The Economic Benefits of Unleashing American Energy

The Council of Economic Advisers

July 2025

Executive Summary

The United States has abundant energy resources and is one of the top energy producers globally. In 2023, it was the world's leading producer of petroleum, natural gas, and nuclear power.[1] It also holds the largest estimated coal reserves[2] and is the top exporter of dry and liquid natural gas.[3] This abundance of energy and natural resources, paired with economic policies that promote the energy sector's growth and support competition, can meaningfully contribute to economic growth, consumer welfare, and national security. However, total U.S. energy production has not always reflected this resource wealth. Electricity production, for example, has been fairly stagnant over the past 20 years[4] and the grid needs substantial investment to handle rising power demand and a shift to more intermittent generation sources.[5] As U.S. energy needs increase in the presence of increasing domestic reshoring of manufacturing as well as growing artificial intelligence (AI) and data processing capabilities, the United States needs to expand its energy output while ensuring that its energy goals are met without excessive regulations.

The Trump Administration has made unleashing American energy one of its priorities in a broader agenda aimed at strengthening the economy and bringing down the cost of living.[6] The administration has already taken important actions to support energy dominance, stimulate domestic energy production, and reduce costs. These actions include reforming burdensome regulations, reducing review and approval timelines for permits, resuming federal lease sales for energy development, issuing permits for new Liquefied Natural Gas (LNG) export terminals, supporting advanced nuclear technology development and knowledge transfer, modernizing and securing the electricity grid, and streamlining funding decisions, among others.

We estimate that policies which support American energy dominance could raise GDP by at least 0.56-1.90 percent by 2035, or 0.31-1.23 percent without deregulation effects. Specifically,

- Removing restrictions on commingling in offshore oil reservoirs could increase GDP by 0.03-0.13 percent by 2035
- Increased production from federal lands could increase GDP by 0.025-0.11 percent per year
- Increased LNG exports could raise GDP by at least 0.03 percent by 2035
- Removing excess regulation could increase GDP by 0.25-0.67 percent or more by 2035

[1] https://www.eia.gov/international/rankings/country/USA?pa=301&u=2&f=A&v=none&y=01%2F01%2F2023
[2] https://www.eia.gov/international/rankings/world?pa=264&u=0&f=A&v=none&y=01%2F01%2F2023&ev=fals
[3] https://www.eia.gov/todayinenergy/detail.php?id=64844 and https://www.eia.gov/international/rankings/country/USA?pa=89&u=2&f=A&v=none&y=01%2F01%2F2023&ev=false
[4] https://www.eia.gov/energyexplained/electricity/electricity-in-the-us-generation-capacity-and-sales.php
[5] See, for example, https://www.energy.gov/gdo/articles/what-does-it-take-modernize-us-electric-grid
[6] https://www.whitehouse.gov/presidential-actions/2025/01/unleashing-american-energy/

Current Energy Policy Landscape

Energy and environmental policy in the United States has undergone significant oscillations over the last few presidential administrations. But despite two decades of changing energy source priorities, the United States has re-emerged as a dominant global energy producer with the ability to use its increasing market share for geopolitical leverage.[7] Despite this success, some challenges remain. New energy and infrastructure projects face significant delays due to long local, state, and federal government approval and permitting timelines. Aging energy infrastructure, including the electrical grid, is in need of expansion and modernization in order to handle rising energy demand, shifting consumption patterns, and reliability constraints created by an increasingly intermittent supply portfolio. The segmented power grid exacerbates regional congestion and price spikes in electricity markets. Some critical minerals that the United States imports and uses for energy purposes come from unreliable or adversarial sources. The United States has insufficient domestic maritime transportation capacity to meet demand for energy exports[8] because it is a minor player in the global shipbuilding industry.[9] And the energy industry faces critical skills shortages.

The Trump Administration has focused on unleashing American energy as a solution to these challenges. After all, the United States is blessed with a wealth of natural resources. Enacting policies that make the most of U.S. resource abundance and promote U.S. energy dominance can meaningfully contribute to economic growth and consumer welfare. President Trump has already issued executive actions to support production of crude oil, natural gas, coal, and nuclear energy; strengthen the supply chain of critical energy and industrial minerals; strengthen, expand, and modernize the electrical grid; reduce excess regulations; and use modern technology to streamline permitting. Through this "all of the above" energy strategy, the Trump Administration aims to stimulate investment, increase domestic production of energy resources for domestic consumption as well as exports, make energy more affordable for all Americans, boost GDP growth, and strengthen national and economic security.

Provisions included in the One Big Beautiful Bill Act (OBBB) support executive actions to promote domestic energy sources in which the U.S. has a comparative advantage and shifting money to technologies that support domestic inputs and manufacturing.[10] Specifically, OBBB:

- Reboots oil, gas, and coal leasing with regular lease sales and lower royalties;[11]
- Appropriates funds to repair and restock the Strategic Petroleum Reserve (SPR),[12] which the previous Administration drew down to its lowest level in 30 years;[13]

[7] For example, European countries are beginning to replace natural gas imported from Russia with U.S. LNG. https://www.reuters.com/business/energy/eu-seeks-more-us-gas-renewable-energy-replace-russian-supplies-2025-02-21/

[8] Here we are referring to ships built in the United States to transport goods to other countries, for example to satisfy requirements of the recent United States Trade Representative (USTR) Section 301 rule. See https://ustr.gov/about/policy-offices/press-office/press-releases/2025/april/ustr-section-301-action-chinas-targeting-maritime-logistics-and-shipbuilding-sectors-dominance

[9] According to BRS Shipbrokers, over the last decade, China delivered 49% of all non-naval commercial ships with capacity over 3,000 deadweight tons (Dwt). South Korea delivered 22%, Japan 17%, and the United States 0.3%.

[10] https://www.congress.gov/bill/119th-congress/house-bill/1/text/enr, specifically Title V, Title VI, and Chapter 5 of Title VII.

[11] https://www.congress.gov/bill/119th-congress/house-bill/1/text/enr, Sec. 50101-50204

[12] https://www.congress.gov/bill/119th-congress/house-bill/1/text/enr, Sec. 50401

[13] https://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=WCSSTUS1&f=W

- Appropriates funds to create AI models to help develop new energy technologies;[14]
- Increases the scope of Department of Energy's (DOE) loan guarantee program to include all projects that improve availability of electricity supply and thus increase grid reliability and adequacy;[15]
- Terminates tax credits for solar and wind energy projects and electric vehicles, which have enjoyed taxpayer subsidies for decades and are now successful industries,[16] and lets the market drive the continued growth of these industries;[17]
- Extends tax credits for biofuels produced from domestically-sourced crops;[18]
- Allows favorable tax treatment of income from advanced nuclear, hydropower, geothermal, hydrogen storage, and carbon capture projects;[19]
- And penalizes foreign entity involvement—including ownership, financing, and component supply—in all sectors of the U.S. economy.[20]

The Coming Increase in Energy Demand for AI

Energy is a key input into the economy, and continued economic growth will depend on availability of affordable and accessible energy supplies. U.S. demand for energy, and in particular electricity, is projected to grow substantially over the coming years, driven by increasing demand for data processing, cryptocurrency, and AI capabilities;[21] electrification of heavy industry; and continued economic and population growth.[22]

Projections related to the energy needs of AI are particularly salient, as President Trump has made U.S. AI dominance a policy priority.[23] By some estimates, executing a ChatGPT prompt can be 10 times more energy intensive than a Google search.[24] The International Energy Agency (IEA) estimates that by 2030, U.S. data centers will consume more electricity than "production of aluminum, steel, cement, chemicals and all other energy-intensive goods combined."[25] The IEA also warns that "… there is no AI without energy; […]

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[14] https://www.congress.gov/bill/119th-congress/house-bill/1/text/enr, Sec. 50404
[15] https://www.congress.gov/bill/119th-congress/house-bill/1/text/enr, Sec. 50403
[16] Investment tax credits for solar and wind energy were initially enacted in the Energy Tax Act of 1978, see https://www.congress.gov/95/statute/STATUTE-92/STATUTE-92-Pg3174.pdf, Sec. 101, 301. Tax credits for electric vehicles were introduced by the American Recovery and Reinvestment Act of 2009, see https://www.congress.gov/bill/111th-congress/house-bill/1/text, Sec. 1141-1144.
[17] https://www.congress.gov/bill/119th-congress/house-bill/1/text/enr, Sec. 70501-70503, 70506, 70512-70513. Solar and wind credits end in 2028, except for projects that begin construction within 12 months of OBBB's signing. EV credits end after September 2025.
[18] https://www.congress.gov/bill/119th-congress/house-bill/1/text/enr, Sec. 70521
[19] https://www.congress.gov/bill/119th-congress/house-bill/1/text/enr, Sec. 70524
[20] https://www.congress.gov/bill/119th-congress/house-bill/1/text/enr, various sections.
[21] See, for example, https://www.goldmansachs.com/insights/articles/AI-poised-to-drive-160-increase-in-power-demand; https://www.goldmansachs.com/images/migrated/insights/pages/gs-research/is-ai-already-boosting-us-power-demand/Redacted_GMD_%20US_Power_Demandv3.pdf, p. 1 and Exhibit 1; https://www.kansascityfed.org/research/economic-bulletin/powering-up-the-surging-demand-for-electricity/; and https://iea.blob.core.windows.net/assets/0f028d5f-26b1-47ca-ad2a-5ca3103d070a/Electricity2025.pdf, pp. 8-9, 142.
[22] https://www.eia.gov/todayinenergy/detail.php?id=56040 and https://www.census.gov/data/tables/2023/demo/popproj/2023-summary-tables.html, Table 1.
[23] https://www.whitehouse.gov/presidential-actions/2025/01/removing-barriers-to-american-leadership-in-artificial-intelligence/
[24] See, for example, https://www.goldmansachs.com/insights/articles/AI-poised-to-drive-160-increase-in-power-demand
[25] https://iea.blob.core.windows.net/assets/dd7c2387-2f60-4b60-8c5f-6563b6aa1e4c/EnergyandAI.pdf, p. 14.

Affordable, reliable and sustainable electricity supply will be a crucial determinant of AI development, and countries that can deliver the energy needed at speed and scale will be best placed to benefit."[26]

If half of U.S. businesses engage in widespread use of AI by 2034, the annual productivity growth of labor could be 1.5 percentage points higher starting in 2034 than it would otherwise be without widespread AI adoption.[27] This boost in labor productivity could, in turn, increase GDP growth by 0.4 percent in 2034.[28] To effectively compete for AI dominance, the United States must focus on rapid growth of low-cost domestic baseload generation. U.S. growth in electricity generation has averaged close to zero over the last 20 years, while China's generation expanded at annual rates of 5 to 10 percent or more (see **Figure 1**).

