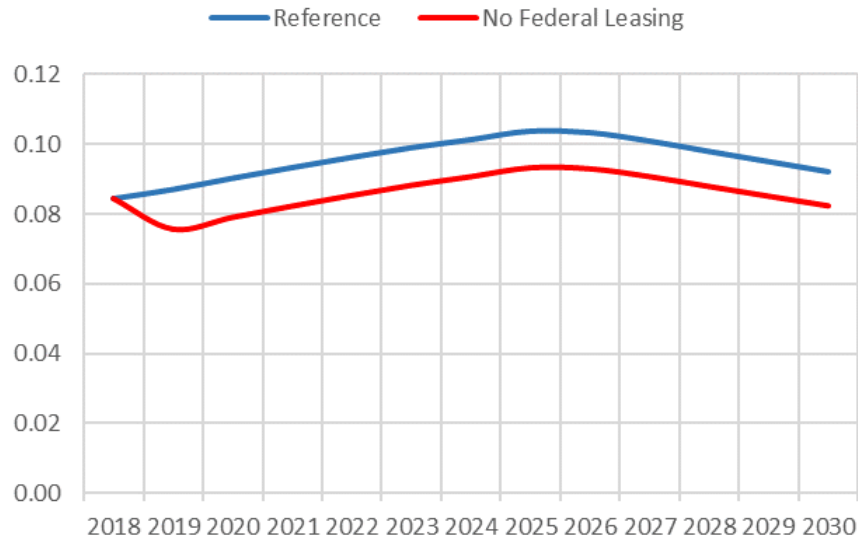


Total state natural gas production is **down 19 percent** from what it otherwise would have been

Impact on Energy Security:

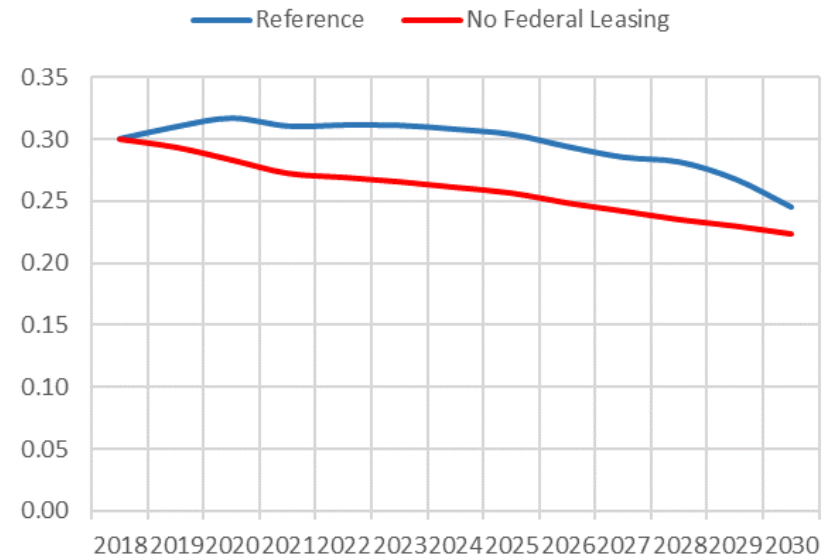
Utah Production Decreases

Utah Crude Oil Production (MMb/d)



Total state oil production is **down 11 percent** from what it otherwise would have been

Utah Dry Natural Gas Production (Tcf)



Total state natural gas production is **down 16 percent** in 2025 and **down 9 percent** by 2030 from what it otherwise would have been

