

The U.S. Energy Information Administration

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The U.S. Energy Information Administration (EIA) is the lead federal agency for collecting, analyzing, and disseminating data on U.S. and world energy supply and consumption. EIA was established in 1977 by the Department of Energy Organization Act (P.L. 95-91), though other federal agencies had regularly collected energy-related information since at least the early 1900s.

A main driver for the creation of EIA was the energy crisis of the 1970s. At the time, many lawmakers felt a lack of federal energy data had contributed to the crisis and limited policymaking in response. EIA's statutory authorities reflect many congressional concerns at the time. Congress authorized EIA with substantial political independence—the EIA Administrator does not need approval from any other DOE officer or employee for data collection, analysis, or projections. EIA must “promptly” disseminate to the public the energy information it collects, except for information deemed confidential or proprietary. Additionally, Congress authorized EIA to compel the submission of data from energy companies. In other words, reporting to EIA is mandatory.

EIA's appropriation for FY2020 is \$126.8 million, which includes \$54.3 million for a staff of 359 full-time equivalent federal employees. EIA's budget has varied substantially since its first year of operation in FY1978. As with the rest of DOE, the annual Energy and Water Development appropriations bill currently funds EIA.

One of EIA's core functions is to collect “data and information which is relevant to energy resource reserves, energy production, demand, and technology, and related economic and statistical information” (42 U.S.C. § 7135). EIA data collections span the energy system from supply and transport to consumption. All energy sources are included in EIA's data and analysis products, though some (e.g., petroleum) are more detailed than others (e.g., renewables). EIA's emphasis on petroleum data partly stems from the founding of the agency, when oil supply was a focus of national policy. EIA primarily collects domestic energy information, but it also aggregates and analyzes international energy information.

EIA publishes its data on its website by fuel or energy source: Petroleum & Other Liquids, Natural Gas, Electricity, Consumption & Efficiency, Coal, Renewables & Alternative Fuels, Nuclear & Uranium, and Total Energy. Time frames for data collection span a wide range: some data are collected hourly, while other data are collected every few years. EIA also provides mapping tools on its website that show the location of energy infrastructure. Some maps can display congressional district boundaries, providing a potentially useful tool for responding to constituent requests or informing policy decisions. Appendices to this report summarize EIA's mapping tools and data collection surveys.

EIA also produces analysis and projections. EIA often draws a distinction between projections (i.e., estimates based on specified assumptions) and forecasts or predictions (i.e., best guesses about the future). Its flagship projection, the Annual Energy Outlook (AEO), is widely used among Members of Congress, industry, and other observers. The AEO provides an outlook for U.S. energy supply, demand, prices, certain air emissions, and other factors over a 25-30 year period, based on the laws and regulations in place at the time of publication. The International Energy Outlook (IEO), updated annually, projects global energy supply, demand, and prices over a 25-30 year period. These long-term projections include scenarios based on alternative assumptions. Scenarios provide information about the possible range of future energy supply and demand conditions, and they can help identify how sensitive the U.S. energy system might be to changes in certain factors such as fuel prices and potential policy changes. EIA also produces the Short-Term Energy Outlook (STEO), a monthly forecast of U.S. energy supply, demand, and prices over the next 12-24 months.

EIA's projections have been criticized for not taking into account potential changes in laws and regulations. Some critics argue that this presents a misleading reference upon which many policy and investment decisions are made. Others argue EIA insufficiently accounts for policy or technology changes in its projections.

EIA also performs ad hoc analysis at the request of Congress. In the past, EIA has projected potential energy system outcomes for proposed energy policies (e.g., lifting the crude oil export ban), environmental policies (e.g., federal regulation of greenhouse gas emissions), and tax policies (e.g., extended production tax credits for wind generators). EIA's projections have been used during congressional debate, alongside projections from other organizations. EIA has also produced a series of reports at the request of Congress estimating the value of federal energy subsidies.

