BACKGROUNDER
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CENTER FOR DATA ANALYSIS

Time for U.S. Energy Dominance: Unlocking America's Oil and Gas Potential through Innovation and Policy

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KEY TAKEAWAYS

The U.S. has vast oil and gas resources—federal and state policymakers should pursue policies to unlock these resources for the good of all Americans.

Tapping these resources would produce peak employment gains of 6 million jobs and generate more than $25 trillion in GDP from now until 2050.

Regardless of assumptions about the severity of climate change, the global temperature impact of tapping these resources will be less than 0.03 degrees Celsius.

Access to affordable and reliable energy is fundamentally important to the success and well-being of any society. Affordable energy enhances quality of life by powering essential infrastructure, including hospitals, schools, and transportation systems. Reliable energy sources, including fossil fuels, have fueled global economic growth, driving industrial productivity, supporting modern conveniences, and lifting millions out of poverty. Ensuring a stable and cost-effective energy supply remains crucial for fostering innovation, sustaining economic growth, and advancing social progress.

President Donald Trump has pledged to fight for affordable and reliable energy for the American people, continuing the commitment of his first term. In 2017, President Trump issued an executive order to promote energy independence, directing federal agencies to review, rescind, and potentially replace burdensome regulations that obstruct energy development.[1] When President Joe Biden took office in January 2021, he immediately curbed much of the progress the Trump Administration had made in terms of energy development by actively discouraging the use of certain forms of energy under the pretense of fighting climate change.[2] The associated regulations pursued by the Biden Administration are not only costly but also have been shown to have little or no effect on the climate itself.[3]

This *Backgrounder* analyzes the costs and benefits of resurrecting the policies that President Trump pursued during his first term that sought to leverage the country's vast oil and gas supply. The analysis finds that tapping these resources here in the United States will provide significant opportunity for economic growth for generations to come.

America Has Vast Energy Abundance

It is well understood that America is rich in energy resources. Chart 1 depicts oil and gas resources throughout North America as presented in the Institute for Energy Research's "2024 North American Energy Inventory."[4]

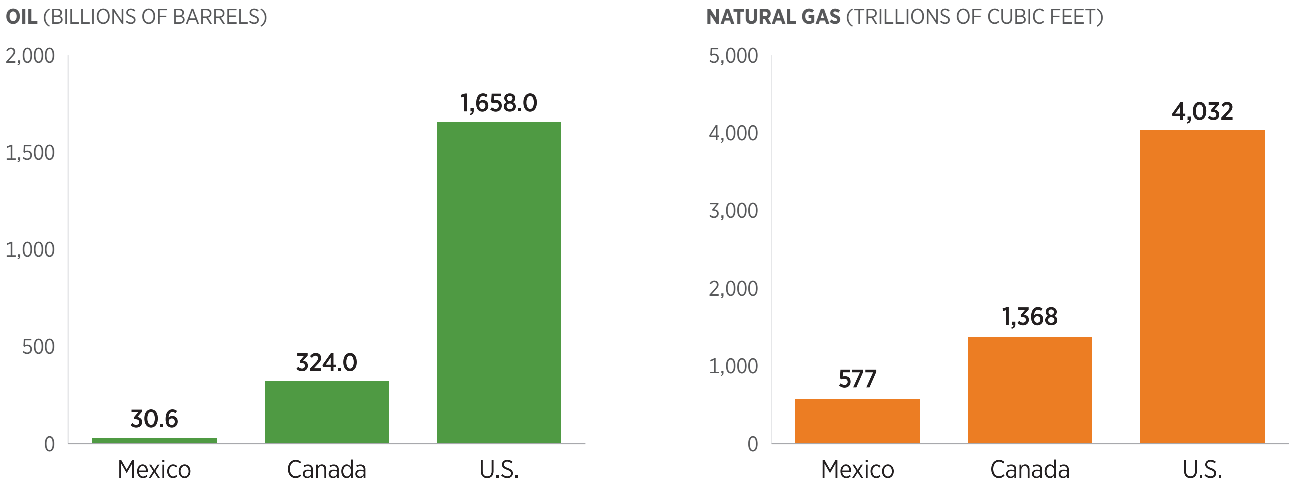
North America has more than 2 trillion barrels of technically recoverable (can be produced using current technologies) oil (Chart 1) and more than 5.9 quadrillion cubic feet of technically recoverable natural gas, more than two-thirds of which are in the United States. Resources in the United States alone could sustain 2021 oil demand levels for more than 200 years, and natural gas demand for more than 130 years.[5]

Appendix Chart 1 contains 2021 estimates produced by the Bureau of Ocean Energy Management of offshore oil and gas, which were the latest data available. All these estimates of technically recoverable oil and gas, however, are based on oil and gas capable of being extracted using *current* technology. Of course, as markets evolve and more innovative tools and techniques are developed, more oil and gas will be recoverable than now.[6] As a result, the estimates in this chart likely underestimate the actual supply of recoverable oil and gas in North America.[7]

Regardless, access to affordable and reliable energy will continue to be fundamentally important. The dramatically expanding use of energy-dependent artificial intelligence is but one example that underscores this reality.