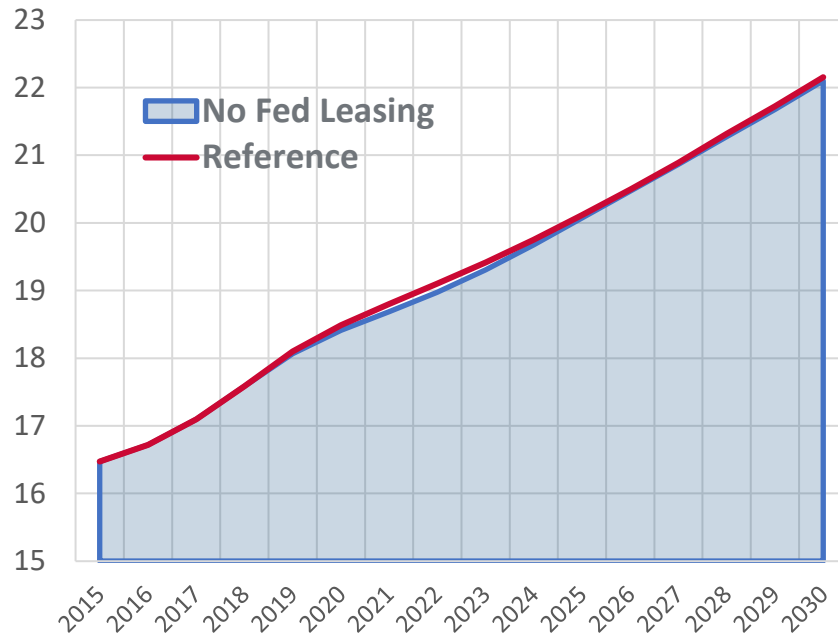
Economic Impacts



Economic Impact

GDP Decreases by \$700 Billion By 2030

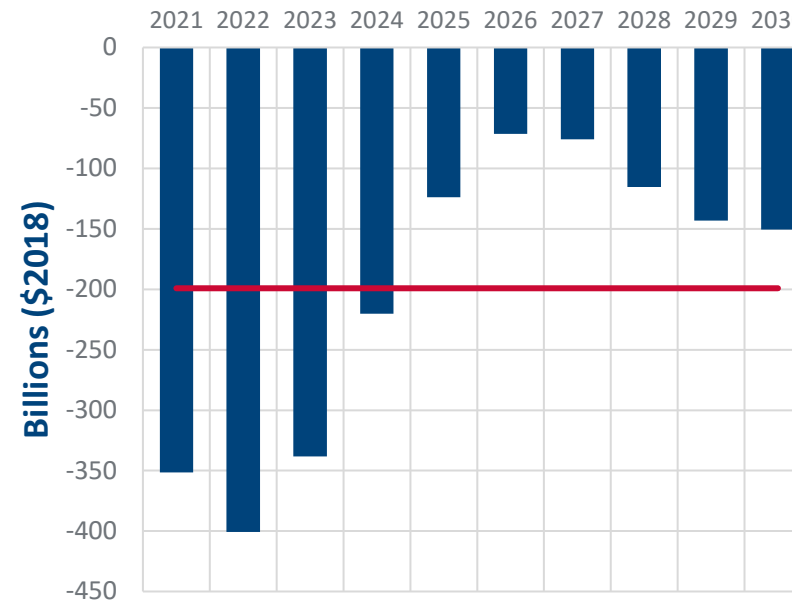
Real Gross National Product



Immediately following the Federal Leasing Restrictions are implemented, the U.S. economic growth slows

Lower U.S. energy production and higher energy prices reduce GDP by a cumulative \$0.7 trillion

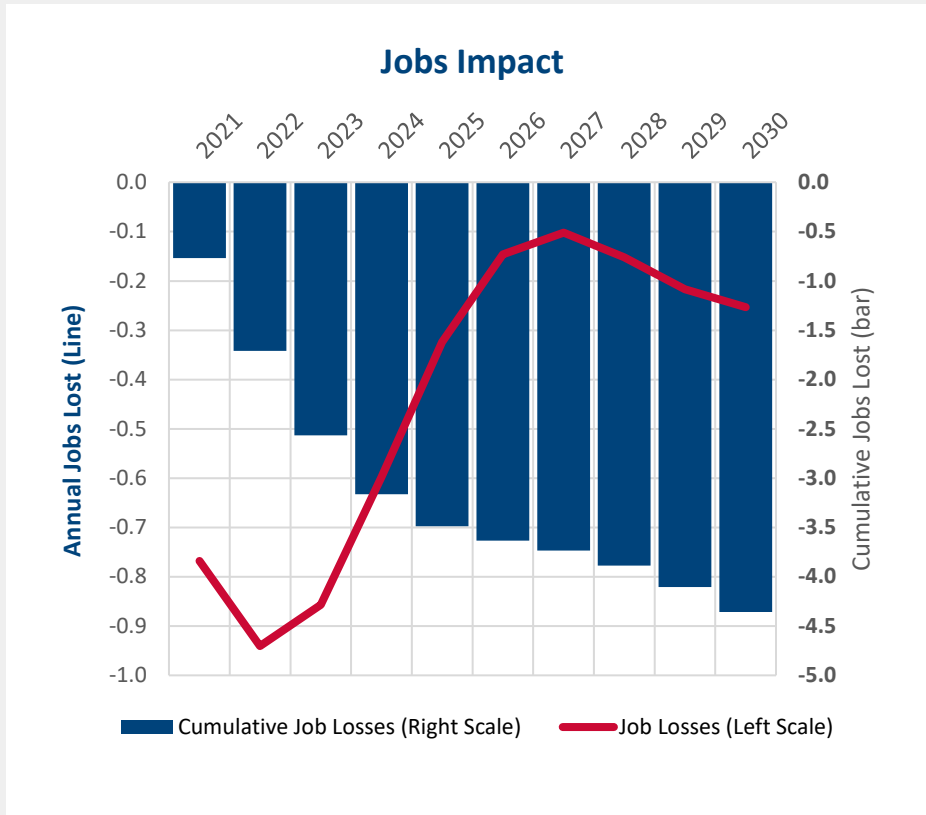
GDP Per Capita (\$2018) Restricted Federal Leasing vs Reference



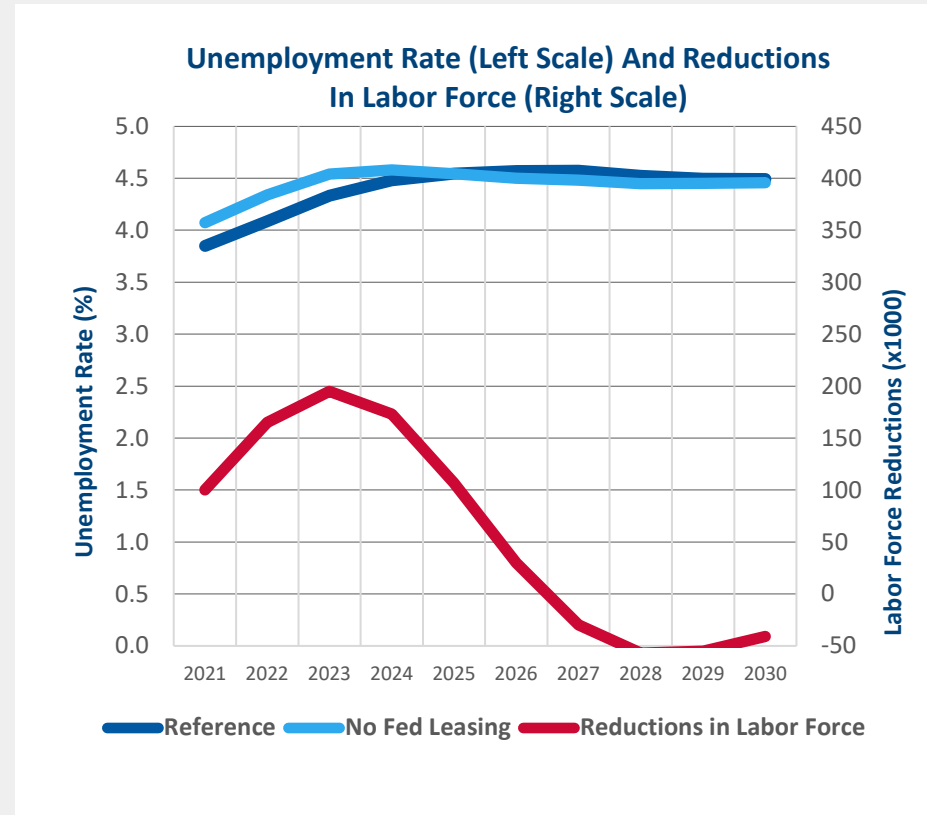
GDP per capita decline \$200 (\$2018) on average and peak at \$401