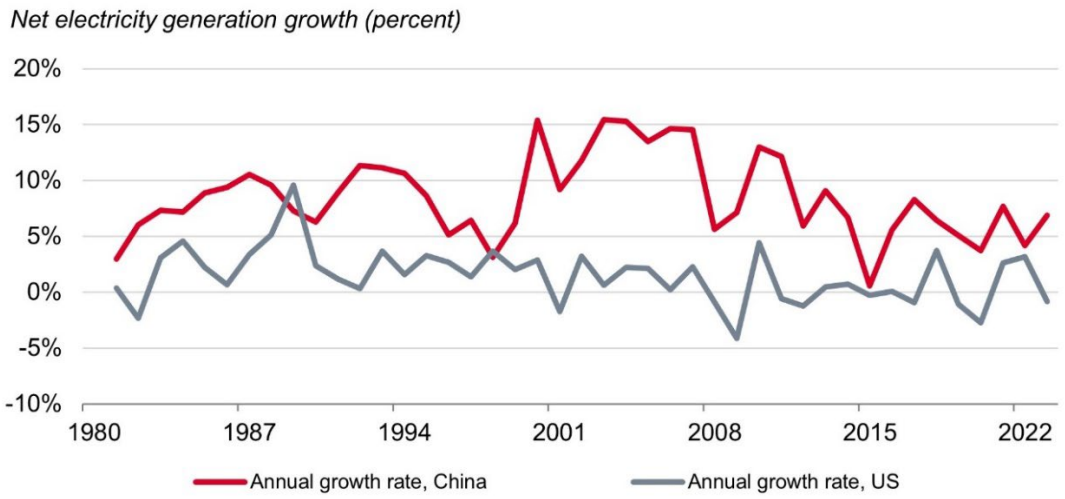
China currently produces about twice as much power as the United States[29] and is investing aggressively in nuclear power. Based on these investments, China is projected to become the largest nuclear power producer in the world by 2030.[30] In 2021, the Chinese government committed to building 150 nuclear reactors by 2035, which would provide 200 GW of total nuclear generation capacity.[31] Thirty nuclear reactors are reported to be currently under construction in China and five have been brought online since 2022.[32]

Under President Trump's guidance, the United States has also committed to expanding its nuclear power industry. On May 23, 2025, President Trump signed four executive orders[33] directing reform of the U.S. nuclear industry and aiming to roughly quadruple nuclear power generation capacity by 2050.[34] However, the United States has only built two reactors in the last 30 years, spending twice as much time and money as was originally budgeted.[35] Given this lack of activity, it is not clear whether the United States will be able to overcome regulatory and financing hurdles to restart its nuclear power industry, which is why the Trump Administration has focused on executive action to force fast results. President Trump's executive orders reform the Nuclear Regulatory Commission (NRC), provide funding for nuclear reactors for civilian and military applications, streamline and expedite reactor design approval and licensing, refocus nuclear safety assessment, establish a reactor pilot program, strengthen nuclear fuel procurement, improve recycling and

[26] https://iea.blob.core.windows.net/assets/dd7c2387-2f60-4b60-8c5f-6563b6aa1e4c/EnergyandAI.pdf, p. 13.
[27] Under the researchers' baseline model, the productivity effect would present once about 50 percent of U.S. businesses have adopted generative AI. See https://www.gspublishing.com/content/research/en/reports/2023/03/27/d64e052b-0f6e-45d7-967b-d7be35fabd16.pdf, pp. 10-15.
[28] https://www.goldmansachs.com/insights/articles/ai-may-start-to-boost-us-gdp-in-2027
[29] Bloomberg New Energy Finance Data
[30] https://www.ecns.cn/news/cns-wire/2025-04-27/detail-iheqvnys2380544.shtml
[31] https://itif.org/publications/2024/06/17/how-innovative-is-china-in-nuclear-power/
[32] https://www.nuclearbusiness-platform.com/media/insights/chinas-nuclear-power-program-a-blueprint-for-global-competitiveness
[33] https://www.whitehouse.gov/presidential-actions/2025/05/ordering-the-reform-of-the-nuclear-regulatory-commission/; https://www.whitehouse.gov/presidential-actions/2025/05/reforming-nuclear-reactor-testing-at-the-department-of-energy/; https://www.whitehouse.gov/presidential-actions/2025/05/reinvigorating-the-nuclear-industrial-base/; https://www.whitehouse.gov/presidential-actions/2025/05/deploying-advanced-nuclear-reactor-technologies-for-national-security/.
[34] https://www.whitehouse.gov/presidential-actions/2025/05/ordering-the-reform-of-the-nuclear-regulatory-commission/, Section 2.c. The Executive Order specifies expanding nuclear generation capacity from 100 GW in 2024 to 400 GW by 2050.
[35] https://www.eia.gov/todayinenergy/detail.php?id=61963. Vogtle units 3 and 4 took 15 years to build, instead of originally estimated 7 or 8, and cost more than $30 billion, instead of originally estimated $14 billion.

reprocessing of spent nuclear fuel, expand nuclear energy training and workforce, and engage in foreign diplomacy to promote exports of U.S. nuclear technology.[36]

Figure 1: Annual electricity generation growth in U.S. and China



Source: EIA International Energy Outlook 2023; Bloomberg NEF NEO 2025

The rise in demand for AI and cloud computing capabilities is already driving up electricity use in the United States. After two decades of growth below one percent per year, the demand for electricity grew by two percent in 2024.[37] By 2028, the expansion in U.S. data center capacity is expected to increase electricity use by about 150-400 terawatt-hours (TWh) relative to 2023 levels, roughly doubling or tripling data centers' share of total electricity use from 4.4 percent to between 6.7 and 12 percent.[38] To guarantee that the extra demand for electricity from data centers is met, industry estimates indicate that the United States will need to invest in as much as 47 gigawatts (GW) of additional power generation capacity through 2030.[39] Once higher demand from industrial electrification and reshoring of manufacturing is added in, the total increase in power demand would require an estimated $1.4 trillion of investment between 2025 and 2030 – more

[36] https://www.whitehouse.gov/presidential-actions/2025/05/ordering-the-reform-of-the-nuclear-regulatory-commission/; https://www.whitehouse.gov/presidential-actions/2025/05/reforming-nuclear-reactor-testing-at-the-department-of-energy/; https://www.whitehouse.gov/presidential-actions/2025/05/reinvigorating-the-nuclear-industrial-base/; https://www.whitehouse.gov/presidential-actions/2025/05/deploying-advanced-nuclear-reactor-technologies-for-national-security/.
[37] For historical demand growth, see https://gridstrategiesllc.com/wp-content/uploads/National-Load-Growth-Report-2024.pdf, p. 5. For 2024 data and projections, see https://iea.blob.core.windows.net/assets/0f028d5f-26b1-47ca-ad2a-5ca3103d070a/Electricity2025.pdf, pp. 142-143.
[38] https://eta-publications.lbl.gov/sites/default/files/2024-12/lbnl-2024-united-states-data-center-energy-usage-report.pdf, pp. 5-6.
[39] https://www.goldmansachs.com/pdfs/insights/pages/generational-growth-ai-data-centers-and-the-coming-us-power-surge/report.pdf, p. 3. And https://www2.deloitte.com/us/en/insights/industry/power-and-utilities/funding-growth-in-us-power-sector.html. Note that the Goldman Sachs report assumes a larger increase in data center power demand than the Berkeley Lab report, so 47 GW of incremental capacity is likely an upper bound.

than the industry's investment over the previous decade.[40] Continued electrification of the economy and reshoring of energy-intensive manufacturing will contribute additional demand for electricity.[41] The total resulting growth in power demand can have important implications for reliability of electricity supplies and prices.

Projecting Potential Electricity Price Increase Without New Generation

Another thought experiment may help to better understand potential implications of a positive electricity demand shock. If demand for electricity continues to grow without a commensurate increase in low-cost generation capacity (that is, if we continue to rely on existing generation infrastructure), prices can rise substantially. To bring prices down, we would need to build more low-cost generating plants. The extent to which electricity prices may increase as demand grows depends on how quickly additional low-cost generation can be brought online to meet higher demand. In the long run, the supply curve is relatively flat (very elastic) – with sufficient time, we can build as much of the type of generation as we need. In the short run, however, the supply curve is fairly steep (inelastic) and to meet rising demand we would need to ramp up generators that are already producing (that is, deploy any spare capacity they have), dispatch more costly generators, or both.

Goldman Sachs forecasts that electricity demand in the United States will rise by about 12 percent by 2030.[42] If we know the supply elasticity of generation, we can estimate what the impact on price will be. This elasticity varies with the composition of the generation portfolio in a particular region, but can be proxied by the supply elasticity of fuel that most often sets the market-clearing price. Currently, this fuel is natural gas.[43] Additionally, natural gas plants have spare capacity[44], so a rising demand would mean higher utilization of gas plants, rather than a shift to a more costly fuel source.[45] Thus, we can use the supply

[40] https://www2.deloitte.com/us/en/insights/industry/power-and-utilities/funding-growth-in-us-power-sector.html
[41] https://eta-publications.lbl.gov/sites/default/files/2024-12/lbnl-2024-united-states-data-center-energy-usage-report.pdf, p. 7.
[42] https://www.goldmansachs.com/pdfs/insights/pages/generational-growth-ai-data-centers-and-the-coming-us-power-surge/report.pdf, p. 3, reporting compound annual growth rate (CAGR) of 2.4 percent.
[43] Currently, in every RTO, combined cycle gas generators are the marginal producers during the majority of hours. One exception is SPP, where during windy months in the spring and fall wind is on the margin more often than gas. See, for example, https://www.monitoringanalytics.com/reports/PJM_State_of_the_Market/2024/2024-som-pjm-press-briefing.pdf, slide 21; https://www.potomaceconomics.com/wp-content/uploads/2024/05/NYISO-2023-SOM-Full-Report__5-13-2024-Final.pdf, figure A-8 on p. A-15; https://www.potomaceconomics.com/wp-content/uploads/2024/05/2023-State-of-the-Market-Report_Final_060624.pdf, p. vi; https://www.caiso.com/Documents/Gas-Conditions-and-CAISO-Markets-Report-for-Dec2022-Jan2023.pdf, p. 22; https://www.iso-ne.com/static-assets/documents/100020/2024-fall-quarterly-markets-report.pdf, p. 23, Figure 3-5; https://www.spp.org/documents/71645/2023%20annual%20state%20of%20the%20market%20report%20v2.pdf, p. 44, Table 2-24.
[44] In 2022, the average capacity factor of a natural gas plant in the United States was 57 percent (https://www.eia.gov/todayinenergy/detail.php?id=60984). Theoretically, gas plants can operate at capacity factors of 90 percent or higher (see, for example, https://www.eia.gov/todayinenergy/detail.php?id=25652, distribution graph). Natural gas accounted for 43.1 percent of total generation in 2023. In theory, if all U.S. gas plants operated at 90 percent capacity factors (holding all else equal), they would produce and extra 14.2 percent of electricity (43.1 x (0.9-0.57) = 14.2). In practice, however, all else would not be equal. More demand for natural gas would raise the price of natural gas and potentially lead to substitution toward other, lower-cost generation sources.
[45] The average capacity factor of baseload natural gas plants in 2022 was between 40 and 70 percent. See https://www.eia.gov/todayinenergy/detail.php?id=61444. Conditions under which it may not be possible to ramp up gas-fired generators arise rarely and in only some regions of the United States. For example, limited natural gas pipeline capacity in New England may constrain the maximum amount of gas that can be supplied to power plants during extreme winter cold. During normal grid operations, however, higher demand would lead to ramping up of generators already in operation, not fuel switching.