CHART 1

North America Is Abundant in Technically Recoverable Oil and Natural Gas



NOTE: Figures are estimates.
SOURCE: Institute for Energy Research, "2024 North American Energy Inventory," May 2024, https://www.instituteforenergyresearch.org/wp-content/uploads/2024/05/2024-North-American-Energy-Inventory.pdf (accessed January 7, 2025).

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Accessing America's Abundant Energy: Horizontal Drilling and Hydraulic Fracturing

In the United States, companies extract oil and gas—known as tight oil or shale oil and gas—through a combination of two processes, known as horizontal drilling and hydraulic fracturing.

- **Horizontal drilling** is an innovative technique in the shale oil and gas extraction process. In this approach, energy companies drill down and subsequently outward. A key advantage of this horizontal drilling is that the process enables producers to expand their search horizons to extract more oil and gas in a quicker and more efficient manner than typical vertical drilling allows. Horizontal drilling also minimizes the visible environmental footprint by significantly reducing the associated surface area footprint of the drilling activities.

- **Hydraulic fracturing**, referred to informally as fracking, enables producers to extract oil and natural gas locked within rock deposits.

> Producers drill wells that are on average 7,500 feet below surface level—thousands of feet below drinking water aquifers—injecting water, sand, and chemical additives deep into the ground at high pressure to fracture the associated rock formations. The process releases trapped oil and gas, which is then pumped back up to surface level for extraction.

Hydraulic fracturing and horizontal drilling are imperative to the safe and efficient extraction of recoverable oil and gas in various parts of the country, generating tremendous economic growth and job creation.[8]

Misinformation from environmental activist organizations has demonized fracking and the fossil fuel industry.[9] Although opponents claim the process to be unsafe, arguing that fracking contaminates drinking water, both the Environmental Protection Agency (in a five-year study) and the U.S. Geological Survey recently found that fracking has not adversely affected drinking water.[10]

The Economic Effects of Using U.S. Oil and Gas Resources

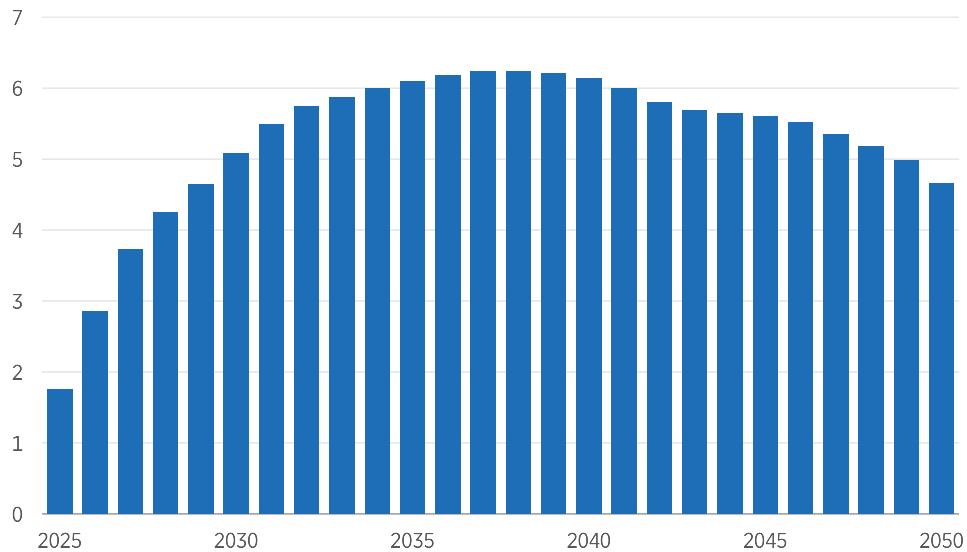
To assess the economic effect of capitalizing on the vast oil and gas supply in the United States, we used the Heritage Energy Model (HEM). In particular, we performed a simulation comparing current policy under the Energy Information Administration's (EIA's) current reference case to a policy assuming that the recoverable shale oil and shale gas are 50 percent higher than under current policy.[11] Although this simulation is not a specific policy simulation per se, it nevertheless highlights the effect of increasing domestic oil and gas production, and regulatory reform could indeed put a 50 percent increase within reach. Altogether, the model finds that through 2050, doing so would result in:

- An overall average gain of more than 5.27 million jobs per year,
- A peak employment gain of more than 6 million jobs,
- A total income gain for a family of four of more than $300,000 with an average annual gain of $12,418, and
- An aggregate gross domestic product (GDP) gain of more than $25 trillion through 2050.

CHART 2

How Unleashing America's Energy Abundance Would Affect U.S. Jobs

OVERALL EMPLOYMENT DIFFERENTIAL BY YEAR, IN MILLIONS OF JOBS



SOURCE: Heritage Foundation calculations using Heritage Energy Model. See the appendix for details.

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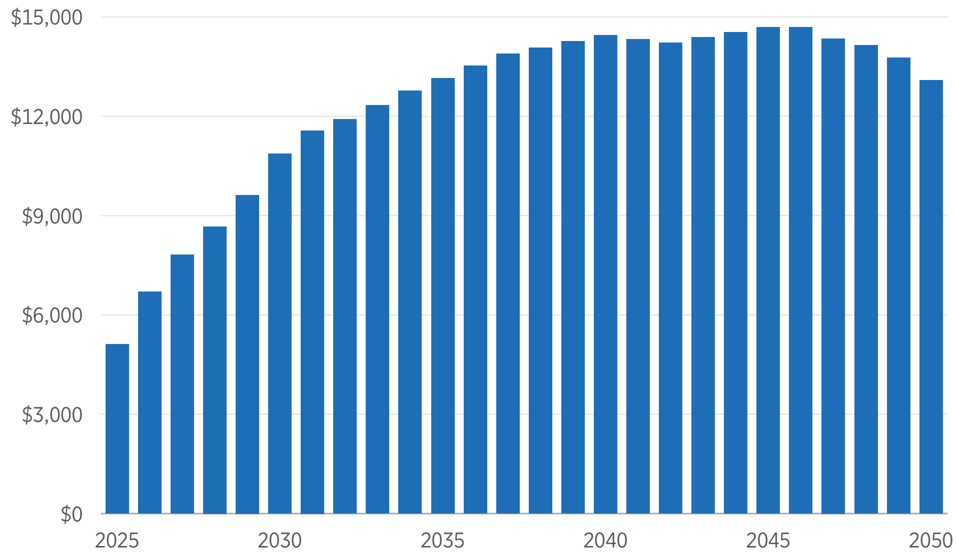
Chart 2 provides the model simulation's predicted impact in terms of employment. As Chart 2 shows, through 2050, there are tremendous employment gains as a result of increasing domestic oil and gas production: average employment gains of more than 4.9 million jobs with a peak employment gain of more than 6 million jobs. The reason for these gains is multifold. First are the opportunities directly for those working on the fracking—the workers, engineers, managers, and data scientists associated with the extraction. Fracking projects also provide opportunities for local businesses, including hotels, motels, restaurants, and laundromats. Most fundamentally, however, as discussed, access to affordable and reliable energy reduces the cost of doing business, thereby reducing operational expenses for businesses, leaving more resources for investing in labor, and more capital at their disposal.

Increasing access to affordable energy increases productivity. That is, the increase in available energy does not simply increase the number of jobs, it makes employment across the economy more productive. The result is not

CHART 3

How Unleashing America's Energy Abundance Would Affect Family Income

PERSONAL INCOME DIFFERENTIAL BY YEAR FOR A FAMILY OF FOUR, IN INFLATION-ADJUSTED DOLLARS



SOURCE: Source: Heritage Foundation calculations using Heritage Energy Model. See the appendix for details.

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just more workers, but more workers with higher incomes. Chart 3 quantifies the model simulation results in terms of changes in per capita GDP.

As Chart 3 illustrates, the changes in income for a family of four are significant: Through 2050, these gains average more than $12,000 annually, amounting to over $320,000 for a family of four. In terms of aggregate GDP, the gains are immense, amounting to more than $1 trillion annually and more than $25 trillion through 2050. These results are a manifestation of the vibrant economy that results from tapping the vast U.S. oil and gas supply.