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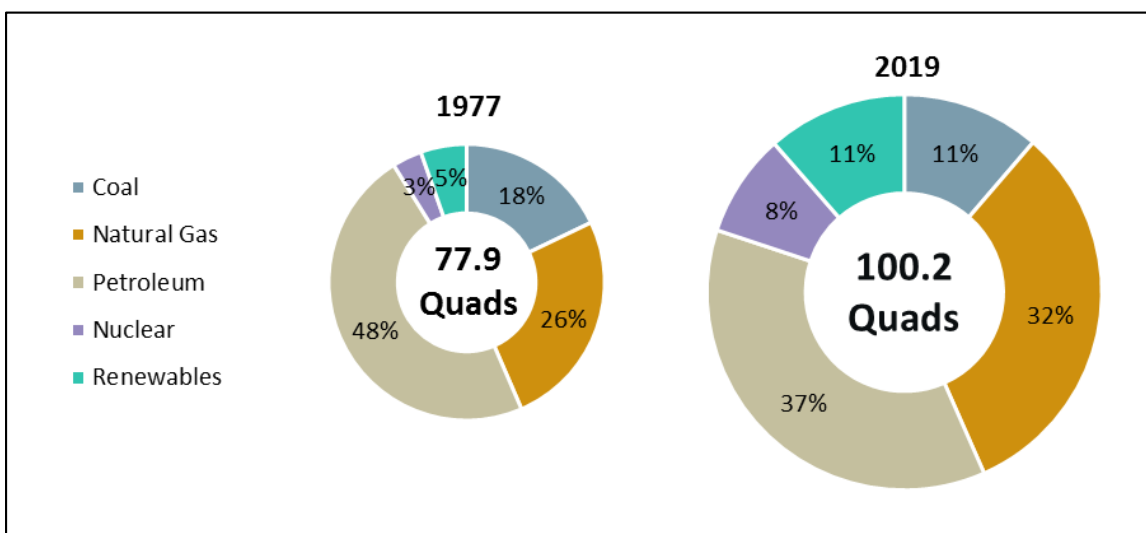
Introduction

The U.S. Energy Information Administration (EIA) is the lead federal agency for collecting, analyzing, and disseminating energy information. According to one industry leader who has been critical of EIA, “The EIA forecast is very important.... It moves markets, and it impacts our industry greatly.... Right or wrong, no other agency provides data with greater impact.”¹

EIA’s data, projections, and analysis serve multiple audiences, including Members of Congress, industry, government agencies, and the public. These audiences use EIA information in different ways to make decisions that affect the economy, businesses, and individuals. EIA data also contribute to the functioning of energy markets and policy decisions.

EIA was born from the oil crisis of the early 1970s, and as such its primary focus had been on data and analysis related to the oil industry. However, the U.S. energy mix has changed since EIA’s creation in 1977 and is continuing to change (see **Figure 1**).

Figure 1. U.S. Primary Energy Consumption by Source
Percent of Total



Source: U.S. Energy Information Administration, *Monthly Energy Review*, Table I.3, July 2020.

Notes: Total primary energy consumption in 1977 was 77.9 quadrillion British thermal units (Quads) and in 2019 it was 100.2 Quads. Renewables include biomass, geothermal, hydroelectric power, solar, and wind.

The total amount of energy consumed has increased from 77.9 quadrillion British thermal units (Quads) in 1977 to 100.2 Quads in 2019, a 29% increase. In absolute terms, both petroleum and coal dropped between 1977 and 2019, by 1% and 19%, respectively. Natural gas increased the greatest amount in absolute terms, 12 Quads. Nuclear energy, though comprising a smaller share of the total than natural gas, rose by a higher relative amount, more than tripling. Renewables, of which biomass is the largest, nearly tripled.

EIA collects data and provides projections on most forms of commercially used energy, including oil and petroleum products, natural gas, natural gas liquids, coal, electricity, renewables,

¹ Joseph Markman, “Hamm: EIA Forecasts Costly to Industry,” *HartEnergy*, November 17, 2017, at <https://www.hartenergy.com/exclusives/hamm-eia-forecasts-costly-industry-30538>, online edition.

alternative fuels, nuclear, biofuels, and others. The level of detail of collected data and analysis, however, are not evenly distributed.

This report provides an overview of the history and major functions of EIA, with an emphasis on how EIA information can be used by Members of Congress.