elasticity of natural gas as a proxy for the supply elasticity of electricity.[46] Using elasticity estimates from economic literature, [47] electricity prices in 2030 could be 9 to 58 percent higher as a result of higher demand for power if lower-cost providers don't come online.[48]

Powering New Energy Demand

In order to avoid such a price increase, the incremental supply would need to come from low-cost sources. Based on EIA data, as well as industry and academic analyses, combined-cycle natural gas power plants are currently the lowest-cost reliable power generation option in the U.S., with a levelized cost of energy (LCOE) of about $30 per megawatt-hour (MWh).[49] Note that, because renewables are intermittent, they cannot contribute to baseload power without dispatchable backup, like batteries and conventional power plants.[50] For this reason, to be directly comparable to the cost of natural gas, the cost of renewables should be considered with storage, which puts their LCOE at $45-$55 per MWh. A more reliable way of meeting rising demand would be to invest in additional dispatchable generation.[51]

In 2023, it took 32.1 quadrillion British thermal units (Btu) of primary energy to generate 13.2 quadrillion Btu of electricity–implying that nearly 60 percent of energy was lost in the generation, transmission, and distribution process.[52] Improving the efficiency of energy conversion can help the United States meet growing energy demand. Gas plants have become about 30 percent more efficient since 2001, primarily due to combined-cycle technology.[53] The average efficiency of a gas plant (the amount of energy produced for a given amount of inputs) in 2023 was 44.2 percent.[54] By contrast, the average "realized

[46] In theory, the supply of upstream fuels should be less elastic than supply of downstream generation because of the potential to substitute among fuels, so these estimates represent a low bound on the supply elasticity of electricity. Although the price elasticity of electricity supply depends on more than just the extent to which fuels are substitutable, including reliability constraints, here we only consider the system operator's decision about which generator to dispatch as demand grows.
[47] Economic studies estimate the long-run price elasticity of supply for gas to be between 0.24 and 0.9. See, for example, https://www.journals.uchicago.edu/doi/abs/10.1086/701531 and https://media.rff.org/documents/WP_25-05_updated.pdf, pp. 19-20.
[48] The calculation applies the share of fuel cost in total LCOE to account for the extent to which fuel costs impact the cost of electricity generated by natural gas power plants. See https://iea.blob.core.windows.net/assets/ae17da3d-e8a5-4163-a3ec-2e6fb0b5677d/Projected-Costs-of-Generating-Electricity-2020.pdf , pp. 56-57, CCGT LCOEs at 7% discount rate. See also https://www.eia.gov/outlooks/Aeo/pdf/electricity_generation.pdf, p. 8.
[49] Levelized cost of energy (LCOE) for different generation sources, which measures the cost of generating electricity over the lifetime of a generating asset, taking into account the capital cost of building power generating equipment and annual fuel, operating, and maintenance costs, is provided by the EIA (https://www.eia.gov/outlooks/aeo/electricity_generation/pdf/AEO2025_LCOE_report.pdf, p. 9), Lazard (https://www.lazard.com/media/xemfey0k/lazards-lcoeplus-june-2024-_vf.pdf), and Locatelli, G. and B. Mignacca, "Economics and finance of Small Modular Reactors: A systematic review and research agenda," *Renewable and Sustainable Energy Reviews*, Vol. 118, February 2020, 109519, https://doi.org/10.1016/j.rser.2019.109519, Figure 6.
[50] https://www.eia.gov/energyexplained/electricity/electricity-in-the-us-generation-capacity-and-sales.php
[51] Dispatchable generation, like natural gas, coal, and nuclear plants, can be turned on and off at will, unlike intermittent generation, like solar and wind, which is driven by natural factors like weather conditions.
[52] https://www.eia.gov/energyexplained/us-energy-facts/images/consumption-by-source-and-sector.pdf. Roughly 54 percent of primary energy was lost during generation (https://www.eia.gov/totalenergy/data/flow-graphs/electricity.php) and another five percent in transmission and distribution (https://www.eia.gov/tools/faqs/faq.php?id=105&t=3).
[53] Combined cycle technology is the primary factor behind improved efficiency of gas plants. A combined cycle plant captures some of the waste heat produced during the initial combustion process and uses it to boil water and drive a steam turbine, generating additional electricity. See https://www.energy.gov/fecm/how-gas-turbine-power-plants-work.
[54] https://www.eia.gov/totalenergy/data/monthly/archive/00352504.pdf, Table A6, p. 233.

efficiency" of wind turbines and solar panels was substantially lower at 33.5 percent[55] and 15 to 25 percent, respectively.[56] A combination of intermittency and low efficiency for solar and wind generators means that as the generation capacity of these technologies grows, unless storage and dispatchable backup generation grow on par, the potential for power outages will increase. The widespread blackout that affected Spain, Portugal, and the south of France on April 28, 2025, is a concerning example of some critical flaws of renewable energy. It appears to have stemmed from a sudden disruption in solar power supply, which destabilized the frequency of the grid and triggered a blackout since the amount of dispatchable generation in operation was inadequate to control voltage swings.[57]

California's electricity struggles amid its widespread deployment of renewables are also informative. California has among the highest residential electricity rates in the nation—often double or triple the level of other states—partly because of its aggressive emissions reductions policies.[58] The state's share of intermittent renewable generation capacity has been growing since the turn of the century, while coal and natural gas generation capacity is being retired.[59] In August 2018, the state legislature set aggressive targets for renewables and committed to getting all fossil fuels out of electricity generation by 2045, despite anticipated supply shortfalls.[60] In 2023, natural gas accounted for 43.7 percent of California's in-state generation, with solar and wind contributing another 25.6 percent.[61] Although natural gas capacity has decreased by 21 percent since its 2013 peak,[62] natural gas generation (produced in-state and imported) remains the primary way by which the state deals with certain types of renewable intermittency.[63] Twenty percent of California's power imports in 2023 came from coal and natural gas plants.[64]

One concern that has emerged about the high energy demand of data centers is that connecting them to the grid will drive up short-term electricity prices for residential, commercial, and industrial customers, given limited near-term flexibility in supply. And because the U.S. grid is fragmented, prices may be particularly affected in Virginia, Ohio, Texas, and Louisiana, where most data center buildout is expected to occur.[65] Two strategies can help prevent this from happening: (1) utilities can delay retirement of existing

[55] https://emp.lbl.gov/sites/default/files/2024-08/Land-Based%20Wind%20Market%20Report_2024%20Edition.pdf, p. ix. Note that efficiency is measured as the ratio of output energy to input energy. For thermal generators, this is calculated as the amount of energy contained in generated electricity divided by the amount of energy contained in the inputs (gas, coal, petroleum) used during the generating process. For wind turbines and solar panels, we report the capacity factor, which we call "realized efficiency." A capacity factor is the ratio of energy that is actually produced and the generator's maximum production capacity. A thermal generator's capacity factor can be adjusted by using more or less fuel. Since it is not possible to adjust the amount of wind or sun that reaches renewable generators, a renewable generator's capacity factor can be a proxy for its efficiency. Note, however, that curtailment of renewable output to balance the grid reduces renewable capacity factors, so our "realized efficiency" measures for renewables are likely to be slightly understated. A recent academic study puts the average curtailment rate for wind and solar at 3 to 4.3 percent. See https://www.sciencedirect.com/science/article/abs/pii/S0095069624000044.

[56] https://www2.nrel.gov/pv/module-efficiency, calculations based on measurements taken in 2023 and 2024.

[57] See, for example, https://www.ft.com/content/756c9efc-da89-4fab-9549-0a426cc07c0f. At the time this was written, the investigation into the cause of the outage was still ongoing.

[58] See https://www.eia.gov/electricity/monthly/epm_table_grapher.php?t=epmt_5_6_a and https://lao.ca.gov/reports/2025/4950/Residential-Electricity-Rates-010725.pdf, p. 12.

[59] https://world-nuclear.org/information-library/country-profiles/others/californias-electricity

[60] https://world-nuclear.org/information-library/country-profiles/others/californias-electricity

[61] https://www.energy.ca.gov/data-reports/energy-almanac/california-electricity-data/2023-total-system-electric-generation

[62] https://www.energy.ca.gov/media/3757

[63] https://www.caiso.com/about/our-business/managing-the-evolving-grid. Some intermittency is offset by battery storage and imports of generation from nearby states.

[64] https://www.energy.ca.gov/data-reports/energy-almanac/california-electricity-data/2023-total-system-electric-generation

[65] See, for example, https://about.bnef.com/blog/power-for-ai-easier-said-than-built/, Figure 4.

baseload capacity until a sufficient amount of reliable new generation and storage capacity comes online, and (2) data centers can use distributed infrastructure instead of drawing power directly from the grid.