Economic Impact

Nearly 1 Million Jobs Lost by 2022



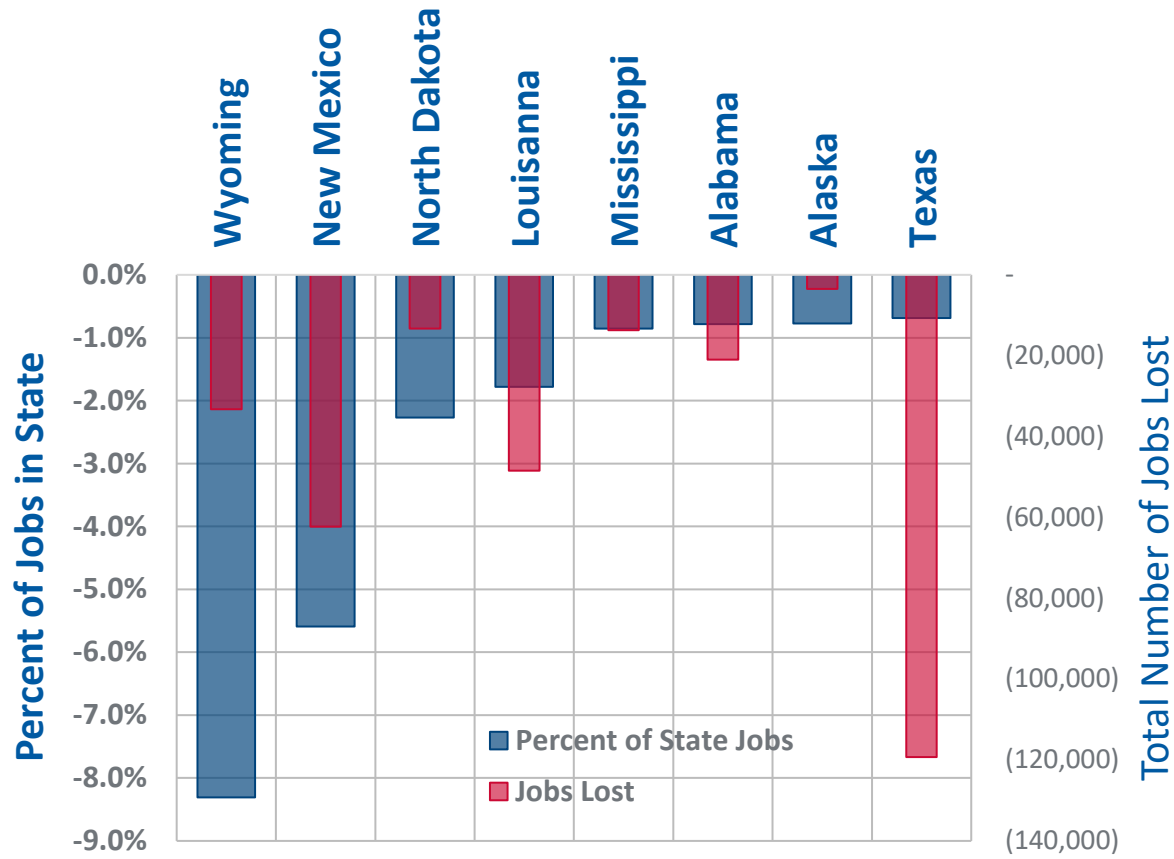
Jobs Lost: Job losses in the U.S. economy could average over **436 thousand** through 2030, peaking at **936 thousand jobs** lost in 2022



- There is an uptick in unemployment that is felt disproportionately in the oil and gas producing states
- The labor force shrinks by about 150,000 jobs during the initial 5 years

Economic Impact

Jobs Lost In Top States *



Jobs Losses in 2022

- ✓ Total Projected Peak Jobs Lost was 936,000
- ✓ Top 10 State Losses Total 518,000 Jobs
- ✓ Wyoming and New Mexico lose more than 5% of the total jobs in each state, respectively
- ✓ Texas loses almost 120,000 jobs

* The NEMS modeling system does not provide state level employment impacts, only national and regional employment impacts. Total state level employment was allocated to match NEMS modal values. Direct state level employment impacts were allocated based on current federal revenue in each state. Indirect and induced state level employment impacts were based each states population.