Reasons for Establishment

Since the nation's early decades, the federal government has carried out the collection, dissemination, and analysis of energy-related statistics. The first significant federal energy statistics (on coal production) are believed to have been gathered during the census of 1830.² The U.S. Geological Survey and U.S. Bureau of Mines, within the Department of the Interior (DOI), also collected energy-related data since at least the early 20th century.³ The Federal Power Commission began collecting and analyzing electricity statistics in the 1930s. By 1970, a study by the not-for-profit Mitre Corporation identified eight federal agencies that were collecting fuels and energy data, including, in addition to those above, the Atomic Energy Commission, the Army Corps of Engineers, the Interstate Commerce Commission, and the Oil Import Administration.⁴

Until the 1970s, energy had been recognized as an important sector of the U.S. economy but was rarely a major focus of national policy. The fragmented collection and dissemination of energy statistics was often viewed as sufficient for the specific governmental purposes for which they were collected and analyzed, such as interstate electricity rate regulation and state-level oil production monitoring.

However, energy supply concerns had risen sufficiently by the 92nd Congress (1971-1972) that the Senate Interior Committee launched an extensive multiyear "National Fuels and Energy Policy Study." According to Committee Chairman Henry M. Jackson,

In the course of this study, it has become increasingly apparent that the Federal government is making energy decisions on the basis of information which is less than adequate. Serious questions have been raised about the accuracy and completeness of available statistics on energy supplies and the extent of energy requirements.⁵

A 1971 Mitre study of energy information needs, quoted during a House subcommittee hearing, concluded, "Little or no data analysis capability exists within the federal agencies to translate the assembled data into either resources policy, research planning and coordination, or to insure that the questionnaires are relevant to Federal information requirements."⁶

² Robert C. Milici and Kristin O. Dennen, *Production and Depletion of Appalachian and Illinois Basin Coal Resources*, U.S. Geological Survey Professional Paper 1625–F, Introduction, 2009, at <https://pubs.usgs.gov/pp/1625f/downloads/ChapterH.pdf>.

³ Robert C. Milici and Kristin O. Dennen, *Production and Depletion of Appalachian and Illinois Basin Coal Resources*, U.S. Geological Survey Professional Paper 1625–F, Introduction, 2009, at <https://pubs.usgs.gov/pp/1625f/downloads/ChapterH.pdf>.

⁴ Mitre Corporation, *A Survey of Fuel and Energy Information Sources*, MTR-1493, November 1970, vol. 1, p. 15.

⁵ Letter from Senate Interior Committee Chairman Henry M. Jackson to the General Accounting Office, April 6, 1973, Appendix 1 of GAO Report "Actions Needed to Improve Federal Efforts in Collecting, Analyzing, and Reporting Energy Data," February 6, 1974, at <https://www.gao.gov/assets/80/78904.pdf>.

⁶ Mitre study quoted in opening statement of Chairman John D. Dingell, House Permanent Select Committee on Small Business, Subcommittee on Activities of Regulatory Agencies, Hearing on Energy Data Requirements of the Federal Government, January 16, 1974, p. 2.

The concerns raised by Senate Interior Committee and increasing numbers of other policymakers were confirmed by the Arab oil embargo that began in 1973. As oil prices nearly tripled and long lines appeared at gas stations throughout the country, Congress determined that it urgently needed much more comprehensive, up-to-date, and authoritative energy statistics and analysis to understand the causes of the crisis and to develop a national response.

Oil Embargo, 1973-1974

Global oil markets had already been tightening for a decade when Israel was attacked by Egypt and Syria in October 1973, triggering the Yom Kippur War. In response, the United States provided emergency aid to Israel, and the Organization of Arab Petroleum Exporting Countries (OAPEC) retaliated by imposing a complete embargo on oil exports to the United States and reducing supplies to U.S. allies. The OAPEC action cut world crude oil supply by about 7%, leading to a U.S. recession that reduced economic output by about 2.5%.⁷ U.S. crude oil prices rose from an average of \$3.58 per barrel in 1972 to \$9.07 in 1974 (in current dollars).⁸

The oil embargo immediately elevated the debate over energy policy, which until then had primarily involved long-term concerns about supply and demand trends, into a national emergency. At a congressional hearing in January 1974, the General Accounting Office (GAO, now the Government Accountability Office) provided this testimony:

The events of the last year which made us all aware of the national energy problem are also making us aware of the need for the best possible information upon which to base both public and private decisions. The cutoff of oil imports accelerated the need for fuel allocation programs; voluntary curtailment of fuel consumption is being sought; and serious consideration now is being given to the rationing of gasoline. The need to take and consider such serious steps has resulted in substantial concern in and out of Government about the data on which the Government is basing its decisions and about the system under which such data is being collected.⁹

As stated by another witness at the same series of hearings,

We are in an energy crisis. The administration, the Congress, the public—the entire economy—is being asked to put up with high prices, a degraded environment, and probably even a real recession because of it. And even now, there is no one—in or out of Government—who can give a credible, objective analysis of the extent or location of the real crisis. There simply is no adequate, credible, objective base of real information.¹⁰

The “energy crisis” sparked by the oil embargo did not end when the embargo was formally lifted in March 1974. Oil and gasoline prices remained at the “price shock” levels through the mid-1970s, exacerbating the effects of an already-weak U.S. and world economy. Reliance on Middle East oil during continued tightness in the world market remained a top national concern. The

⁷ Frank A. Verrastro and Guy Caruso, Center for Strategic and International Studies, “The Arab Oil Embargo—40 Years Later,” October 16, 2013, at <https://www.csis.org/analysis/arab-oil-embargo%E2%80%9440-years-later>.

⁸ EIA, *Annual Energy Review 2011*, Table 5.21, “Crude Oil Refiner Acquisition Costs, 1968-2011,” at https://www.eia.gov/totalenergy/data/annual/pdf/sec5_53.pdf.

⁹ GAO, Statement of Phillip S. Hughes, Assistant Comptroller General, Hearing on Energy Data Collection in the Federal Government, Subcommittee on Activities of Regulatory Agencies Relating to Small Business, House Select Committee on Small Business, January 17, 1974, at <https://www.gao.gov/assets/100/98138.pdf>.

¹⁰ Prepared Statement of Martin Lobel of Lobel, Novins, and Lamont, Hearing on Energy Data Collection in the Federal Government, Subcommittee on Activities of Regulatory Agencies Relating to Small Business, House Select Committee on Small Business, January 16, 1974, p. 9.

Iranian Revolution that erupted in late 1978 created another major oil supply disruption, doubling U.S. gasoline prices and again creating nationwide gas lines—and another economic recession.

Lack of Comprehensive, Up-to-Date Statistics

As the energy crisis grew in the early 1970s, the adequacy of existing statutory authority for federal agencies to collect, analyze, and disseminate comprehensive and timely statistics for energy policymaking became a major topic of congressional debate. GAO's 1974 report noted that "many Federal agencies have been collecting a large volume of energy-related data as an outgrowth of broad legislative mandates or to fulfill particular program needs."¹¹ However, GAO said in related testimony, "Authorities contained in these laws as they relate to energy data, however, seem to us to be vague and fragmented. Moreover, none of them constitute a specific mandate to collect energy data, systematically or otherwise."¹²

The fast-moving consequences of the oil embargo raised concerns about the timeliness of the energy data produced during that period. According to GAO, "With few exceptions, energy data published by Federal agencies is late, with time lags between the period of publication and the period for which the data is reported ranging from a month to a year. In one case, the time lag is 2 years."¹³

In 1974, an Exxon vice president testified at a congressional hearing that the federal government had long demonstrated its capability to produce comprehensive statistics on other aspects of the U.S. economy and could do the same for energy:

The Government must have timely and accurate information on many aspects of the Nation's energy supply and demand situation. This information must not only be of high quality but must have the same degree of acceptability or credibility that is afforded statistics on GNP, employment, population, cost of living, and so forth, the statistics historically presented by the Department of Commerce and the Bureau of Labor Statistics.¹⁴

Key Information Held by Oil Companies

Another major energy statistics issue in the early 1970s was the federal government's reliance on voluntary data reporting by the energy industry, particularly by large oil companies. That situation raised broad concerns about the completeness of the reported energy data and its credibility. Speculation was widespread in the news media and Congress during the height of the oil embargo that major international oil companies were complicit in creating the oil shortage and price spikes. Conspiracy theories involving large numbers of fully loaded oil tankers being held offshore during the shortage were widely circulated.¹⁵

¹¹ GAO, "Actions Needed to Improve Federal Efforts in Collecting, Analyzing, and Reporting Energy Data," February 6, 1974, p. 32, at <https://www.gao.gov/assets/80/78904.pdf>.

