AMERICA'S PROGRESS AT RISK:

An Economic Analysis of a Ban on Fracking and Federal Leasing for Natural Gas and Oil Development

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EXECUTIVE SUMMARY

1 | ECONOMIC/INDUSTRIAL OUTPUT

- **GDP DECLINE**: Cumulative GDP **loss of $7.1 trillion by 2030** after imposition of fracking and federal leasing ban.
- **JOB LOSSES**: **7.5 million jobs lost in 2022** (4.8% of total jobs), averaging at 3.8 million jobs lost through 2030.
  - In 2022, states with highest job losses include Texas, California, Florida, Pennsylvania and Ohio, with a total of **3.6 millon job losses in these 5 states alone**.
  - In 2022, top states for job losses as a share of overall employment include North Dakota, Oklahoma, New Mexico, Wyoming, Louisiana, West Virginia, Kansas and Colorado.
- **ANNUAL HOUSEHOLD INCOME DECLINES:** On average, **$5,040 per year** (4.3%).

2 | HOUSEHOLD ENERGY COSTS

- **FAMILIES PAY MORE:** On average, an increase of **$618 per year** in household energy costs – including higher costs for gasoline, residential natural gas for heating, electricity and heating oil.

3 | ENERGY SECURITY

- U.S. shifts from growing energy self-sufficiency, characterized by declining imports, to a growing reliance on foreign suppliers for **21% of its total energy needs** by 2030.
  - Having just achieved status of net exporter of oil and petroleum products, U.S. reverses course and returns to heavy dependence on imported oil and petroleum, **importing more than 40% of its supplies by 2030**.
  - U.S. shifts from net natural gas exporter to **importing nearly 30%** of its natural gas by 2030.

4 | AGRICULTURE

- **FARM INCOME LOST:** Total cumulative loss could **exceed $275 billion, a reduction of 43%**.
- **AVERAGE ANNUAL LOSS:** More than **$25 billion**.
- **COSTS TO FARMERS SKYROCKET:**
  - Cost of wheat farming **increases 64%**.
  - Cost of corn farming **increases 54%**.
  - Cost of soybean farming **increases 48%**.

INTRODUCTION

Why Fracking and Federal Leasing Matter

More than 95% of U.S. natural gas and oil wells today are developed using hydraulic fracturing.[1] Technologically, fracking is the chief reason the U.S. is the world's leading natural gas and oil producer.[2] At the same time, natural gas and oil produced from federal areas, onshore and offshore[3], account for 14% of U.S. natural gas production[4] and nearly a quarter of U.S. oil production.[5] In fiscal year 2019, oil production from federal areas topped a record 1 billion barrels.[6]

The U.S. energy revolution, based on this production, is dynamic and game-changing for the U.S. economy and energy security. Yet, banning fracking and halting federal natural gas and oil leasing has been proposed.

This API summary of modeling data provided by the consulting firm OnLocation shows the economic impacts that could result from such policies – on the broader economy, national and state employment, and individual households. These include the likelihood of triggering a U.S. economic recession and reversing economic and energy security progress.

A little more than a decade ago, the U.S. economy was saddled with high energy costs and a growing reliance on foreign imports. Oil prices peaked at $133 per barrel in June 2008, and that same month, natural gas prices topped $12 per million British thermal units. Energy imports were at record highs. In 2008, the U.S. imported 57% of its oil products, and natural gas imports accounted for 13% of domestic use.[7]