Climate Effects

Critics contend that the fossil fuels drawn on from fracking will emit greenhouse gases and thus exacerbate the ongoing natural climate change. It is useful to evaluate the actual temperature effects of such policies. To do so, we used the Model for the Assessment of Greenhouse Gas Induced Climate Change (MAGICC)—also used by the Intergovernmental Panel on

Climate Change (IPCC)—to assess the impact of the associated increase in carbon-dioxide (CO_2) emissions. (For full details, see the appendix.)

Our HEM simulation results indicate that CO_2 emissions would increase under the scenario of expanded domestic oil and gas production to no more than 10 percent with respect to current projections. Thus, we used MAGICC to simulate temperature forecasts through 2100 based on current emissions scenarios, comparing these projections to a hypothetical scenario involving approximately a 10 percent annual increase in CO_2 emissions. Our results are contained in Chart 4 under a variety of assumptions about climate sensitivity, namely, the Earth's temperature response to a doubling of CO_2 emissions. These assumptions, varying between 2 degrees Celsius and 5 degrees Celsius, encompass the IPCC's "very likely" range of potential climate sensitivities.[12]

As seen in Chart 4, even under a 5.00 degree sensitivity, there is no more than a 0.03 degree increase in global temperature.[13] As a result, it is clear that using the vast oil and gas resources here in the United States will have little or no impact on global temperature.

The Vital Need for Energy Abundance

Even under worst-case-scenario assumptions, the danger of climate change pales in comparison to the danger of energy scarcity. Energy scarcity threatens resilient access to food, water, health care, and other necessities of life. Environmental protection, like human advancement, can only happen with energy abundance. Energy abundance must be a national priority.

Today, America's position as a dominant producer of oil and gas is threatened by misguided government policies that have restricted oil and gas production on federal lands and federally controlled offshore areas and attempted to stifle oil and gas production on private land through overregulation.

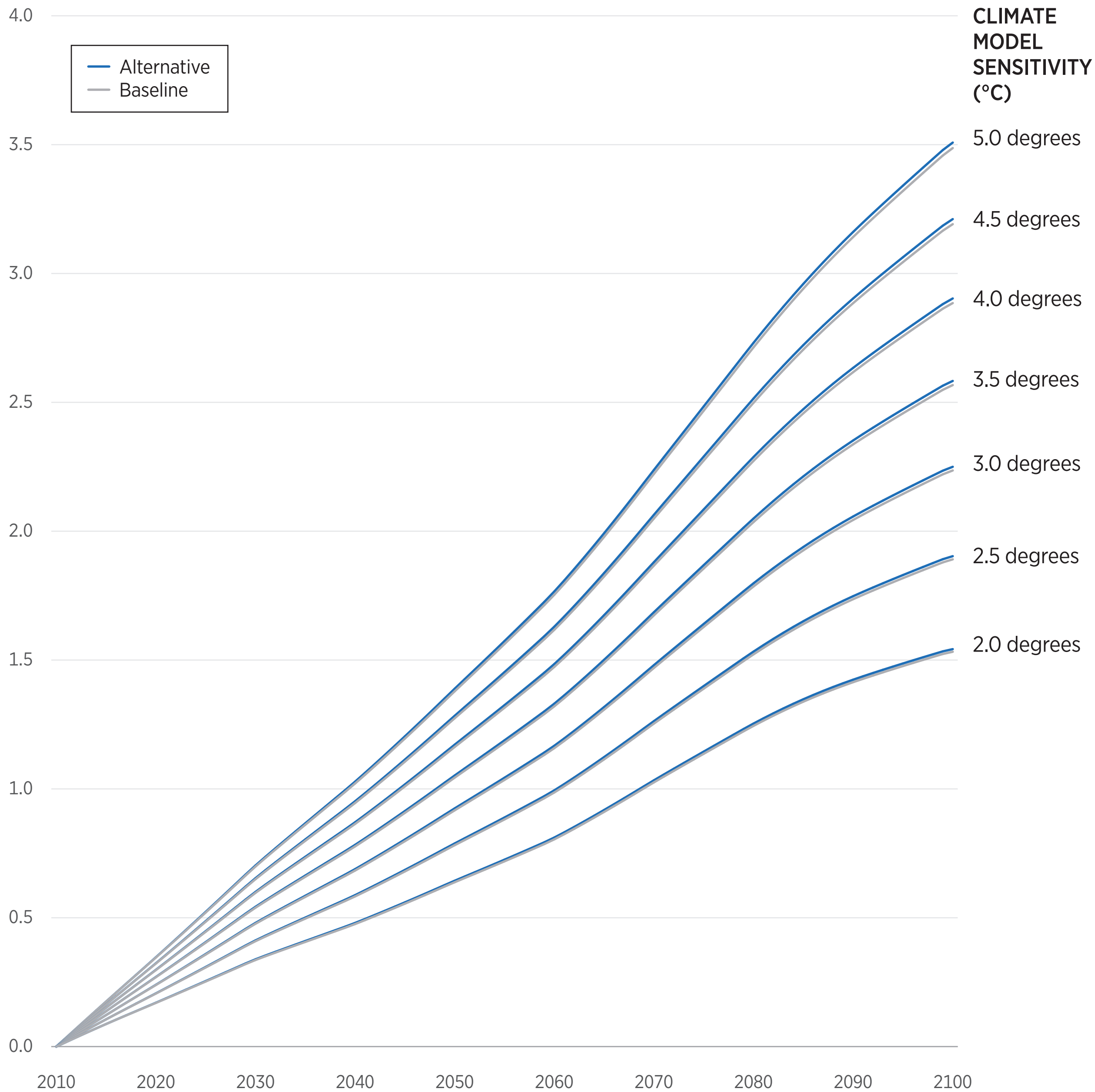
Another major obstacle facing America's energy production is the federal process for permitting major infrastructure projects. The U.S. permitting and environmental review process for major infrastructure projects is the most expensive, lengthy, and unpredictable worldwide. Multiple federal agencies each issue separate permits, delaying projects and introducing high cost and legal uncertainty. Capital availability shrinks and cost of capital rises under this risk, harming U.S. competitiveness—especially compared to China's quick, lower-cost infrastructure deployment.