¹² GAO, Statement of Phillip S. Hughes.

¹³ GAO, "Actions Needed," p. 18.

¹⁴ W. T. Slick, Jr., Senior Vice President, Exxon Co., Statement for Hearing on Energy Data Collection in the Federal Government, Subcommittee on Activities of Regulatory Agencies Relating to Small Business, House Select Committee on Small Business, January 16, 1974.

¹⁵ Deborah Halber, Massachusetts Institute of Technology News, "Seventies Oil Crisis Was a 'Perfect Storm' for U.S.," March 23, 2007, at <http://news.mit.edu/2007/seventies-oil-crisis-was-perfect-storm-us>.

“Our citizens are not only questioning the extent of the shortage, but even asking is there really a shortage of oil,” Senator J. Glenn Beall testified at a February 1974 Senate Interior Committee hearing.¹⁶ S. David Freeman, Director of the Ford Foundation Energy Policy Project, also noted the public doubts at the same hearing:

The energy problem is bad enough but it is being made worse by a real crisis of confidence about whether the problem is real. People are afraid of being taken for suckers because they can't seem to get a straight story. The government is woefully ignorant of basic energy facts. And it doesn't help that the only source for its estimates is the oil industry, which is not exactly losing money these days.¹⁷

Hearings on the energy information issue during this period often included testimony that Congress should give federal agencies statutory authority to compel oil companies and others in the energy industry to provide data needed for policymaking and regulation. An executive of Gulf Oil Corporation testified at the 1974 Senate Interior hearing that the oil industry would accept such requirements. “We recognize that it is necessary to have mandatory reports of operating and inventory statistics. The gaps in petroleum data cannot be filled in any other way. The Federal Government has, and should have, the power to compel reporting of needed operating and inventory statistics,” according to the Gulf statement.¹⁸ Senator Beall’s statement at the hearing also focused on that point:

Therefore, I believe that we immediately need a centralized, information-gathering agency with the ability to require energy interests to report on a regular and continuing basis the total amount of petroleum and other materials that they hold, own, or control. This system must extend to all levels of production, transportation, storage, and distribution, and be able to report to the Congress and to the American people in a timely fashion.¹⁹

Statutes and Regulations

The ideas for improving federal energy data and analysis that were developed during the numerous congressional hearings on energy security in the early 1970s were incorporated into several major pieces of legislation enacted during the decade. This effort culminated in the establishment of EIA as part of the new Department of Energy in 1977, as detailed in this section.

Federal Energy Administration Act of 1974 (P.L. 93-275)

The Federal Energy Administration (FEA) was created as an independent agency to replace the Federal Energy Office, which had been established by President Nixon in December 1973. FEA began operating in June 1974 and was charged with developing and implementing national energy policy, including emergency measures to deal with the ongoing energy crisis. Existing

¹⁶ Senator J. Glenn Beall, Statement to the Senate Committee on Interior and Insular Affairs, Hearing on S. 2782, a Bill to Establish a National Information System, Serial No. 93-34 (92-69), part 1, February 5 and 6, 1974, p. 61.

¹⁷ S. David Freeman, Director, Ford Foundation Energy Policy Project, Statement to the Senate Committee on Interior and Insular Affairs, Hearing on S. 2782, a Bill to Establish a National Information System, Serial No. 93-34 (92-69), part 1, February 5 and 6, 1974, p. 169.

¹⁸ Robert F. Stewart, Manager, Business Economics, Gulf Oil Corporation, Statement to the Senate Committee on Interior and Insular Affairs, Hearing on S. 2782, a Bill to Establish a National Information System, Serial No. 93-34 (92-69), part 1, February 5 and 6, 1974, p. 352.