Slowing retirements

U.S. nuclear and coal generation capacity has been declining as financial pressures and burdensome regulations rose (the latter implemented by the Obama Administration and continued under the Biden Administration).[66] Over 40 percent of U.S. coal-fired electricity-generating capacity was retired during the past two decades.[67] More retirements are planned through 2029,[68] but some of these are being delayed or reconsidered,[69] with the lives of some coal and other thermal power plants being extended to maintain reliability as the electricity grid undergoes upgrades necessary to meet the growing demand for power.[70] For example, President Trump's Executive Order 14262 directs the Secretary of Energy to prevent retirements of certain high capacity and critical generation resources for reliability purposes.[71] Other retirement delays are incentivized by rising natural gas prices and the Trump Administration's recognition that coal can also play an important role in maintaining a reliable and resilient power grid.[72]

U.S. nuclear capacity has declined by a smaller share – 5 percent since its peak in 2012.[73] Twelve nuclear reactors have been shut down since then, but two new units came online in 2023 and 2024 (Vogtle reactors 3 and 4), moderating the decline in capacity. While the new capacity is welcome, it was a long time in the making: the Vogtle reactors are the first new nuclear units built in the United States in over 30 years.[74] Decade-long permitting timelines, cost overruns, and high capital costs deter investment in nuclear generation, although the trend may be reversing. The Nuclear Regulatory Commission (NRC) is currently reviewing a request to restart the Palisades nuclear power plant in Michigan.[75] The plant closed in 2022 and is expected to resume operations by the end of 2025.[76] Constellation Energy has also announced plans to bring Three Mile Island's Unit 1 (shuttered in 2019) back online by 2028 to help power Microsoft's data centers.[77] Another company, NextEra, is reviewing the economics of restarting the Duane Arnold nuclear power plant in Iowa (shuttered in 2020), citing rising demand from data centers and interest in clean power.[78]

Using existing grid interconnections eliminates the years-long delays associated with connecting new generating capacity to the grid and improves reliability. Extending the life of existing generating assets by

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[66] https://www.nytimes.com/interactive/2025/02/06/climate/coal-plants-retirement.html
[67] https://www.eia.gov/todayinenergy/detail.php?id=62784
[68] https://www.eia.gov/todayinenergy/detail.php?id=54559
[69] https://www.nytimes.com/interactive/2025/02/06/climate/coal-plants-retirement.html
[70] https://ir.talenenergy.com/news-releases/news-release-details/talen-energy-other-parties-reach-reliability-must-run-settlement
[71] https://www.whitehouse.gov/presidential-actions/2025/04/strengthening-the-reliability-and-security-of-the-united-states-electric-grid/, Sec. 3(c)i and ii.
[72] https://www.ft.com/content/445a8546-f3f5-4465-9bc1-7ebb9fd7bb41
[73] https://www.eia.gov/todayinenergy/detail.php?id=65104 and https://www.eia.gov/totalenergy/data/browser/index.php?tbl=T08.01#/?f=A&start=1999&end=2024&charted=2-1
[74] https://www.georgiapower.com/about/energy/plants/plant-vogtle/units-3-4/vogtle-facts.html
[75] https://www.nrc.gov/info-finder/reactors/pali.html, "Potential Restart."
[76] https://www.nrc.gov/info-finder/reactors/pali.html, "Decommissioning", and https://holtecinternational.com/2025/04/07/hh-40-08/
[77] https://www.constellationenergy.com/newsroom/2024/Constellation-to-Launch-Crane-Clean-Energy-Center-Restoring-Jobs-and-Carbon-Free-Power-to-The-Grid.html
[78] https://www.cnbc.com/2024/07/24/nextera-weighs-restarting-iowa-nuclear-plant-amid-demand-for-carbon-free-energy.html

slowing the closures of coal and nuclear plants would achieve two goals: support data centers and re-shored industrial production, and delay the need for incremental capacity investment.

Distributed generation

Until recently, companies with large power demands relied primarily on solar panels, batteries, fuel cells, and diesel generators.[79] These technologies are deployed in various combinations in order to supply power consistently and reliably, since some of these sources suffer from intermittency. Since 2024, companies including Amazon, Google, and Microsoft have been turning to nuclear power, and particularly considering the potential of Small Modular Reactors (SMR), to provide stable and reliable power.[80] SMRs could supply a large amount of power reliably, safely, and cleanly at a reasonably low projected cost. Some states that were opposed to nuclear are beginning to recognize this. Kathy Hochul, the governor of New York, recently directed the New York Power Authority to build an advanced nuclear reactor, noting the need to "embrace an energy policy of abundance that centers on energy independence and supply chain security."[81] Preliminary industry estimates suggest that SMR technology can come in at a slightly lower cost than conventional nuclear (about $30 per MWh for SMRs, rather than $32 for conventional), and is competitive with combined cycle gas plants ($30 per MWh for fully depreciated plants).[82] The United States has vast technical expertise in nuclear power and co-locating data centers with SMRs would help to meet both the growing demand for energy and the strategic goal of promoting U.S. AI dominance.

SMRs offer several distinctive advantages for data centers. They provide reliable, round-the-clock power and can be scaled up by adding more modules as data centers expand their processing capacity. [83] SMR proponents argue that because SMRs are smaller than conventional nuclear reactors, they rely on less radioactive material and allow operators more time to react in case of incidents.[84] Sceptics argue that SMRs may suffer from diseconomies of scale, making nuclear power more expensive, but studies suggest that such diseconomies may be limited. In particular, research shows that 60-80 percent of the cost of nuclear electricity is construction costs, that the bulk of cost increases that were observed between 1976 and 1988 were from indirect costs—mainly labor.[85] Long construction time and accumulating financing costs also add

[79] See, for example, https://www.pacificorp.com/content/dam/pcorp/documents/en/pacificorp/energy/integrated-resource-plan/2023-irp/2023-irp-support-studies/PacifiCorp_Private_Generation_Resource_Assessment.pdf, p. 8; https://www.wpr.org/news/microsoft-to-use-diesel-fired-generators-as-backup-power-for-data-centers; https://www.cummins.com/news/2023/05/22/why-data-centers-are-thinking-differently-about-energy; and https://docs.nrel.gov/docs/fy19osti/72509.pdf, p. 4.

[80] See https://www.spglobal.com/market-intelligence/en/news-insights/articles/2024/3/talen-energy-sells-pa-datacenter-campus-to-amazon-web-services-for-650m-80711401, https://www.constellationenergy.com/newsroom/2024/Constellation-to-Launch-Crane-Clean-Energy-Center-Restoring-Jobs-and-Carbon-Free-Power-to-The-Grid.html, https://blog.google/outreach-initiatives/sustainability/google-kairos-power-nuclear-energy-agreement/, and https://www.ans.org/news/article-6480/amazon-investing-in-smrs-to-deploy-5gw-by-2039/

[81] https://www.governor.ny.gov/news/governor-hochul-directs-new-york-power-authority-develop-zero-emission-advanced-nuclear-energy. See also, https://www.governor.ny.gov/sites/default/files/2025-01/2025StateoftheStateBook.pdf, pp. 122-123.

[82] Some caution about SMR costs is warranted: at this time, available SMR costs are estimates obtained from numerical models, as cost data for the three SMRs currently in operation is not available. For conventional nuclear and combined cycle plants, see, for example, https://www.lazard.com/media/xemfey0k/lazards-lcoeplus-june-2024-_vf.pdf, p. 9.

[83] https://www.energy.gov/ne/benefits-small-modular-reactors-smrs

[84] https://energy.ec.europa.eu/topics/nuclear-energy/small-modular-reactors/small-modular-reactors-explained_en and https://www.oecd-nea.org/jcms/pl_90816/the-nea-small-modular-reactor-dashboard-second-edition, p. 21.

[85] For a review of these studies, see https://ifp.org/nuclear-power-plant-construction-costs/.

substantially to the overall cost of traditional nuclear reactors.[86] If SMRs can be built relatively quickly[87] using an assembly line, standard designs, and a modest labor force, SMRs may end up being less costly than their conventional counterparts. Current estimates put the LCOE of SMRs between $50 and $113 per megawatt of electricity, although some industry models suggest that it could be as low as $30/MWh.[88] Another study found that the increase in regulatory requirements faced by nuclear reactors between 1960s and 1970s raised labor requirements by 137 percent and plant costs by 176 percent.[89] Reforming the regulatory process for SMRs in a way that does not sacrifice safety, as outlined by President Trump's recent executive orders,[90] would stimulate even more new investment in this technology.

Lowering Energy Prices

Electricity

One important barrier to lower electricity prices for consumers is the fact that the U.S. electricity grid is highly fragmented. Studies have shown that linking regional grids would reduce price differentials across regions by letting power flow where it is most needed, lowering production costs and increasing resiliency.[91] The U.S. grid is currently composed of three different interconnections (regional grids) that largely do not share power flows and are operated by seven independent system operators (ISOs) and a host of vertically integrated utilities.[92] The regional grids have a different mix of generating assets and operating rules,[93] and face different supply and demand conditions. Because regional grids are not interconnected, an adverse event (e.g., winter storm) in one part of the country can put excess strain on that region's grid, leading to price spikes and blackouts. Even during hours of normal operation, arbitraging regional price differences could lead to cost savings. According to a recent DOE-funded study, most of the value of linking regional transmission grids comes from a small number of hours during normal operating conditions when regional

[86] See, for example, Koomey, Jonathan, Nathan E. Hultman, and Arnulf Grubler, "A reply to 'Historical construction costs of global nuclear reactors'," *Energy Policy*, Vol. 102, March 2017, pp. 640-643. https://pure.iiasa.ac.at/id/eprint/12747/1/A%20reply%20to%20historical%20construction%20costs%20of%20global%20nuclear%20power%20reactors.pdf

[87] Construction time estimates for SMRs vary between 1.5 and 3 years, compared to 5 to 8 years for a large nuclear reactor. See, for example, https://www.nucnet.org/news/economic-modelling-compares-costs-of-smr-to-conventional-pwr-10-4-2020 and https://www.idtechex.com/en/research-article/how-long-until-small-modular-reactors-make-an-impact-on-energy-grids/29549

[88] Confidential estimates based on information in https://www.oecd-nea.org/upload/docs/application/pdf/2025-06/the_economics_of_the_nuclear_fuel_cycle_1994.pdf, https://www.komanoff.net/nuclear_power/Power_Plant_Cost_Escalation.pdf, https://holtecinternational.com/2024/09/30/hh-39-17/, and https://doi.org/10.1016/j.enpol.2016.01.011.

[89] Paik, Soon and William R. Schriver, "Effect of Increased Regulation on Capital Costs and Manual Labor Requirements of Nuclear Power Plants." *The Engineering Economist*, Vol. 26(3), pp.223-244. https://doi.org/10.1080/00137918008902884. See also https://ifp.org/nuclear-power-plant-construction-costs/.

[90] https://www.whitehouse.gov/presidential-actions/2025/05/ordering-the-reform-of-the-nuclear-regulatory-commission/; https://www.whitehouse.gov/presidential-actions/2025/05/reforming-nuclear-reactor-testing-at-the-department-of-energy/; https://www.whitehouse.gov/presidential-actions/2025/05/reinvigorating-the-nuclear-industrial-base/; https://www.whitehouse.gov/presidential-actions/2025/05/deploying-advanced-nuclear-reactor-technologies-for-national-security/.