Over many decades Congress has created a "hydra-headed" system that requires a dozen or more permits for each major infrastructure project, creating uncoordinated, overlapping reviews. Congress has added layers

CHART 4

Expanding U.S. Energy Production Would Have Little Effect on the Climate

INCREASE IN GLOBAL TEMPERATURES WITH RESPECT TO 2010 LEVELS, IN DEGREES CELSIUS



SOURCE: Authors' calculations based on Model for the Assessment of Greenhouse Gas Induced Climate Change (version 6) simulations. For more information, see the appendix.

of permit requirements without mandating interagency coordination or predictable deadlines. There is more than enough capital in the private economy to fund all the investments we need for energy abundance, but federal red tape creates often-prohibitive risk for investors, risk that significantly raises the cost of capital for those projects that do get built.

Policy Recommendations for Policymakers

Policymakers now have an opportunity to leverage America's vast oil and gas resources to make affordable and reliable energy available to all. The Administration should work with Congress and state policymakers to:

Open Access to Energy Exploration of Federal Waters and Lands. All federal lands and waters that are not part of the national park system or congressionally designated as off-limits should be open to exploration and production for all of America's natural resources. Congress should require the Department of the Interior (DOI) to conduct lease sales, rather than develop five-year planning programs, if a commercial interest exists. The lease plans do not reflect dynamic market conditions that affect companies' decisions to explore and develop offshore resources. Congress and the Administration should overhaul the leasing process that ensures access to safely develop energy off America's coasts.

Reverse Federal Regulations on Oil and Gas Production. Locals working in conjunction with state and local officials have a significantly better sense of their locality than bureaucrats in Washington, DC. The federal government should empower state governments to identify—and, if necessary, reform—regulations and the permitting process for drilling. The federal government should also rescind all methane regulations for oil and gas activities. These burdensome regulations drive costs higher for no climate benefit.[14]

Allow States to Manage Drilling on Federal Lands. Federal lands can reap significant benefits from fracking, including local economic gains described above. Historically, the mean period for the federal government to process an application for permit to drill (APD) has lasted for months, whereas states can process an APD in days or weeks. The DOI should reduce the APD time frames to that of states.

Another potential solution—which would require congressional action—is to reintroduce and pass the Federal Land Freedom Act from the 118th Congress, allowing states to regulate energy development on federal land.[15]

Continue to Allow Fracking on Private Lands. Property rights are a cornerstone of American values, granting individuals the freedom to make decisions about their own land. Landowners should have the ability to contract with private companies to engage in fracking activities on their property. With robust enforcement of property rights and reasonable regulations implemented at the state and local levels, it is possible to balance resource extraction with environmental stewardship. Broad bans on fracking imposed by states undermine these rights and should be avoided.