¹⁹ Senator J. Glenn Beall, Statement to the Senate, p. 62.

energy-related functions and authority from several other federal agencies were transferred to the FEA Administrator.²⁰

Among the offices transferred to FEA was the Department of the Interior's Office of Energy Data and Analysis, which helped form the basis of the new agency's National Energy Information Center. In line with the ideas discussed at congressional hearings on federal energy data needs, the act gave the FEA Administrator broad information-gathering authority:

- To "collect, assemble, evaluate, and analyze" comprehensive energy information for monitoring the energy sector and helping guide federal energy policy;
- To require any person "engaged in any phase of energy supply or major energy consumption" to provide any "reports, records, documents, and other data, including responses to surveys and questionnaires," needed to carry out the act;
- To issue subpoenas to compel the attendance of witnesses and the production of required information; and
- To require other federal agencies to provide information about energy resources on federal lands.

In addition, FEA was required to disseminate any information and analysis necessary to fully inform the public about energy supply shortages and the steps being taken to minimize their impact. Provisions were included to protect confidential business and private information.

Energy Conservation and Production Act (P.L. 94-385)

After FEA began operating, Congress continued to be concerned about the objectivity and integrity of the energy statistics and data that the new agency was collecting.²¹ Such concerns were addressed by the 1976 enactment of the Energy Conservation and Production Act (ECPA), which included amendments to the FEA Act of 1974 providing more direction about the operation of FEA's energy information activities.

In particular, ECPA established a separate Office of Energy Information and Analysis in FEA to operate a comprehensive National Energy Information System, which was to "to assure the availability of adequate, comparable, accurate, and credible energy information" The Director of the Office of Energy Information and Analysis was required to have the necessary "professional background and experience" to be "specially qualified to manage an energy information system." The Director was shielded from political interference to ensure the integrity of the office's data and analysis. The act specified, "Prior to publication, the Director may not be required to obtain the approval of any other officer or employee of the United States with respect to the substance of any statistical or forecasting technical reports which he has prepared in accordance with law."

ECPA defined "energy information," which FEA was required to collect and analyze, by referring to the definition in Section 11 of the Energy Supply and Environmental Coordination Act of 1974 (ESECA, P.L. 93-319), which had been enacted a few months earlier:

The term "energy information" includes (A) all information in whatever form on (i) fuel reserves, exploration, extraction, and energy resources (including petrochemical feedstocks) wherever located; (ii) production, distribution, and consumption of energy and fuels wherever carried on; and (B) matters relating to energy and fuels, such as corporate

²⁰ Roger Anders, DOE Office of History, *The Federal Energy Administration*, November 1980, at <https://www.energy.gov/sites/prod/files/FEA%20History.pdf>.

²¹ Anders, *The Federal Energy Administration*.

structure and proprietary relationships, costs, prices, capital investment, and assets, and other matters directly related thereto, wherever they exist.

ESECA also had given FEA the authority to issue regulations that required the energy industry to submit reports to the agency, and to compel responses and the production of records required to fulfill any other authorized requests for energy information.

Department of Energy Organization Act (P.L. 95-91) and Subsequent Legislation

The DOE Organization Act established EIA largely in its current form in 1977. The act transferred to the EIA Administrator the functions of the Director of the FEA Office of Energy Information and Analysis and all other DOE functions “relating to gathering, analysis, and dissemination of energy information....” EIA was explicitly designated as the federal government’s primary energy statistical and analytical organization, with the mandate to carry out a “central, comprehensive, and unified energy data and information program....” The act further specified that EIA must “require each major energy-producing company” to submit a financial report at least once a year.

Congress has continued to modify EIA’s responsibilities and authorities in subsequent legislation, but without making fundamental changes. For example, the Energy Policy Act of 1992 (P.L. 102-486) expanded EIA reporting requirements for renewable energy, vehicles, greenhouse gas emissions, foreign uranium purchases, and other areas. The Energy Policy Act of 2005 (P.L. 109-58) required EIA to conduct a survey of the renewable fuel market. The Energy Independence and Security Act of 2007 (P.L. 110-140) required EIA to regularly analyze refinery outage data and establish guidelines for collecting data “required to provide a comprehensive, accurate energy profile at the State level.”

Key Authorities

Pursuant to the legislation discussed above, EIA currently has several key authorities and responsibilities that define the agency’s overall operational framework.