[91] See, for example, https://eta-publications.lbl.gov/sites/default/files/lbnl-empirical_transmission_value_study-august_2022.pdf

[92] The three interconnections are Western, Eastern, and Texas (ERCOT). The seven independent system operators (ISOs) are: Pennsylvania, New Jersey, Maryland (PJM); Southwest Power Pool (SPP); Midcontinent (MISO); New York (NY ISO); New England (ISO New England); California (CAISO); and Texas (ERCOT). In the western and south-eastern U.S. states that are not covered by ISOs, local vertically integrated utilities are in charge of planning and supplying power. See https://www.epa.gov/green-power-markets/us-grid-regions, https://www.epa.gov/green-power-markets/power-market-structure, and https://rmi.org/the-united-states-has-the-only-major-power-grid-without-a-plan/

[93] https://www.eia.gov/todayinenergy/detail.php?id=790

price differences are large.[94] Interconnecting the regional grids would alleviate regional congestion and provide insurance against high costs that grids encounter during extreme conditions. Less congestion means lower or less frequent wholesale price spikes during periods of unexpectedly high demand or low or intermittent supply, and that, in turn, means lower retail electricity prices. Even though most retail customers in the United States pay a fixed price for electricity,[95] assuming that utilities rationally price wholesale variability into fixed rate contracts, less extreme volatility in wholesale prices should reduce retail prices.

The biggest challenge to integrating the regional grids would likely be one of coordination. A study on the effects of connecting California's electricity market (California Independent System Operator, or CAISO) to nearby Western states found that a wider grid would increase efficiency, reduce emissions, and cut costs for consumers.[96] Yet, CAISO still stands on its own. Integrating independent market systems with different objectives, rules, and processes would require not just money for more transmission connections, but a substantial synchronization effort.

Another system constraint that has led to higher electricity prices in some parts of the United States is insufficient natural gas pipeline capacity.[97] Natural gas pipelines in the Northeast of the United States, for instance, operate at or close to full capacity during the winter.[98] When a winter storm hits, additional gas cannot be delivered to gas-fired power plants and operators have to dispatch alternative generators.[99] In the northeast of the United States (specifically, within New York ISO and ISO New England), only one coal-fired power plant remains.[100] All other coal plants have shut down because of a combination of economic factors and prior administrations' aggressive green mandates, as well as state-level environmental regulations.[101] Because of this, the region ends up meeting critical peak demand chiefly by dispatching petroleum-based generation, which is expensive and produces among the highest levels of local air pollution.[102] Building more pipeline capacity from gas-producing regions to power plants, such as the proposed Constitution Pipeline from Pennsylvania to New York, would at a minimum help mitigate sharp price increases during times of peak demand, and may reduce electricity prices by converting gas that is currently "trapped" (and therefore cheap) into electricity. In 2016, New York State blocked the Constitution Pipeline on environmental grounds – a decision that was later upheld on appeal. The Trump Administration's recent negotiations with Governor Kathy Hochul suggest that pipeline construction may

[94] https://eta-publications.lbl.gov/sites/default/files/lbnl-empirical_transmission_value_study-august_2022.pdf, pp. 28, 33.
[95] Including nearly all residential customers. See, for example, https://dornsife.usc.edu/news/stories/smart-meters-and-dynamic-pricing/
[96] https://www.caiso.com/documents/sb350study_aggregatedreport.pdf, impacts beginning on p. I-28.
[97] https://www.nerc.com/news/Pages/Statement-on-NPCC-Northeast-GasElectric-System-Study.aspx
[98] https://www.nerc.com/news/Pages/Statement-on-NPCC-Northeast-GasElectric-System-Study.aspx
[99] https://www.eia.gov/todayinenergy/detail.php?id=64484
[100] Merrimack Station in New Hampshire is scheduled to close in 2028. See https://www.graniteshorepower.com/facilities and https://www.nhpr.org/nh-news/2025-04-21/merrimack-station-new-air-pollution-rules-exemption-2028-closing.
[101] https://ieefa.org/resources/closure-last-new-england-coal-plant-marks-significant-energy-transition-milestone and https://www.eia.gov/todayinenergy/detail.php?id=42716
[102] https://visualizingenergy.org/watch-the-history-of-oil-power-plants-in-the-united-states/

soon commence.[103] The Administration has also taken measures to prevent state-level action from paralyzing federal energy policy.[104]

Economic research shows that despite the decline in the costs of generating electricity due to electricity restructuring in many parts of the United States, consumers have not benefitted from lower electricity prices.[105] This is partly due to how transmission and distribution (T&D) entities, which are regulated natural monopolies, set their prices.[106] T&D companies are allowed to earn a reasonable return on their capital investment under rate of return (ROR) regulation or cost of service (COS) models. This incentivizes companies to invest in infrastructure that increases their capital asset base and disincentivizes investment in more efficient infrastructure or initiatives that may delay or eliminate the need for incremental investment, like grid upgrades and energy efficiency projects. In response to existing incentives, T&D companies have been investing in capital projects and passing the cost on to consumers.[107] Allowing T&D entities to also earn a return on avoided investment could help reduce the incentive for empire building, encourage the development of a more efficient grid, and lower consumer prices.

Demand response is one initiative that provides a return on avoided investment. When a customer signs up for demand response, he or she gives the utility access to a smart thermostat and permission to change thermostat settings during peak demand periods. If the utility can reduce demand for enough customers, it can avoid having to generate electricity using expensive peaking plants. This reduces the cost of generation and translates into lower costs for customers. The utility generally pays customers for access to their smart thermostats, so the customers are compensated for enduring a few hours of slightly higher household temperatures.[108]

Demand-response projects at grid scale can be effective at reducing or delaying new investment in generation, transmission, and distribution infrastructure. In 2014, New York utility Con Edison launched a demand-management program covering the Brooklyn and Queens boroughs in New York City. The utility encouraged residents to sign up for energy-saving programs, rolled out efficiency upgrade programs (lighting, HVAC, and insulation), and invested in large-scale battery storage and voltage optimization to increase reliability. These measures allowed Con Edison to defer spending $1 billion to build a new substation.[109]

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[103] The negotiations reportedly allowed a large wind project off the coast of New York to proceed in exchange for clearance for the Constitution Pipeline. See, for example, https://www.nytimes.com/2025/05/29/business/energy-environment/constitution-pipeline-hochul-trump.html

[104] https://www.whitehouse.gov/presidential-actions/2025/04/protecting-american-energy-from-state-overreach/

[105] See, for example, Cicala, Steve, "Imperfect markets versus imperfect regulation in U.S. electricity generation," *American Economic* Review, Vol. 112(2), 2022, pp. 409-441. https://doi.org/10.1257/aer.20172034; Cicala, Steve, "Restructuring the Rate Base," 2022, https://www.stevecicala.com/papers/restructuring_rate_base/restructuring_rate_base_draft.pdf; Razeghi, Ghazal, Brendan Shaffer, and Scott Samuelsen, "Impact of electricity deregulation in the state of California," *Energy Policy*, Vol. 103, April 2017, pp. 105-115, https://doi.org/10.1016/j.enpol.2017.01.012; and MacKay, Alexander and Ignacia Mercadal, "Do markets reduce prices? Evidence from the U.S. electricity sector" (March 30, 2024). Available at SSRN: https://ssrn.com/abstract=3793305.

[106] The same applies to the remaining vertically-integrated utilities operating in parts of the United States where electricity markets have not been restructured.

[107] Cicala, Steve, "Restructuring the Rate Base," 2022, https://www.stevecicala.com/papers/restructuring_rate_base/restructuring_rate_base_draft.pdf

[108] See, for example, https://www.iea.org/energy-system/energy-efficiency-and-demand/demand-response

[109] https://www.utilitydive.com/news/bqdm-program-demonstrates-benefits-of-non-traditional-utility-investments/550110/

Hawaii's Public Utility Commission has transitioned from a cost-of-service model to performance-based regulation (PBR). The new model rewards utilities for meeting certain performance goals, including reducing interconnection times, lowering costs, and improving customer service.[110] By decoupling revenue from investment or sales, PBR allows utilities to improve service and reliability in a way that does not increase customer costs.[111]

Gasoline

The coastal regions, in particular California and New York, face some of the highest gasoline prices in the United States. If refineries in Pennsylvania and New Jersey could more easily get Gulf Coast crude, the region could rely less on imports and prices could come down. However, there is no pipeline capacity to get crude oil from Texas to New York,[112] so New York has been importing crude from Canada.[113] Because pipelines are the most economic form of transportation for crude oil, transporting by any other means increases the costs for consumers.[114] Expanding crude oil pipeline capacity from the Gulf Coasts to East Coast refineries could help reduce the need for imports and bring down prices.

The situation is trickier in California because the state's strict environmental regulations make refining economically unsustainable.[115] Recent state legislation that raised the regulatory burden faced by refiners, including by allowing state regulators to mandate minimum inventory levels,[116] has caused California's refining capacity to continue to shrink.[117] Two refineries are slated to be shut down within the next 12 months, and gasoline prices are expected to increase as a result.[118] Reducing California's onerous regulatory burden on refineries would help slow down the loss of refining capacity and may help to bring down gasoline prices.

Increasing Access to Energy Resources on Federal Lands and Waters

U.S. federal lands and waters contain significant natural resource deposits, including crude oil, natural gas, coal, uranium ore, and other metal and non-metal minerals.[119] In recent years, about 42 percent of U.S. coal production,[120] 26 percent of crude oil production, and 10 percent of natural gas production[121] came from Federal lands and waters. Federal and tribal lands also contain about 75 percent of all known and potential

[110] https://puc.hawaii.gov/energy/pbr/
[111] https://puc.hawaii.gov/energy/pbr/overview-of-the-pbr-framework/
[112] The Colonial Pipeline and Kinder Morgan PPL carry refined products, but not crude oil, from Texas to New York and from Louisiana to Virginia, respectively. https://www.colpipe.com/about-us/ and https://www.kindermorgan.com/Operations/Products/Index#tabs-refined_products_pipelines
[113] See https://www.eia.gov/state/analysis.php?sid=NY and https://www.colpipe.com/about-us/. In May of 2021, the Colonial Pipeline that sends refined products from Texas to New York was attacked by a ransomware group. The attack shut down the pipeline's operations, led to shortages of gasoline and jet fuel along the U.S. east coast, and exposed the risks of a concentrated fuel supply chain.
[114] See, for example, https://rbnenergy.com/rock-the-boat-don-t-rock-the-boat-crude-by-water-and-the-jones-act
[115] https://www.eia.gov/todayinenergy/detail.php?id=63944 and https://www.argusmedia.com/en/news-and-insights/latest-market-news/2679266-valero-benicia-refinery-closure-latest-calif-challenge
[116] https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=202320242AB1
[117] https://www.eia.gov/todayinenergy/detail.php?id=63944
[118] https://files.constantcontact.com/6ddc9aab901/d3ac27a3-d4d4-44f3-9a3b-f91f88735d11.pdf
[119] https://www.eia.gov/uranium/production/annual/ and https://revenuedata.doi.gov/downloads/production/
[120] See https://revenuedata.doi.gov/downloads/production/ for U.S. coal production on federal lands (2023 volumes) and https://www.eia.gov/coal/annual/ for total U.S. coal production.
[121] https://www.gao.gov/assets/gao-25-108130.pdf

uranium reserves in the United States and present strong geological potential for uranium mining.[122] Domestic uranium mining carries strategic importance because the United States currently imports nearly all of the uranium that it uses in nuclear generation.[123] In 2023, about half of uranium purchased by U.S. nuclear plants came from Canada and Australia, and another 44 percent was supplied by Russia, Kazakhstan, and Uzbekistan.[124] In 2024, Congress passed legislation banning Russian uranium imports and allocating $2.7 billion to expand domestic uranium enrichment and improve U.S. energy, economic, and national security,[125] and the Trump Administration is committed to continue strengthening the domestic nuclear power industry and nuclear fuel supply chain.[126]