Prohibit Taxes or Regulations on Greenhouse Gas Emissions. Prior Heritage Foundation research has demonstrated that any carbon tax or climate change regulations will constrict access to affordable and reliable energy, thereby raising energy costs, reducing employment prospects and income across the board. These policies, under the auspice of protecting the climate, would have little or no impact on global temperatures.[16] These regulations should be rescinded, and Congress should clarify that the Clean Air Act was never intended to regulate CO_2 and other greenhouse gas emissions.

Reform Federal Infrastructure Permitting and the National Environmental Policy Act (NEPA). The NEPA mandates federal agencies to conduct detailed environmental impact reviews for numerous projects, including energy development on public lands. However, the NEPA process is often hindered by delays arising from multiple sources. Federally, these challenges include inconsistent interpretations of NEPA mandates, poor interagency collaboration, procedural inefficiencies, and outdated guidelines that fail to reflect evolving conditions.

Streamline the NEPA Process. Policymakers should streamline the NEPA processes to empower White House officials with delegated presidential directive authority and coordinate a "whole-of-government" effort. Policymakers should require agencies to create general and programmatic permits and categorical exclusions for low-conflict areas (such as existing transmission corridors). Policymakers should also strengthen the Federal Permitting Improvement Steering Council (FPISC) by merging the roles of its executive director with an associate or deputy role at the White House Council on Environmental Quality (CEQ).

Rescind and Reissue CEQ Regulation. Policymakers should rescind the CEQ's regulation of NEPA and reissue it as a presidential directive or CEQ memorandum for agency heads. Agency compliance would still be mandatory as with any executive order, but this conversion would make clear that the CEQ has no authority under NEPA or any other law to create judicially enforceable rights and obligations beyond what is in the statutory text of NEPA. Policymakers should invite independent agencies (such as the Federal Energy Regulatory Commission and the Nuclear Regulatory Commission) to sign memoranda of understanding agreeing to follow these directives.

Expedite the Process for Nationally Important Projects. Policymakers should create a one-stop-shop, single-permit process and portal, with a decision guaranteed within two years of a complete application. Policymakers should allow project sponsors to pay a substantial fee for certification as a "nationally important infrastructure" designation, triggering the expedited process.

Pursue Litigation and NEPA Reforms. Congress should tighten standing and require courts to weigh the public interest more heavily when considering injunctions that would delay projects. Congress should require plaintiffs to post a bond for preliminary injunctions to compensate for wasted taxpayer resources and losses to project proponents when the agency ultimately prevails on the merits. Policymakers should adopt a "substantial performance" standard so that minor errors in NEPA documents do not stall permits. Policymakers should clarify "major federal action" and "reasonably foreseeable" impacts to limit agencies to analyzing effects within their jurisdiction. They should also create a public tracking portal for all pre-application and ongoing projects applications.

Conclusion

America has a vast supply of oil and gas. Capitalizing on this supply will have tremendous economic benefits, creating hundreds of thousands of jobs and making families across the country more prosperous in the process. Policymakers should pursue policies to unlock these resources.

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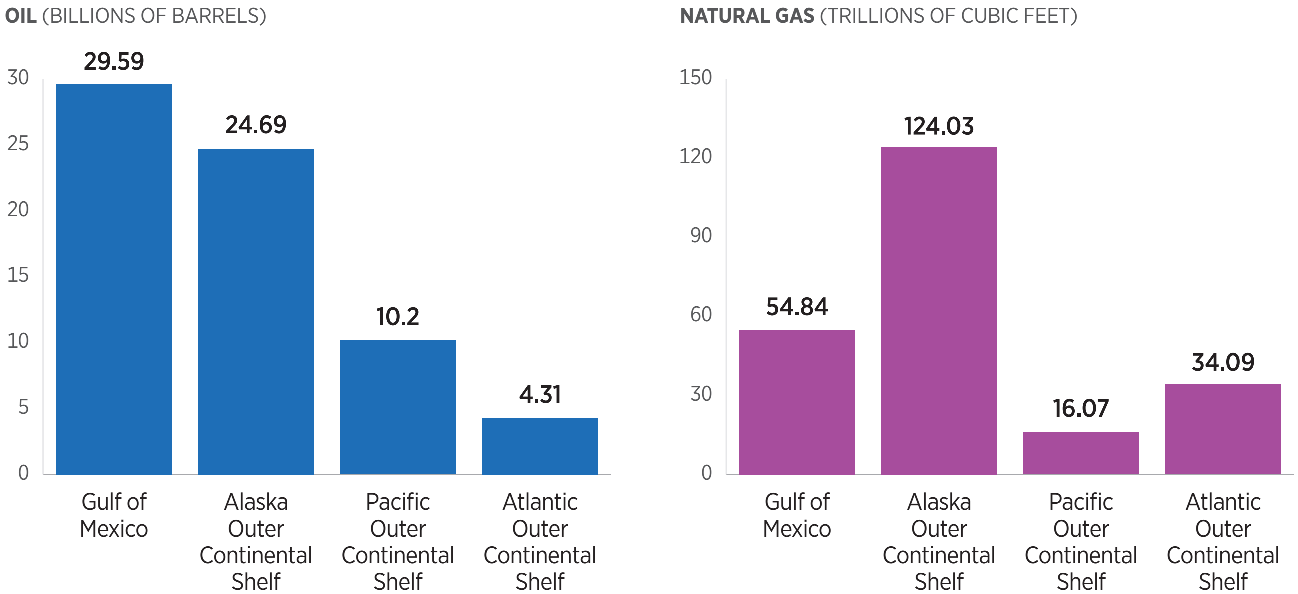
Appendix: Additional Data and Methodology