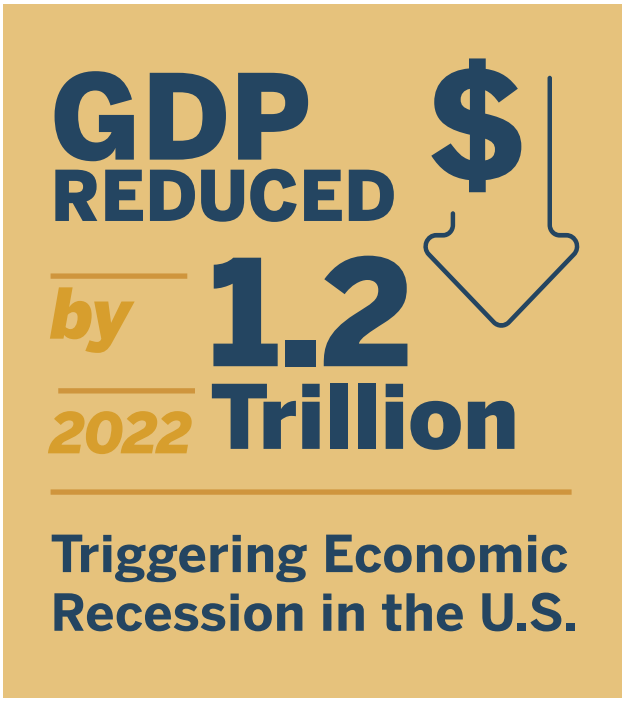
According to government experts then, the U.S. would need significant imports of oil and natural gas well into the future.[8] Instead, the combination of hydraulic fracturing and horizontal drilling technologies and access to federal lands fundamentally changed the trajectory of U.S. energy, generating broad benefits to the country and consumers.

OnLocation's modeling data was developed by modifying assumptions going into the U.S. Energy Information Administration's National Energy Modeling System (NF-NEMS), a well-known and vetted model used to build the agency's Annual Energy Outlook (AEO).[9]

The NF-NEMS is an integrated model that captures interactions of economic changes and energy supply, demand, and prices. The AEO 2019R used for comparisons in this analysis is the 2019 AEO Reference Case– which doesn't predict what will happen but models projections of possible outcomes given certain assumptions. The AEO 2019R is based on many key assumptions, such as improvement in known energy production, delivery, and consumption technology trends. AEO's 2019R generally assumes that current laws and regulations that affect the energy sector, including laws that have end dates, are unchanged throughout the projection period. The potential impacts of proposed legislation, regulations, or standards are not included. All monetary figures in this analysis are expressed in 2018 dollars (2018 $).

1 Economic and Industrial Output Plummets

Based on the OnLocation modeling, banning hydraulic fracturing and federal leasing could trigger a U.S. recession – marked by declining economic output as measured by Gross Domestic Product (GDP). Increased energy costs include West Texas Intermediate oil prices persisting at a +30% premium over the AEO2019R and Henry Hub natural gas prices three or four times that of the AEO2019R. As a consequence, total real industrial output declines. **There are job losses and increased energy costs across all economic sectors**, potentially increasing prices for goods and services. Annual household incomes **decline more than $5,000 per year.**



DETAILED ECONOMIC IMPACTS:

- U.S. economy at risk of falling into recession, with **GDP reduced by $1.2 trillion** in 2022 compared to AEO 2019R.
- **7.1 trillion in cumulative GDP** loss from 2020-2030.
- **$1,950 decline in per capita GDP**, on average, with those declines reaching $3,500 in 2022.
- **7.5 million jobs lost** in 2022 (4.8% of total jobs), averaging 3.8 million jobs lost through 2030.
- **Top states with highest job losses** include Texas (1,103,000), California (765,000), Florida (711,000), Pennsylvania (551,000) and Ohio (500,000), for a total of 3.6 million job losses in these 5 states alone in 2022.
- **Top states with highest job losses as a share of overall employment** include North Dakota (76,000), Oklahoma (319,000), New Mexico (149,000), Wyoming (48,000), Louisiana (321,000), West Virginia (109,000) Kansas (208,000) and Colorado (353,000).
- Under a fracking and federal leasing ban, net natural gas and oil imports **increase the trade deficit by a cumulative $3.1 trillion** through 2030.