Federal oil and gas leases also hold potential to boost production and lower prices. The Biden administration issued several executive orders pausing federal oil and gas leasing[127] and withdrawing federal lands and waters from oil and gas development.[128] Restricting oil and gas development on federal lands can be a costly policy, as producers pay royalties on all oil and gas produced from federal lands.[129] This money is split between state and federal coffers and can be used to reduce taxes or fund social programs and other initiatives. A recent working paper found that banning oil and gas leasing on federal lands would not only raise oil and gas prices, it would also reduce royalty receipts by over 50 percent (about $5 billion a year) and shift more production to private leases and outside of the United States.[130] The Trump Administration reopened federal lands and waters to drilling and mining in efforts to stimulate domestic production and bring down the cost of energy.[131]

According to the Bureau of Land Management (BLM), which manages federal onshore mineral leasing,[132] nearly half of federal onshore acreage that was under lease at the end of 2022 was not developed, either

[122] https://www.epa.gov/radiation/tenorm-uranium-mining-residuals
[123] https://www.eia.gov/todayinenergy/detail.php?id=64444
[124] https://www.eia.gov/uranium/marketing/
[125] https://2021-2025.state.gov/prohibiting-imports-of-uranium-products-from-the-russian-federation
[126] See, for example, the following Executive Orders: https://www.whitehouse.gov/presidential-actions/2025/05/deploying-advanced-nuclear-reactor-technologies-for-national-security/, https://www.whitehouse.gov/presidential-actions/2025/05/ordering-the-reform-of-the-nuclear-regulatory-commission/, https://www.whitehouse.gov/presidential-actions/2025/05/reforming-nuclear-reactor-testing-at-the-department-of-energy/, and https://www.whitehouse.gov/presidential-actions/2025/05/reinvigorating-the-nuclear-industrial-base/.
[127] https://www.federalregister.gov/documents/2021/02/01/2021-02177/tackling-the-climate-crisis-at-home-and-abroad, section 208.
[128] https://bidenwhitehouse.archives.gov/briefing-room/presidential-actions/2025/01/06/memorandum-on-the-withdrawal-of-certain-areas-of-the-united-states-outer-continental-shelf-from-oil-or-natural-gas-leasing/ and https://bidenwhitehouse.archives.gov/briefing-room/presidential-actions/2023/03/13/memorandum-on-withdrawal-of-certain-areas-off-the-united-states-arctic-coast-of-the-outer-continental-shelf-from-oil-or-gas-leasing/
[129] In 2024, royalty rates on oil and gas production from federal leases increased from 12.5 percent to a minimum of 16.67 percent. See https://www.blm.gov/press-release/blm-ensures-fair-taxpayer-return-strengthens-accountability-oil-and-gas-operations and https://iratracker.org/programs/ira-section-50261-offshore-oil-and-gas-royalty-rates/.
[130] Prest, Brian C. "Supply-Side Reforms to Oil and Gas Production on Federal Lands," Resources for the Future working paper 20-16, December 2021, Table 1, p. 26. Available at https://media.rff.org/documents/WP_20-16__Dec_2021.pdf
[131] https://www.nytimes.com/2025/04/08/climate/trump-new-mexico-nevada-mining-drilling.html https://www.doi.gov/sites/default/files/document_secretarys_orders/so-3420-binder.pdf. President Trump also issued Executive Order 14285 that directs relevant agencies to streamline license and permit grants for exploration and recovery of critical minerals from the seabed. See https://www.whitehouse.gov/presidential-actions/2025/04/unleashing-americas-offshore-critical-minerals-and-resources/
[132] https://www.blm.gov/programs/energy-and-minerals/oil-and-gas/about

because of long regulatory approval timelines or economic considerations.[133] Similarly, the Bureau of Ocean Energy Management (BOEM), which manages offshore leasing, reported that 80 percent of offshore leases were non-producing at the start of April 2025.[134]

The distinction between leasing and drilling is an important one for economic outcomes. Because there is a time lag between when an oil and gas property is leased and when a well is drilled, incentivizing producers to speed up the pace of drilling may help to bring economic benefits in the near-term. Drilling and production decisions depend on a variety of economic factors, including oil and gas prices, tax incentives, and regulatory regimes. This means that leasing is not always followed promptly by drilling. Empirical evidence from Texas shows that the behavior of oil and gas producers is impacted by expectations about future volatility of prices.[135] When prices are expected to rise, drilling picks up. Drilling on public lands, however, is likely to be less responsive to price because of the additional constraints that long permitting and environmental approval timelines impose.[136] Reducing the permitting and National Environmental Policy Act (NEPA) approval timelines could make federal leases more attractive (i.e., profitable) by allowing producers to better time drilling decisions – that is, to drill when the price environment is attractive.

Between 2014 and 2024, it took on average 4 to 10 months for BLM to approve an application for a permit to drill (APD).[137] Drilling permits were issued significantly faster during the first Trump Administration than before and after, thanks to the deregulatory agenda. The average review time fell from 7.3-8.5 months in 2014-2017 to 4-6 months in 2018-2021.[138] The time savings appear to be evenly split between a) operators more quickly assembling required information and b) BLM more quickly reviewing the submitted applications. Before the BLM can issue a drilling permit, the lease has to pass NEPA review. In 2024, NEPA reviews took on average 2.2 years to complete, and for some complex projects extended to a decade or longer.[139] Permit reviews are typically conducted concurrently with NEPA reviews, but any delays during either process can set back drilling and production timelines.

[133] See, for example, https://www.deseret.com/utah/2024/05/27/whats-up-with-delays-on-projects-on-federal-lands/ and https://news.oilandgaswatch.org/post/thousands-of-permits-to-drill-on-federal-lands-are-not-being-used-so-why-accelerate-more-approvals

[134] https://www.boem.gov/sites/default/files/documents/oil-gas-energy/leasing/Lease%20stats%204-1-25.pdf

[135] Kellogg, Ryan, "The Effect of Uncertainty on Investment: Evidence from Texas Oil Drilling," *American Economic Review*, Vol 104(6), 2014. http://dx.doi.org/10.1257/aer.104.6.1698

[136] For example, in 2020, BLM took on average 143 days to approve a federal drilling permit. The Rail Road Commission of Texas, by contrast, approved a standard drilling permit in two days. See https://www.blm.gov/sites/blm.gov/files/docs/2021-03/Table12_TimetoCompleteAPD_2020.pdf and https://www.rrc.texas.gov/news/rrc-staff-processing-standard-drilling-permits-in-two-days/

[137] The range has varied between 121 and 305 days. See BLM Fiscal Year 2024 Statistics, Table 12. https://www.blm.gov/programs-energy-and-minerals-oil-and-gas-oil-and-gas-statistics

[138] During the first year of a new administration, permitting times appear to still reflect the prior administration's policy priorities. In year two, however, once the new policies and regulations have been implemented, significant changes become evident.

[139] https://ceq.doe.gov/docs/nepa-practice/CEQ_EIS_Timeline_Report_2025-1-13.pdf, p. 1, Table 1 on p. 3 and Figure 3 on p. 5. The average review took about three years to complete in 2020 and 2.75 years in 2010.

The average time from leasing to production has fallen since 1995, from more than five years to three years or less.[140] This decrease can be attributed to rising crude oil prices, changes in regulatory requirements, and other factors like lease characteristics and financing available to operators.[141] Delays and uncertainty that firms encounter during the regulatory approval process make it difficult to finance production on federal lands – the longer firms wait for regulatory approvals, the more likely financing is to disappear. This can cause producers to substitute away from public lands into private leases, where production can be more costly once it begins, but also entails less risk of being unable to produce. As a result, the energy potential of public lands remains underutilized. Regulatory reform that accounts for advances in technical knowledge and harnesses economies of scale can facilitate companies' utilization of federal lands and boost productivity.

During its second term, the Trump Administration carried out a substantial overhaul of NEPA. It took regulatory and implementation authority away from the Council on Environmental Quality (CEQ) and granted it to individual agencies, directing them to streamline and coordinate reviews and to use technology to avoid duplication and expedite approvals. The Department of the Interior (DOI) recently issued an alternative timeline for NEPA reviews under the emergency authority stipulated by Executive Order 14156, reducing assessment time to 28 days and 14 days for projects with and without significant environmental impacts, respectively – a decline of roughly 97 to 99 percent. The streamlining efforts and expedited timelines will substantially reduce regulatory uncertainty and help attract investment in new projects.

Updating regulations based on advances in technical knowledge

On April 24, 2025, the Trump Administration revised regulations governing offshore oil extraction from multiple reservoirs with pressure differentials.[142] BLM expects the updated rule to increase offshore oil production by as much as 10 percent over the next decade. This can be viewed as a one-time boost to the productivity of the offshore oil and gas industry. A 10 percent increase in offshore production is equivalent to a 1.6 percent increase in total U.S. oil output.[143] The value of oil and gas production as a share of GDP stood at 1.6 percent in 2024. Estimates that capture spillovers (associated infrastructure investment, royalty payments, employment effects, and so on), put the value of the oil and gas industry closer to 8 percent of GDP.[144] Based on these values, a 10 percent productivity shock for offshore oil wells could raise GDP by between 3 and 13 basis points by 2035.[145]

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[140] These averages are based on BLM data and represent federal onshore leases that went into effect in 2015 or earlier. Leases are in effect for ten years and operators can begin production at any time during those ten years. Leases that went into effect after 2015 have not yet expired, so drilling timeline information for these leases is incomplete. The data also suggests that if a lease is going to be put in production, it will happen by year six, on average. Expanding the sample to leases signed by 2018 reduces average time to production to about 2.5 years.