APPENDIX CHART 1

Estimates of Technically Recoverable Offshore Oil and Natural Gas in North America



SOURCE: Bureau of Ocean Energy Management, "2021 Assessment of Undiscovered Oil and Gas Resources of the Nation's Outer Continental Shelf," https://www.boem.gov/2021-assessment-undiscovered-oil-and-gas-resources-nations-outer (accessed January 7, 2025).

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Offshore Estimates of Oil and Gas in the United States

Offshore regions along the American coasts also have a vast amount of oil and gas.[17] Appendix Chart 1 presents some data from the Bureau of Ocean Energy Management on these areas.

As Appendix Chart 1 illustrates, the Atlantic and Pacific Outer Continental Shelves have a total of 14.53 billion barrels of oil and 50.16 trillion cubic feet of natural gas, respectively; Alaska has 24.69 billion barrels of oil and 124.03 trillion cubic feet of natural gas; and the Gulf of Mexico has 29.59 billion barrels of oil and 54.84 trillion cubic feet of natural gas.

The Heritage Energy Model

The analysis in this *Backgrounder* uses the Heritage Energy Model (HEM), a clone of the National Energy Model System 2023 Full Release (NEMS).[18] NEMS is used by the Energy Information Administration (EIA) in the U.S. Department of Energy as well as various nongovernmental organizations for a variety of purposes, including forecasting the effects of energy policy changes on a plethora of leading economic indicators.

The methodologies, assumptions, conclusions, and opinions in this *Backgrounder* are entirely the work of statisticians and economists in the Center for Data Analysis (CDA) at The Heritage Foundation, and have not been endorsed by, and do not necessarily reflect the views of, the developers of NEMS.

HEM is based on well-established economic theory as well as historical data and contains a variety of modules that interact with each other for long-term forecasting. In particular, HEM focuses on the interactions among

1. The supply, conversion, and demand of energy in its various forms;
2. American energy and the overall American economy;
3. The American energy market and the world petroleum market; and
4. Current production and consumption decisions as well as expectations about the future.[19]

These modules are the:

- Macroeconomic Activity Module,[20]
- Transportation Demand Module,
- Residential Demand Module,
- Industrial Demand Module,
- Commercial Demand Module,
- Coal Market Module,

- Electricity Market Module,
- Liquid Fuels Market Module,
- Oil and Gas Supply Module,
- Renewable Fuels Module,
- Natural Gas Market Module, and
- International Energy Activity Module.

HEM is identical to the EIA's NEMS with the exception of the Commercial Demand Module. The Commercial Demand Module makes projections pertaining to commercial floor-space data of pertinent commercial buildings. Other than HEM not having this module, it is identical to NEMS.

Overarching these modules is an Integrating Module, which consistently cycles, iteratively executing and allowing these various modules to interact with each other. Unknown variables that are related, such as a component of a particular module, are grouped together, and a pertinent subsystem of equations and inequalities corresponding to each group is solved via a variety of commonly used numerical analytic techniques, using approximate values for the other unknowns. Once a group's values are computed, the next group is solved similarly, and the process iterates. After all group values for the current cycle are determined, the next cycle begins. At each particular cycle, a variety of pertinent statistics is obtained.[21] HEM provides a number of diagnostic measures, based on differences between cycles, to indicate whether a stable solution has been achieved.