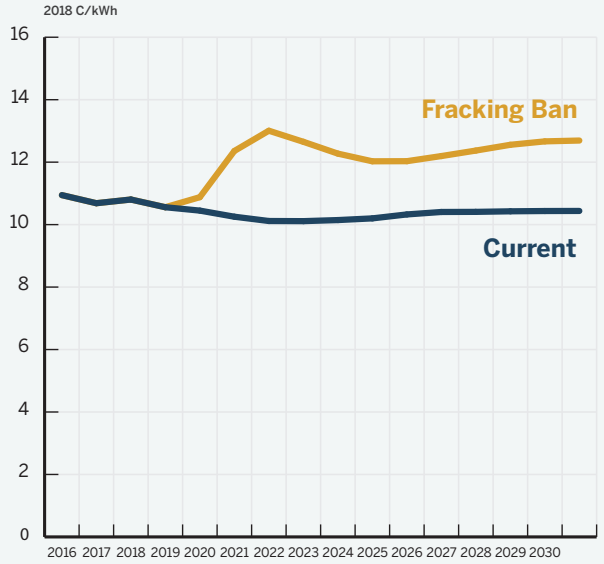
2 Household Energy Costs Spike

Higher wholesale energy costs, resulting from a fracking and federal leasing ban, are projected to lead to increased energy costs for American families at home and at the fuel pump, compared to these costs under the AEO 2019R. The average U.S. household is projected to spend $618 more per year for gasoline, natural gas for heating, electricity, and heating oil – even though it consumes less. From 2020 to 2030, average household energy use is projected to decline 12%, yet energy costs still are expected to be 14% higher.

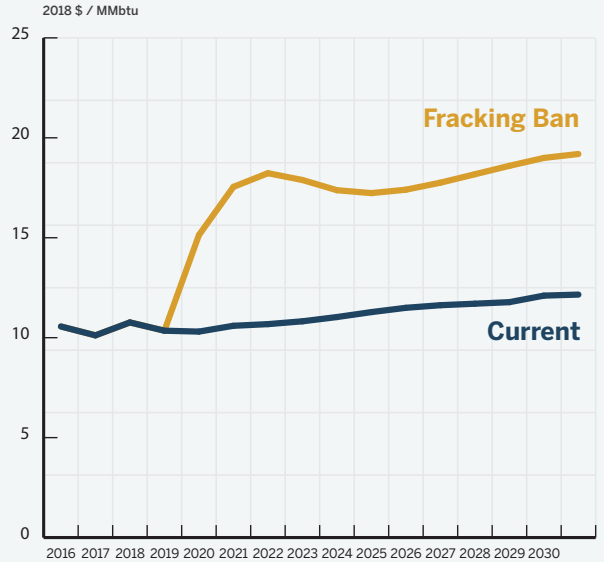
DETAILED HOUSEHOLD COST IMPACTS:

- On average, American households spend **$618 more per year** on energy.
- Residential natural gas prices average **58% higher**.
- Gasoline prices average **15% higher**.
- Electricity prices average **20% higher per family**, per year.
- Residential heating oil prices average **15% higher**.

Average Electricity Retail Price



Residential Natural Gas Price



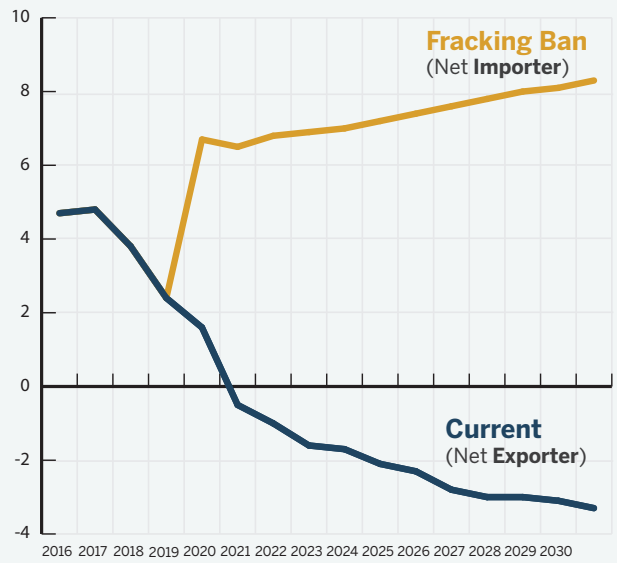
3 Return to Dependence on Foreign Energy