[141] Some federal parcels go into production on the day they are leased because they are being drained by an offsetting well on a nearby lease. The timing of production on these leases is obviously not affected by prices or regulatory approval timelines. See, for example, https://www.blm.gov/sites/blm.gov/files/uploads/mediacenter_blmpolicymanual3160.pdf, section 1.2.

[142] https://www.doi.gov/pressreleases/interior-boosts-offshore-oil-production-new-commingling-policy

[143] In 2024, offshore crude oil production accounted for 14 percent of total U.S. crude oil output. Offshore oil wells also produced about 2 percent of associated natural gas (https://www.boem.gov/oil-and-gas-energy). Increasing offshore production by 10 percent would therefore bump up oil production by 1.35 percent and associated gas by 0.2 percent.

[144] https://www.api.org/-/media/files/policy/taxes/dm2018-086_api_fair_share_onepager_fin3.pdf

[145] Using Baqaee-Farhi methodology to calculate first-order effects. See Baqaee, David Rezza and Emmanuel Farhi, "The Macroeconomic Impact of Microeconomic Shocks: Beyond Hulten's Theorem," *Econometrica*, Vol. 87(4), pp. 1190-1192.

Updating regulations to harness economies of scale

OBBB reinstated the 12.5 percent royalty on production from all federal leases. This effectively gives four to six percentage points of revenue back to the operators (or four to six cents for every dollar of revenue) and is expected to increase total U.S. oil production by about 1 percent.

The current leasing and permitting process on public lands is quite fragmented and could be simplified to enable economies of scale. Before a federal lease auction, the BLM must conduct an environmental assessment that would enable it to issue exploratory permits, based on which firms would decide whether or not to bid on particular acreage during an auction. Following the auction, a lease holder must apply for a drilling permit and undergo a NEPA evaluation. Only once the NEPA process is complete and a drilling permit is issued can the lease holder begin to prepare the site for drilling. Combining the two environmental assessments (the pre-exploratory environmental evaluation and the NEPA review) could lead to significant efficiency gains. And if these two requirements were settled before the leases were auctioned, not only would producers be able to commence drilling faster, but they would also likely be willing to pay more for the leases, since they would not have to face regulatory uncertainty or delays embedded in the NEPA review process. Additional efficiency gains could come from letting BLM districts build comprehensive environmental plans for the acreage they plan to put up for auction and putting that acreage through NEPA review as a single block, instead of subjecting individual leases to their own prolonged NEPA assessments.

An additional lesson that could be learned from private leases relates to the appropriate structure of lease terms. Research has shown that leases on private lands are drilled faster and are more likely to generate fair value for mineral owners because of a combination of short lease terms and high royalty rates.[146] Short lease terms encourage producers to drill wells faster because they would have to lease the minerals anew if the lease contract were to expire. When short lease terms are combined with sizeable royalty rates,[147] leases are drilled faster and mineral owners receive a fair value for allowing companies to extract their minerals.

The Inflation Reduction Act (IRA) of 2022 raised the minimum leasing bids (from $3 per acre to $10) and royalty rates (from 12.5 percent of revenue to 16.67 percent of revenue onshore and up to 18.75 percent of revenue offshore) applicable to production from federal lands and waters,[148] but it did not shorten lease terms. On its own, a higher royalty rate actually disincentivizes drilling by reducing profits. Thus, without reducing lease terms, at least for onshore leases that often don't require the extensive infrastructure investment that offshore leases entail, the IRA changes may be exacerbating the drilling time lag.

[146] Herrnstadt, Evan M., Ryan Kellogg, and Eric Lewis, "The Economics of Time-Limited Development Options: The Case of Oil and Gas Leases," NBER working paper 27165, May 2020, abstract and p. 2. https://www.nber.org/system/files/working_papers/w27165/w27165.pdf
[147] Private mineral lease contracts stipulate royalty rates as high as 25 percent. See Herrnstadt, Evan M., Ryan Kellogg, and Eric Lewis, "The Economics of Time-Limited Development Options: The Case of Oil and Gas Leases," NBER working paper 27165, May 2020. https://www.nber.org/system/files/working_papers/w27165/w27165.pdf
[148] https://iratracker.org/programs/ira-section-50262-onshore-oil-and-gas-royalty-rates-minimum-bid-requirements-and-rental-fees/

If faster permitting results in one quarter of currently non-producing onshore leases[149] to be drilled over the next ten years, total domestic production of oil and gas would increase by 1.5 percent and 1.13 percent, respectively, adding between 2.5 and 11 basis points to GDP per year.[150]

In Executive Order 14261, the Trump Administration directed the Department of the Interior to expedite coal leasing and requests for royalty reductions in efforts to keep coal mines open and tax revenues flowing to local economies.[151]

Expanding LNG Export Infrastructure

Globally, natural gas demand is expected to continue to grow, with LNG demand growing by more than 3 percent per year over the next ten years.[152] Over this time period, the global LNG trade will be driven largely by demand from Western Europe, China, and India, with annual projected net imports rising by 1.2, 2.9, and 6.5 percent for each region, respectively.[153] In 2024, the United States exported more LNG than any other country in the world, sending a large share of the supply to Europe and Turkey to replace pipeline imports from Russia.[154] Because the United States is considered to be a stable supplier of competitively-priced LNG, demand for and exports of U.S. LNG will continue to grow as new export capacity comes online over the next few years.[155] Since 2010, the U.S. Department of Energy (DOE) has authorized nearly 50 billion cubic feet per day (Bcf/d) of LNG export volume.[156] Just over 14 Bcf/d was already in operation as of September 2024, and another 11.5 Bcf/d under construction and estimated to come online before 2028. The Trump Administration approved five additional LNG export terminals since January.[157]

DOE's analysis estimates that by 2035, increased LNG exports will raise U.S. industrial output by 0.6 percent, primarily because of more upstream oil and gas activity, and increase GDP by 0.03 percent.[158]

At this time, LNG exporters rely on foreign LNG tankers to supply the growing global demand for exports. The Trump Administration recently issued a rule that would require an increasing share of U.S. LNG exports to be transported on U.S.-built and U.S.-flagged ships over time (USTR Section 301 action).[159] Currently,

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[149] Approximately 50 percent of all onshore leases currently in effect are non-producing. See https://www.blm.gov/programs/energy-and-minerals/oil-and-gas/about

[150] Applying Baqaee-Farhi methodology to estimate first-order impacts. See Baqaee, David Rezza and Emmanuel Farhi, "The Macroeconomic Impact of Microeconomic Shocks: Beyond Hulten's Theorem," *Econometrica*, Vol. 87(4), pp. 1155-1203.

[151] https://www.whitehouse.gov/presidential-actions/2025/04/reinvigorating-americas-beautiful-clean-coal-industry-and-amending-executive-order-14241/, sec. 5, and https://www.doi.gov/pressreleases/department-interior-moves-restore-coal-industry

[152] https://www.mckinsey.com/industries/oil-and-gas/our-insights/global-gas-outlook-to-2050, executive summary, p. 2.

[153] https://www.eia.gov/outlooks/ieo/data/pdf/I_I2_r_230822.081459.pdf

[154] https://www.eia.gov/todayinenergy/detail.php?id=64844

[155] https://www.eia.gov/todayinenergy/detail.php?id=64884

[156] See https://www.energy.gov/sites/default/files/2024-10/LNG%20Snapshot%20Sep%2030%202024.pdf and https://www.energy.gov/sites/default/files/2025-01/Summary%20of%20LNG%20Export%20Applications_1.22.25.pdf.

[157] https://www.energy.gov/articles/doe-issues-lng-export-authorization-port-arthur-phase-ii-advancing-president-trumps

[158] https://www.energy.gov/sites/default/files/2024-12/LNGUpdate_AppendixB_Dec2024.pdf, p. B-65, comparing the difference in GDP levels between 2025 and 2035 for DP: ExFID and DP: MR; and p. B-67, similarly comparing the difference in industrial production levels between 2025 and 2035 for DP: ExFID and DP: MR.

[159] https://ustr.gov/sites/default/files/files/Press/Releases/2025/301%20Ships%20-%20Action%20FRN%204-17.pdf, Annex IV on p. 36. See also U.S. Trade Representative (USTR) Section 301 Action to restore American shipbuilding, https://ustr.gov/about/policy-offices/press-office/press-releases/2025/april/ustr-section-301-action-chinas-targeting-maritime-logistics-and-shipbuilding-sectors-dominance

there exist no U.S.-built LNG tankers and only one U.S.-flagged LNG tanker.[160] Investing in U.S.-built LNG tankers—highly complex, double-hulled, cryogenic vessels—would require considerable resources to expand the U.S. shipbuilding industry[161] and acquire new technology and know-how, but would bring several benefits. For one, building LNG and other commercial ships in the United States would further increase industrial activity and create jobs. It would also address the Executive Order on Restoring America's Maritime Dominance,[162] and expand domestic use of metallurgical coal. "Met" coal is an important input in the production of steel, which itself is an important input in the production of LNG tankers.[163] About 10 percent of total U.S. coal production is met coal, and in 2023, about three quarters of U.S. met coal production was exported.[164] Some exports could instead be diverted to the domestic steel industry, or overall production could be increased, incentivized by the new production tax credit for met coal included in OBBB.[165] In March 2025, the U.S. steel industry was utilizing about 76.5 percent of its available capacity, leaving room to ramp-up steel production (by 5 to 10 percentage points) in the short term.[166]

Expanding Pipeline Access for Energy Commodities

Pipelines are the lowest-cost form of transportation for natural gas, crude oil, and other liquids. In some parts of the United States, insufficient pipeline capacity has led to "stranded" commodities and substantial regional price disparities, discouraging additional production. For example, the Permian Basin in West Texas is the top producer of shale oil in the United States.[167] Permian oil wells also co-produce a considerable amount of natural gas. When production is high, pipeline capacity is insufficient to transport all the available gas out of West Texas and producers have to sell the "trapped" gas at a discount. Since at least 2017, the average natural gas trading price at the Waha Hub (the main gas trading hub in West Texas) has been consistently lower than the price of natural gas at the Henry Hub (the U.S. benchmark for natural gas, located in Louisiana).[168] In fact, since 2019, traders at the Waha Hub have repeatedly observed *negative* natural gas prices.[169] In October 2024, a new natural gas pipeline (Matterhorn Express) came online in West Texas, carrying gas to the Houston area.[170] This extra takeaway capacity, however, has not been enough to