- **Substantive Independence.** The EIA Administrator does not need approval from any other DOE officer or employee to collect or analyze energy information, nor the approval of any federal officer or employee for “the substance of any statistical or forecasting technical reports which he has prepared in accordance with law” (42 U.S.C. §7135(d)).
- **Dissemination of Information.** The EIA Administrator shall “promptly” share information or analysis with other DOE offices that have determined a need for it (42 U.S.C. §7135(f)). Information collected by EIA shall be available to the public upon request unless exempted from mandatory disclosure (42 U.S.C. §7135(g)).
- **Mandatory Data Submission.** Authority under P.L. 93-319 (15 U.S.C. §796(b)) for the Federal Energy Administrator to compel the submission of data from the energy industry is delegated to the EIA Administrator (42 U.S.C. §7135(b)). These authorities include subpoena power, requirements for mandatory responses to questions under oath, and the power to enter places of business to inspect energy inventories, records, and other documents.

- **Exemptions for Disclosure.** The DOE Organization Act refers to several statutory provisions that exempt government information from disclosure. Government-wide exemptions are provided for classified information, trade secrets, internal communications, and other categories under 5 U.S.C. §552(b). A confidentiality provision of P.L. 93-319 (15 U.S.C. §796(d), originally applying to the Federal Energy Administrator, allows persons providing energy information to EIA to ask that it not be released, upon a satisfactory showing of evidence that it is proprietary. EIA maintains confidential information pursuant to the Confidential Information Protection and Statistical Efficiency Act of 2002 (CIPSEA), Title V of the E-Government Act of 2002 (P.L. 107-347, 44 U.S.C. §3501)).
- **Access to Data from Other Federal Agencies.** Under P.L. 93-275 as amended by P.L. 94-385, as cited above, EIA “shall have access to energy information in the possession of any Federal agency” unless expressly prohibited by law or if such sharing of information would “significantly impair” another agency’s mission. If energy information cannot be shared by another federal agency, EIA may use its legal authority to obtain the information from other sources (15 U.S.C. §790g).

Regulations

DOE’s regulations for the Department’s general authority to compel the energy industry to provide information to EIA are found at 10 C.F.R. Part 207—Collection of Information. These regulations implement the energy collection authority provided by ESECA, when necessary energy data and information “is not available to DOE under the authority of statutes other than ESECA or that such energy information should, as a matter of discretion, be collected under the authority of ESECA.”²²

General guidelines for the Voluntary Reporting of Greenhouse Gases Program, which was authorized by Section 1605(b) of the Energy Policy Act of 1992, are found at 10 C.F.R. Part 300. Voluntary reports are to be submitted by “businesses, public or private institutions or organizations, households, or other entities having operations that annually release emissions, at least in part, in the United States.”

EIA Budget and Oversight

Congress appropriated \$126.8 million to EIA for FY2020, including \$54.3 million for a staff of 359 full-time equivalent federal employees and \$51.7 million for support services. The support services budget item covers energy supply surveys (\$16.0 million for FY2020), energy consumption and efficiency surveys (\$13.3 million for FY2020), energy modeling and analysis (\$10.1 million for FY2020), and resource and technology management (\$12.3 million for FY2020).²³ As with the rest of DOE, funding for EIA is currently provided in the annual Energy and Water Development appropriations bill.