U.S. energy security is weakened if hydraulic fracturing and federal natural gas and oil leasing are banned – as U.S. dependence on foreign supplies grows. Halting fracking and federal leasing stymies domestic production from shale and other tight-rock formations. As a result, the U.S. once again becomes a net energy importer, with increased reliance on foreign suppliers making the country less energy secure. By 2030, projected shale natural gas production shrinks to 9 Tcf, compared to 28 Tcf projected in AEO 2019R reference case, while tight oil production is 8 million barrels per day lower, 3 MMbbld vs. 11 MMbbld.

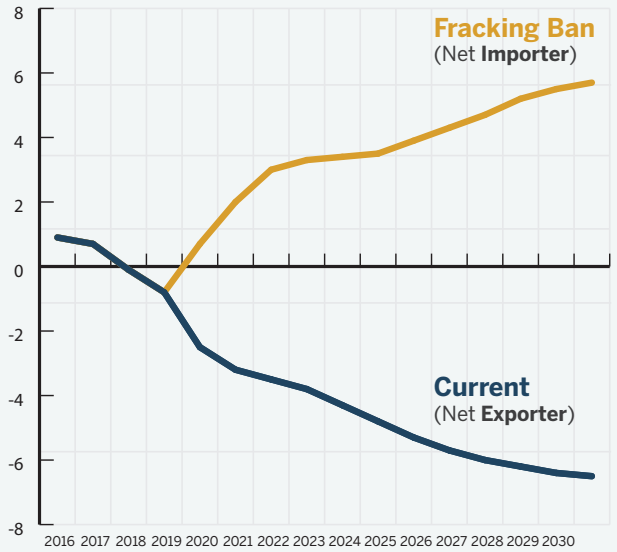
DETAILED ENERGY SECURITY IMPACTS:

- The U.S., which recently became a net exporter of oil and petroleum products, **returns to dependence on foreign suppliers for more than 40%** of its oil needs by 2030.
- U.S. shifts from being a net exporter of natural gas to needing **foreign imports for almost 30%** of its natural gas by 2030.

Net Imports of Petroleum
(Crude and Product) Millions bbl/d



Net Imports of Natural Gas
TCF per Year



4 American Farmers Suffer

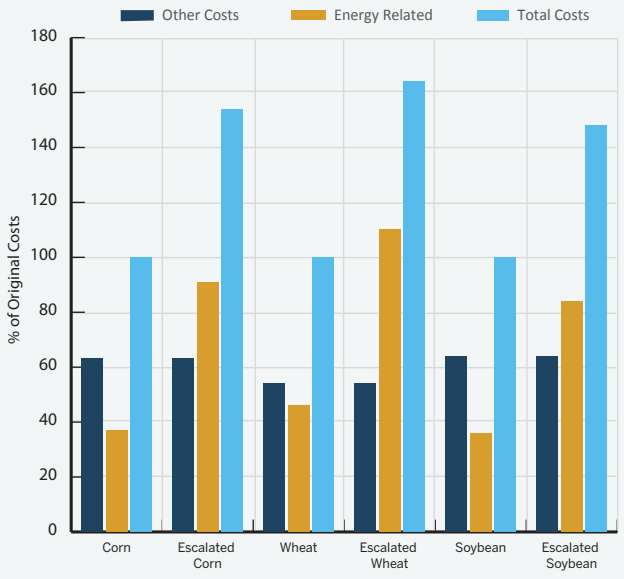
Banning hydraulic fracturing and federal natural gas and oil leasing, which would increase the cost of energy, would heavily impact the U.S. agriculture sector. According to the U.S. Department of Agriculture, direct and indirect energy costs can account for 36% to 48% of total production costs for crops including corn, wheat, and soybeans.[10] Farms use energy directly in the form of electricity, diesel, gasoline and natural gas.