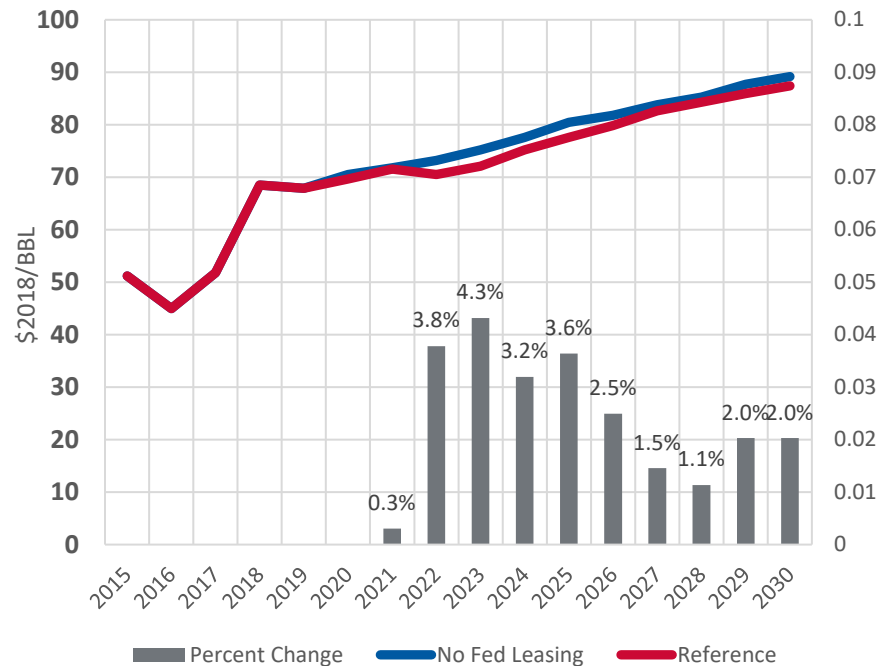
Economic Impact

Energy Prices Increase



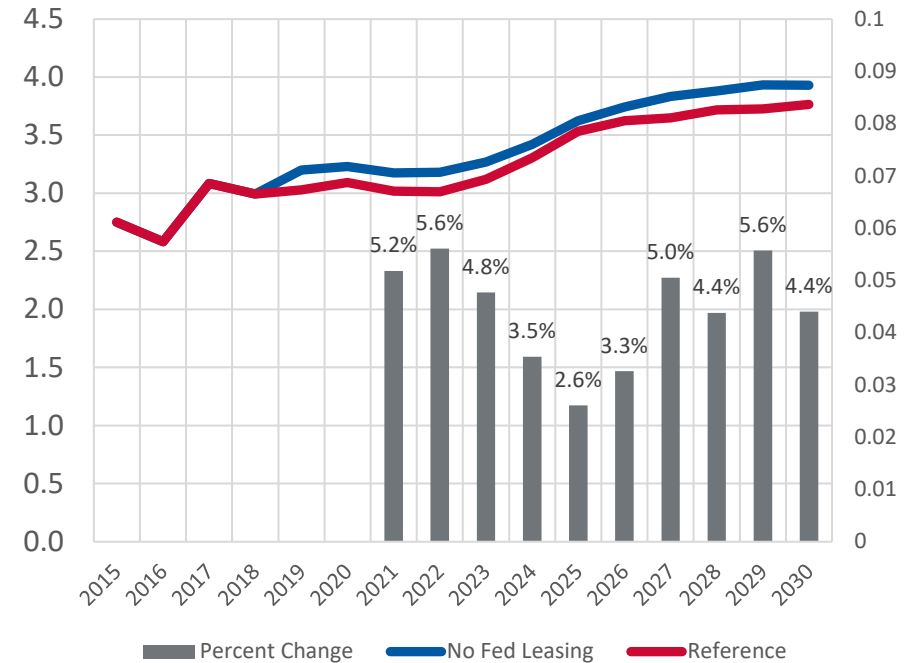
Projections from publicly-available
information and OnLocation analysis

WTI Crude Oil Spot Price (2018 \$/bbl)



Stopping oil production on federal leases leads to a modest increase in domestic oil prices

Henry Hub Natural Gas Price (2018 \$/mmBtu)

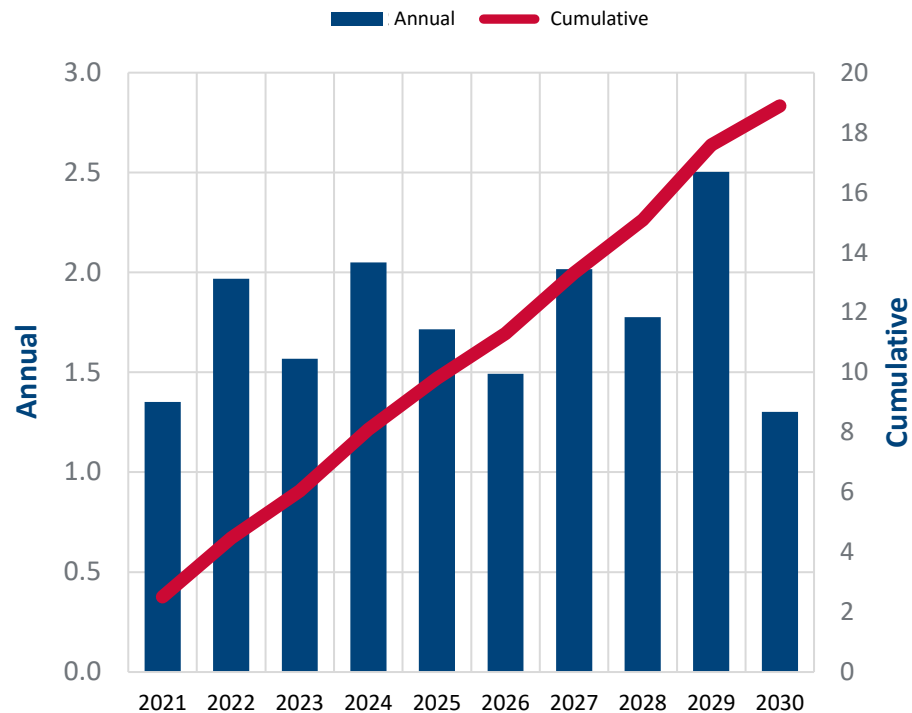


Stopping natural gas supply from new federal leases leads to a 4.5% average increase in Henry Hub natural gas prices