[160] https://www.crowley.com/news-and-media/press-releases/crowley-and-naturgy-deploy-first-u-s-lng-carrier-american-energy-to-serve-puerto-rico/
[161] According to BRS Shipbrokers, over the last decade, U.S. delivered 0.3% of all non-naval commercial ships with capacity over 3,000 deadweight tons (Dwt). This compares to 49% of deliveries from China, 22% from South Korea, and 17% from Japan.
[162] https://www.federalregister.gov/documents/2025/04/15/2025-06465/restoring-americas-maritime-dominance
[163] See, for example, https://theicct.org/wp-content/uploads/2024/09/ID-174-%E2%80%93-Shipbuilding-steel_final.pdf, for overall shipbuilding statistics.
[164] https://www.eia.gov/todayinenergy/detail.php?id=61924
[165] https://www.congress.gov/bill/119th-congress/house-bill/1/text/enr, section 70514(e).
[166] https://www.trade.gov/data-visualization/us-steel-executive-summary. Maximum historic capacity utilization appears to be around 85 percent (see Figure 9 on p. 6)
[167] https://www.eia.gov/todayinenergy/detail.php?id=17031
[168] https://www.eia.gov/todayinenergy/detail.php?id=53919
[169] See, for example, https://globallnghub.com/waha-gas-prices-the-cheapest-gas-on-earth.html, https://www.reuters.com/business/energy/us-natgas-prices-waha-hub-texas-fall-into-negative-territory-2025-05-19/, and https://www.energy.gov/sites/default/files/2024-12/17-Exh.%20N2%20-%20U.S.%20Natural%20Gas%20Prices%20Hit%2025-Year%20Low.pdf
[170] https://www.ttnews.com/articles/permian-gas-matterhorn

prevent negative prices.[171] In order to reduce losses, some producers in the Permian focus on extracting ethane—a feedstock for petrochemical products[172]—from trapped natural gas when the latter trades at negative prices.[173] But this is a temporary remedy. Solving the problem of negative prices and increasing the economic benefits to West Texas would require building additional pipeline capacity to transport gas out of the region.

In other parts of the country, constrained pipeline capacity for energy commodities has led to high prices. As discussed above, limited natural gas capacity in the Northeast of the United States creates supply bottlenecks during the winter, leaving available natural gas generation capacity unutilized when it is needed most.[174] Expanding the ability to deliver natural gas to East Coast power plants will help bring down electricity prices along the New England coast.

Similarly, building additional pipelines to carry crude oil and refined products from Texas and Midwestern states to the Northeast and California will reduce reliance on Canadian imports and lower gasoline prices for millions of Americans.[175]

As LNG exports ramp up, it will also be important to expand gas pipeline capacity to supply liquefaction terminals. With the bulk of LNG export capacity concentrated in Texas and Louisiana,[176] early focus should be on pipelines that deliver feedstocks to the Gulf Coast from major gas producing plays like Haynesville and the Permian Basin.[177] Pipelines should also be supplemented with storage infrastructure to ensure that contracted LNG volumes are delivered on time even in the case of supply disruptions.

The Economic Benefits of Broad Regulatory Reform

Reducing the regulatory burden for firms along the entire energy supply chain will also help to stimulate investment and create economic benefits. From a basic economics perspective, regulation introduces compliance costs, which shift a firm's production cost curve inward, reducing productivity, and changes the equilibrium price and quantity in a market. If regulation solves a market failure, then the new equilibrium represents the price and quantity that maximize social welfare. In contrast, counterproductive regulation leads to a higher price and lower quantity than is optimal, and imposes a dead-weight cost on society. Excessive regulation redistributes rents and affects not just prices and quantities, but also wages and unemployment.[178]

[171] See, for example, https://www.reuters.com/business/energy/us-natgas-prices-waha-hub-texas-fall-into-negative-territory-2025-05-19/ and https://www.eastdaley.com/media-and-news/is-matterhorn-running-full-negative-gas-prices-haunt-permian-producers-this-spring
[172] https://www.eia.gov/energyexplained/hydrocarbon-gas-liquids/uses-of-hydrocarbon-gas-liquids.php
[173] https://www.eastdaley.com/ngl-insider/negative-waha-prices-set-to-lift-ethane-recovery
[174] Refer to the Electricity section for more details.
[175] Refer to the Gasoline section for more details.
[176] https://www.ferc.gov/media/us-lng-export-terminals-existing-approved-not-yet-built-and-proposed
[177] https://www.eia.gov/todayinenergy/detail.php?id=63964
[178] See, for example, Blanchard, Olivier, and Francesco Giavazzi. 2003. "Macroeconomic Effects of Regulation and Deregulation in Goods and Labor Markets." *The Quarterly Journal of Economics* 118 (3): 879–907.

The Trump Administration's current energy deregulatory agenda aims to reduce the regulatory burden for firms over at least the next four years.[179] Examples of proposed and taken actions not already mentioned elsewhere in this report include:

- Implementing the U.S. Supreme Court's definition of "waters of the United States" (WOTUS), which narrows the jurisdictional reach of the Clean Water Act (CWA) relative to the Biden Administration's WOTUS definition.[180]
- Rescinding the Endangered Species Act's (ESA) definition of "harm" to retain direct actions against protected species, like killing and injuring, but exclude indirect actions, like habitat modification.[181]
- Repealing certain rules regulating emissions from fossil-fired power plants.[182]
- Streamlining funding decisions for energy and critical minerals projects.[183]

By reducing regulatory barriers, these actions will lower the costs of developing new energy and infrastructure projects and incentivize developers to increase investment, which will in turn boost economic growth. As academic literature suggests, firms facing a lower regulatory compliance burden will be able to reduce their lobbying efforts and increase capital investment and employment.[184] In 2014, U.S. firms spent over $200 billion[185] and more than 10 billion working hours complying with regulations.[186] When multiple federal agencies regulate the same issue, firms incur even higher costs and even lower productivity, profits, and growth.[187] Additionally, there is some evidence that firms respond to potential regulations (or the uncertainty surrounding the potential outcome) by reducing investment well before the proposed rules are finalized and implemented.[188] The uncertainty-driven delay in investment applies equally to increasing and decreasing regulatory burden.

Two recent macroeconomic models of regulation estimated that between 1977 and 2012, increasing regulations reduced the average growth rate of GDP across 22 U.S. industries by 0.8 percent per year, on

[179] One estimate of regulatory intensity, based on the number of hours it takes firms to prepare and file regulatory paperwork, fell to roughly its level at the end of the first Trump Administration within the first 100 days of the second Trump Administration. See figure showing regulatory intensity patterns here https://sites.google.com/view/jkalmenovitz/home
[180] https://www.federalregister.gov/documents/2025/03/24/2025-04649/wotus-notice-the-final-response-to-scotus-establishment-of-a-public-docket-request-for
[181] https://www.federalregister.gov/documents/2025/04/17/2025-06746/rescinding-the-definition-of-harm-under-the-endangered-species-act
[182] https://www.govinfo.gov/content/pkg/FR-2025-06-17/pdf/2025-10992.pdf and https://www.govinfo.gov/content/pkg/FR-2025-06-17/pdf/2025-10991.pdf
[183] https://www.whitehouse.gov/presidential-actions/2025/06/simplifying-the-funding-of-energy-infrastructure-and-critical-mineral-and-material-projects/
[184] Kalmenovitz, Joseph, "Regulatory Intensity and Firm-Specific Exposure," *Review of Financial Studies*, 36(8), August 2023, Pages 3311-3347, https://doi.org/10.1093/rfs/hhad001
[185] Trebbi, Francesco, Miao Ben Zhang, and Michael Simkovic, "The Cost of Regulatory Compliance in the United States," working paper, July 2023. https://ftrebbi.com/research/TZS.pdf
[186] Kalmenovitz, Joseph, "Regulatory Intensity and Firm-Specific Exposure," *Review of Financial Studies*, 36(8), August 2023, p. 3312, https://doi.org/10.1093/rfs/hhad001, Figure 2.
[187] Kalmenovitz, Joseph, Michelle Lowery and Ekaterina Volkova, "Regulatory Fragmentation," *Journal of Finance*, forthcoming, 2025. Available at SSRN: https://ssrn.com/abstract=3802888.
[188] Chang, Suzanne and Kalmenovitz, Joseph and Lopez-Lira, Alejandro, "Follow the Pipeline: Anticipatory Effects of Proposed Regulations" (February 15, 2023). Working paper. Available at SSRN: https://ssrn.com/abstract=4360231

average;[189] and that holding the regulatory stock fixed at 2022 levels may increase GDP by 1.8 percent over the next decade.[190]

We can attempt to isolate the macroeconomic impact of energy and environmental regulations by assessing what share of all economically significant regulations relate to energy or the environment. Recent estimates show that environmental regulations account for 14 percent of economically significant rules and 37 percent of all rules.[191] If the macroeconomic impact of particular regulations is proportional to their share of rules, and if the impact of regulations and deregulations is roughly symmetric, then holding energy and environmental regulations at their 2022 levels would increase GDP in 2035 by 0.25 to 0.67 percent relative to current regulatory policy.[192] The Trump Administration has made it a priority to reduce the regulatory burden, not just hold it steady.[193] Thus, the GDP impact is likely to be larger than 25-67 basis points over the course of a decade, but likely less than the 10 to 30 basis points per year suggested by the estimate based on 1977-2012 data.

Conclusion

The Trump Administration has made it a priority to create energy abundance, which will bring down the costs of energy for Americans and create energy security. The administration has already taken a variety of executive actions to reduce regulatory burdens, streamline permitting, modernize aging infrastructure, stimulate investment in new projects, and increase the supply of energy available for domestic consumption and exports. Working with federal agencies and Congress to put into effect the policies and proposals described in this paper will help cement U.S. energy dominance and supply American households and industries with affordable and reliable energy.

[189] https://www.mercatus.org/research/working-papers/cumulative-cost-regulations

[190] https://www.heritage.org/sites/default/files/2025-02/BG3890.pdf The estimation period used in the study ends in 2022 and the regulatory burden is assumed to remain constant from that year on.

[191] McLaughlin, P. A., & Mulligan, C. B. (2022). Three misconceptions about federal regulation. *Journal of Benefit-Cost Analysis, 13*(3), p. 295, Table 1. https://doi.org/10.1017/bca.2022.13

[192] It is not obvious that the impact of adding regulations should be symmetric to that of removing regulations. The upfront cost of understanding and complying with new regulations may be higher than the amount of resources that are freed up for productive purposes if a firm no longer has to comply with an existing rule. If this is the case, then adding regulations will reduce GDP growth by more than removing regulations.

[193] Indeed, empirical evidence shows that since the start of the second Trump Administration, the regulatory burden, measured in terms of numbers of required pages of compliance forms, has fallen to roughly the level at the end of the first Trump Administration. See graph at https://sites.google.com/view/jkalmenovitz/home