Farms also use significant amounts of energy-intensive products, including pesticides and fertilizers. For example, natural gas can account for between 75% and 85% of fertilizer manufacturing costs.[11] A ban on fracking and federal leasing could increase the cost of natural gas delivered to fertilizer manufacturers by an average of more than 170%.[12] Under this scenario, higher energy costs would lower total farm production and farmer income.

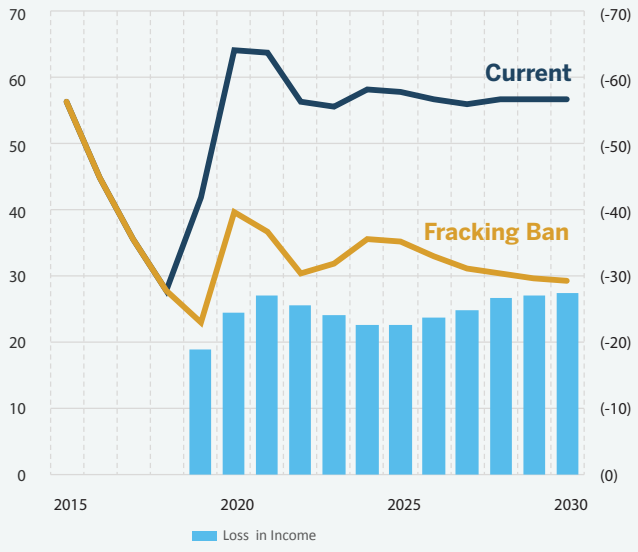
DETAILED FARM IMPACTS:

- Total cumulative lost farm income **exceeds $275 billion**.
- Average annual farm income loss is **more than $25 billion**.
- Farm income **declines 43%**.
- Cost of wheat farming **increases 64%**.
- Cost of corn farming **increases 54%**.
- Cost of soybean farming **increases 48%**.

Estimated Crop Cost Escalation



National Income: Farm Proprietors
(Real 2018 $)



STUDY NOTES

OnLocation's modeling data was developed with the National Energy Modeling System (NF-NEMS), the same modeling software used to build EIA's Annual Energy Outlook (AEO). Results are based on assumptions, laws, and regulations that were in place in 2019. As with any model, the economic relationships here are a simplification of reality. Yet, even with these limitations, models are essential to make quantitative projections about the future.

Please note:

- The fracking and federal leasing ban scenario here extends the NF-NEMS model outside its general operating range. This was done to show the potential impacts of a sudden end to fracking and federal leasing, because such policies are currently being proposed. Thus, the supply and demand responses are outside the usual output ranges. The impact of abrupt restrictions on new natural gas and oil supplies is particularly visible in the finding of an initial surge in natural gas and oil prices.
- **OIL SUPPLY**: NF-NEMS is a U.S.-only model. The international element of oil supply and demand is not represented fully. All the endogenous international interactions in terms of demand and supply may not be captured by the NF-NEMS model. However, the total international demand and supply curves are accounted for in NF-NEMS, and so the import and export response to a fracking ban is captured.
- **NATURAL GAS SUPPLY**: The 2019 AEO version of the NF-NEMS model has future imports of liquefied natural gas (LNG) fixed at current levels. It does not allow for additional LNG imports. As a result of this constraint, in the NF-NEMS scenario the model leans on imports from Canada. Recoding this component of NF-NEMS to allow more LNG imports was beyond the scope of the project. The resources and the time required to recode the model were not available. To the extent that LNG imports could substitute for Canadian imports may change some regional impacts.
- As with all models, projections in this analysis can become more uncertain the further out into the future they go.

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[10] **USDA, Share of 2014 Farm Business Energy-Based Expenses as a Percentage of Total Cash Expenses, by Principal Commodity** https://www.ers.usda.gov/webdocs/publications/74658/60128_eib159.pdf?v=0

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[12] **OnLocation Modeling,** The cost of natural gas delivered to fertilizer manufacturers increases by over 170%. Natural gas price paid by industrial consumers national average 2020-2030.

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