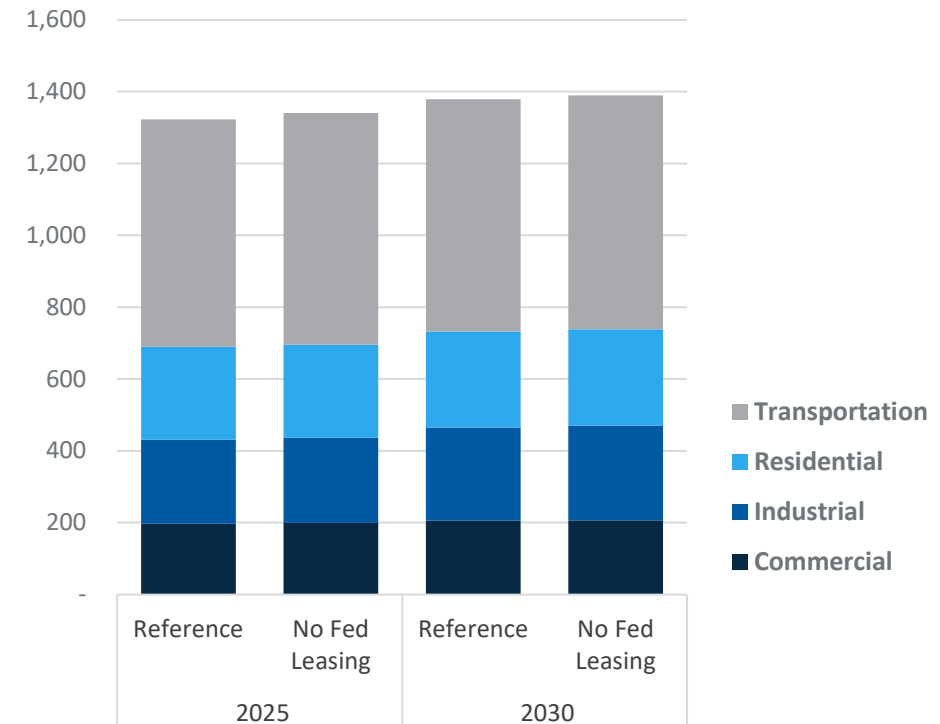
Economic Impact

Household Energy Costs Increase

Residential Energy Expenditure Increase
(Billions \$2018)



Total Energy Expenditures by Sector
(bill 2018 \$)

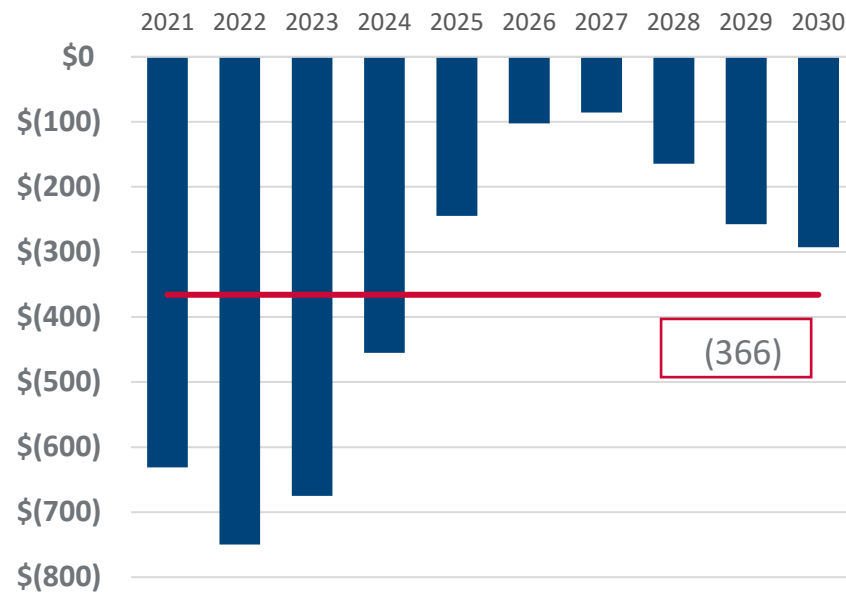


- Residential energy costs are up on average **\$1.7 Billion per year**
- Households spend a total of **\$19 billion more on energy** over the period 2030
- Increases in energy expenditures in all sectors could result in increases in the costs of goods sold