This *Backgrounder* uses HEM to analyze the EIA's high oil and gas scenario with respect to its reference case, which models current policy. As the EIA notes, in the high oil and gas supply case,

> the estimated ultimate recovery per well for tight oil, tight gas, or shale gas in the United States and undiscovered resources in Alaska and the offshore lower 48 states is assumed to be 50% higher than in the reference case. Rates of technological improvement that reduce costs and increase productivity in the United States are also 50 percent higher than in the reference case. In addition, tight oil and shale gas resources are added to reflect new plays or the expansion of known plays.[22]

The Model for the Assessment of Greenhouse Gas Induced Climate Change

The analysis in this *Backgrounder* also uses the Model for the Assessment of Greenhouse Gas Induced Climate Change (MAGICC) version 6.[23] MAGICC quantifies the relationship between atmospheric radiative forcing, oceanic heat content, and surface temperature perturbation via the following relationship:

$$\Delta Q_G = \lambda_G \Delta T_G + \frac{dH}{dt},$$

where ΔQ_G is the global-mean radiative forcing at the top of the troposphere. This extra energy influx is decomposed into increased outgoing energy flux and heat content changes in the ocean via the derivative dH/dt. The outgoing energy flux is related to the global-mean feedback factor λ_G as well as surface temperature perturbation ΔT_G.

Climate sensitivity, denoted in the MAGICC model as ΔT_{2x}, is defined as the equilibrium global-mean warming after a doubling of carbon-dioxide concentrations and specified via a reciprocal relationship to a feedback factor λ:

$$\Delta T_{2x} = \frac{\Delta Q_{2x}}{\lambda}.$$

In the above equation, ΔT_{2x} represents the climate sensitivity, and ΔQ_{2x} represents the radiative forcing following a doubling of carbon-dioxide concentrations. The time- or state-dependent effective climate sensitivity S^t is defined by combining the above two equations as follows:

$$S^t = \frac{\Delta Q_{2x}}{\lambda^t} = \Delta Q_{2x} \frac{\Delta T_G^t}{\Delta Q^t - \left.\frac{dH}{dt}\right|^t},$$

where ΔQ_{2x} represents the model-specific forcing for doubled carbon-dioxide concentration, λ_t represents the time-specific feedback factor, ΔQ^t represents the radiative forcing, $\Delta T_G{}^t$ represents the global-mean temperature perturbation, and $dH/dt|_t$ represents the climate system's heat uptake at time t.

MAGICC also contains a carbon cycle model that incorporates temperature feedback effects. One of the *a priori* specifications pertaining to this model is a greenhouse gas emissions trajectory. We assumed trajectories specified in the model based on the most recent IPCC assessment reports. In our simulations, we used and modified Representative Concentration Pathway 6.0 (RCP6), specified in the Fifth IPCC Assessment Report.[24]

Using data from the Environmental Protection Agency, we found that the United States emitted approximately 40 percent of carbon dioxide of all Organization for Economic Co-operation and Development (OECD) member nations.[25] In our simulations, we altered OECD projections accordingly, assuming this fraction to be constant over time. Subsequently, we modified RCP6 by increasing projected emissions by 10 percent. In the simulations presented in Appendix Chart 1, we assumed climate sensitivities between 2 degrees Celsius and 5 degrees Celsius, the "very likely range" in the IPCC's Sixth Assessment Report.

Endnotes

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11. The EIA refers to this simulation as its high resource case. U.S. petroleum production and natural gas production in 2016 were about 50 percent *higher* than the projection the EIA made for them eight years earlier. In fact, our assumptions in this study may even be underestimates that do not fully take into account the potential of ever-improving smart drilling technologies.
12. Intergovernmental Panel on Climate Change, "IPCC Sixth Assessment Report: The Physical Science Basis Figure 1.16," https://www.ipcc.ch/report/ar6/wg1/figures/chapter-1/figure-1-16 (accessed January 7, 2025).
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19. Ibid., pp. 3 and 4.
20. HEM's Macroeconomic Activity Module uses the S&P Global Insight Model, which is used by government agencies and Fortune 500 organizations to forecast the effects of economic events and policy changes on notable economic indicators. As with NEMS, the methodologies, assumptions, conclusions, and opinions in this *Backgrounder* are entirely the work of statisticians and economists at Heritage's Center for Data Analysis, and have not been endorsed by, and do not necessarily reflect the views of, the owners of the IHS Global Insight model.
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