Economic Impact

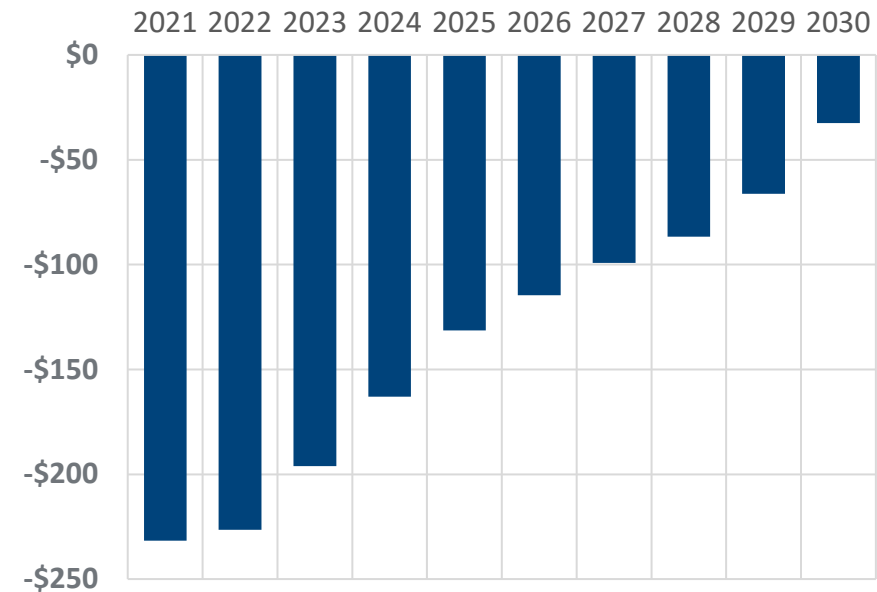
Household Income and Industrial Output Declines

Reduction in Incomes per Household (\$2018)



Household incomes **decline \$366** on average

Change In Total Real Industrial Output (Billion 2018 \$)



Industrial output **declines \$231 Billion** in 2021

Cumulative industrial output **declines over \$1.6 Trillion** to 2030

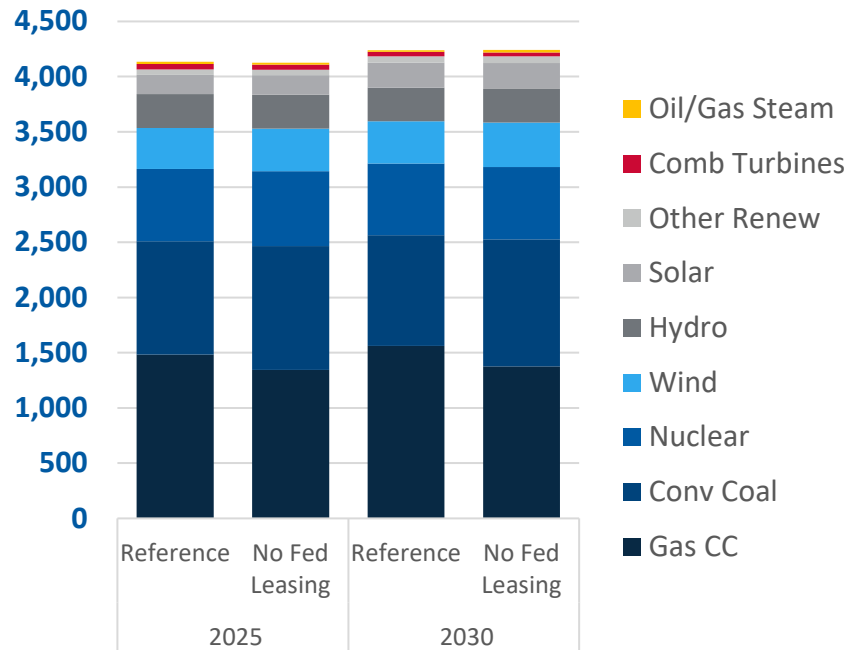
Environmental Impacts



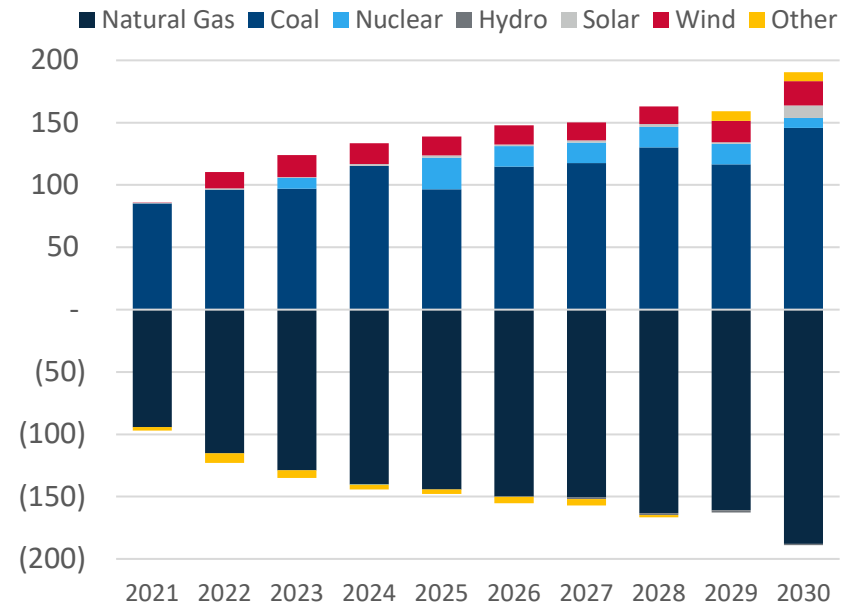
Environmental Impacts

Increase Reliance on Coal

Electricity Generation (billion kWh)



Generation Mix: No Fed Leasing vs.
Reference (billion kWh)

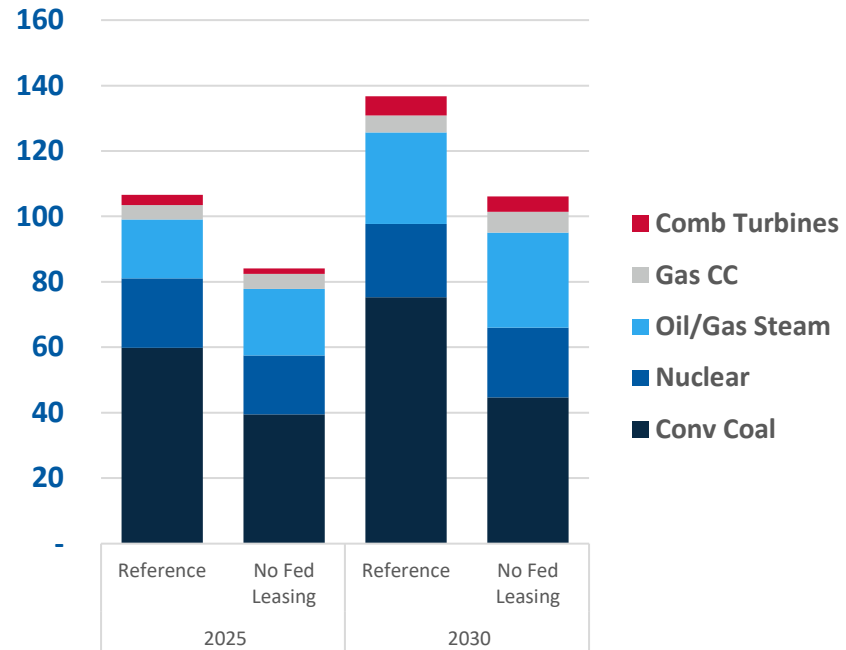


The primary response in the power industry is to shift generation from natural gas to coal-fired generation
Coal generation initially increases by 6 Percent and continues to increase by 15 Percent in 2030

Environmental Impacts

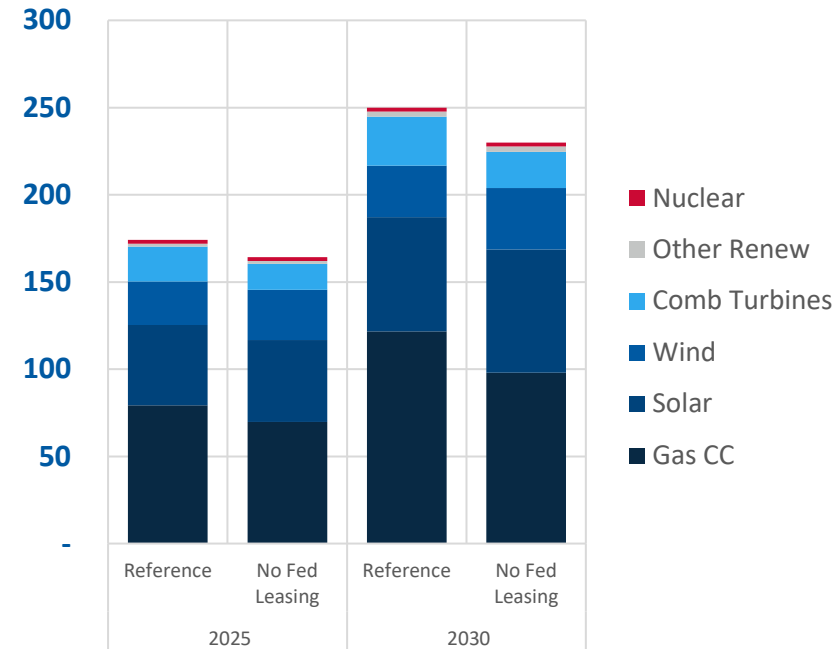
Increase Reliance on Coal

Cumulative Capacity Retirements (GW)



Half as much coal generating capacity retired

Cumulative Capacity Additions (GW)

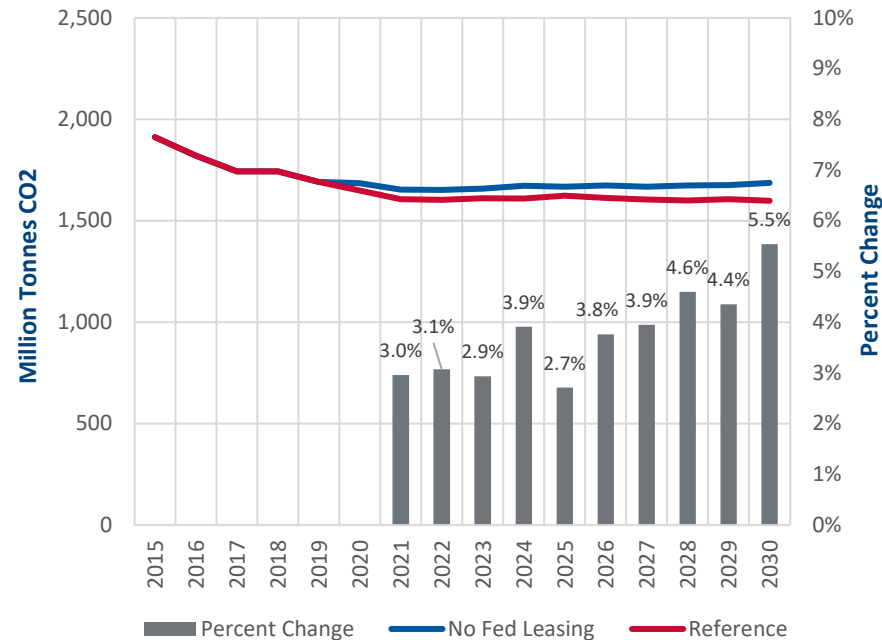


Fewer gas-fired combined cycle and combustions turbines are built

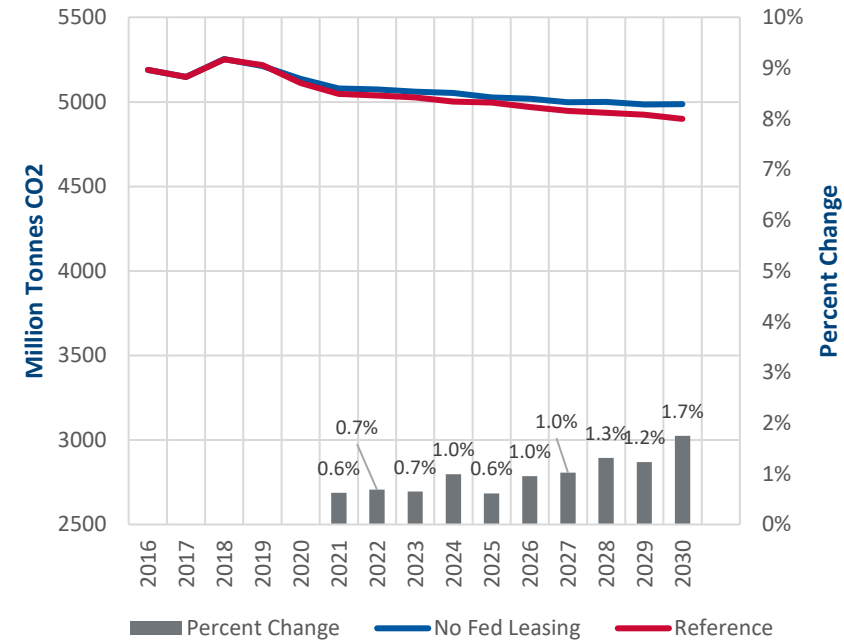
Environmental Impacts

CO2 Emissions Increase

CO2 Emissions from Power Sector



CO2 Emissions from All Sectors



The power sector's greater sensitivity to higher natural gas prices lead to increased coal generation which, in turn, produces **5 percent higher CO2 emissions** in the long run

The shift away from natural gas due to its higher price leads to an **overall increase in CO2 emissions of 2 percent** in 2030

This analysis uses the National Energy Modeling System (NEMS), the same modeling software that is used by the U.S. Energy Information Administration (EIA) for its Annual Energy Outlook (AEO). The 2019 AEO is the reference case used. As with all models, this analysis will generate results based on assumptions, laws and regulations that were in place in 2019. Within any model, the economic relationships here are a simplification of reality. Even with their limitations, models are essential to make quantitative projections about the future.

Please note:

- **Oil Supply:** NEMS is a U.S. only model. The international element of oil supply and demand is not represented fully. All of the international interactions in terms of demand and supply may not be captured endogenously by the NEMS model, However, the total international demand and supply curves are accounted for in NEMS and so the import and export response to stopping leasing on federal lands is captured.
- **Coal Generation:** In the No Federal Leasing (NFL) scenario, as the power sector transitions away from more costly natural gas (due to declining domestic production), there is a move to generate more electricity using coal. This increase in coal use is assisted by not implementing the planned retirements of approximately 35 GWe of coal-fired generating capacity in 2019-2030. *(Note an additional 40 GWe of coal is economically retired in the Reference case.)*
- **NEMS Changes:** In addition to stopping leasing on federal lands and offshore we removed the *planned* retirements of coal plants after 2018
- As with all models, projections in this analysis can become more uncertain the farther out they go.
- All projections in this study are based on publicly-available data and OnLocation's expert analysis.

What is the EIA Reference Case?

- The AEO2019 Reference case represents EIA's best assessment of how U.S. and world energy markets will operate through 2050, based on many key assumptions. For instance, the Reference case assumes improvement in known energy production, delivery, and consumption technology trends.
- The economic and demographic trends reflected in the Reference case reflect current views of leading economic forecasters and demographers.
- The Reference case generally assumes that current laws and regulations that affect the energy sector, including laws that have end dates, are unchanged throughout the projection period. This assumption is important because it permits EIA to use the Reference case as a benchmark to compare policy-based modeling.
- The potential impacts of proposed legislation, regulations, or standards are not included in the AEO2019 cases.
- The Reference case should be interpreted as a reasonable baseline case that can be compared with the cases that include alternative assumptions.

Slide 5, <https://www.eia.gov/outlooks/aeo/pdf/aeo2019.pdf>

EIA Caveats on the NEMS integrated model

- Projections in the *Annual Energy Outlook 2019* (AEO2019) are not predictions of what will happen, but rather modeled projections of what may happen given certain assumptions and methodologies.
- The AEO is developed using the National Energy Modeling System (NEMS), an integrated model that captures interactions of economic changes and energy supply, demand, and prices.
- Energy market projections are subject to much uncertainty because many of the events that shape energy markets as well as future developments in technologies, demographics, and resources cannot be foreseen with certainty. To illustrate the importance of key assumptions, AEO2019 includes a Reference case and six side cases that systematically vary important underlying assumptions.
- More information about the assumptions used in developing these projections will be available shortly after the release of the AEO2019.
- The AEO is published to satisfy the Department of Energy Organization Act of 1977, which requires the Administrator of the U.S. Energy Information Administration to prepare annual reports on trends and projections for energy use and supply.

Slide 4, <https://www.eia.gov/outlooks/aeo/pdf/aeo2019.pdf>