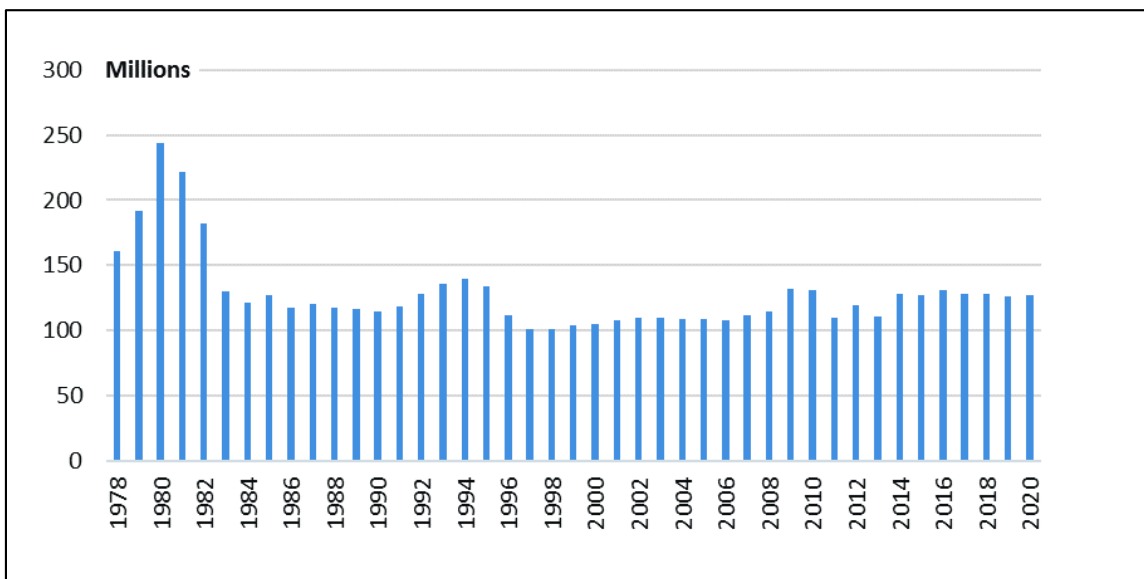
²² For a list of statutory authorities for each EIA data series, see EIA, *Improving the Quality and Scope of EIA Data*, Appendix B. Legal Sources for EIA’s Mandatory Data Collection Authority, July 2011, at <https://www.eia.gov/analysis/requests/2011/qualityscope2011.pdf>.

²³ DOE, *FY2021 Congressional Budget Request*, February 2020, vol. 2, p. 310, at <https://www.energy.gov/sites/prod/files/2020/03/f72/doe-fy2021-budget-volume-2.pdf>.

The Trump Administration is requesting \$128.7 million for EIA in FY2021, an increase of \$1.9 million (1.5%). According to the DOE budget justification, EIA in FY2021 will begin a multi-year modernization of its energy modeling capabilities, which is to provide “greater agility in EIA’s modeling system to address key current and emerging trends,” such as the growing production and consumption of natural gas and renewable energy, and “more flexible options for modeling energy-related CO₂ emissions.” According to DOE, “The Request will also continue EIA’s planned cybersecurity initiatives to bolster information security.”²⁴ EIA’s models, and the assumptions EIA uses in its models, have been criticized by various stakeholders as discussed in the section “Selected Criticisms.”

EIA’s budget has varied substantially since its first year of operation in FY1978, as shown in **Figure 2**. The appropriation for that initial year was \$50.7 million, about \$161 million in 2020 dollars (as estimated using the Bureau of Economic Analysis gross domestic product (GDP) implicit price deflator). The annual appropriation rose to a high of \$90.8 million in FY1980 (about \$247 million in 2020 dollars), before dropping to \$56.4 million by FY1984 (about \$121 million in 2020 dollars). In 2020 dollars, EIA’s annual funding has since ranged from a low of about \$101 million in FY1997 and FY1998 to a high of \$140 million in FY1994. Annual funding since FY1997 has, on average, gradually risen to its current level.²⁵

Figure 2. EIA Appropriations, FY1978-FY2020
2020 Dollars



Source: DOE budget justifications and annual appropriations acts.

Notes: FY1993 includes a transfer of \$49.0 million from unobligated balances in the Biomass Energy Development account. Converted to 2020 dollars using Bureau of Economic Analysis Implicit Price Deflator.

²⁴ DOE, *FY2021 Congressional Budget Request Budget in Brief*, DOE/CF-0167, February 2020, p. 46, at https://www.energy.gov/sites/prod/files/2020/02/f72/doe-fy2021-budget-in-brief_0.pdf.

²⁵ DOE, “Budget History Table by Appropriation.” Available from the authors. Converted to 2020 dollars using Bureau of Economic Analysis Implicit Price Deflator with online calculator tool at https://stats.areppim.com/calc/calc_usdlrxdeflator.php. EIA’s FY1993 appropriation includes a transfer of \$49.0 million from unobligated balances in the Biomass Energy Development account; see Committee on Conference, *Making Appropriations for the Department of the Interior and Related Agencies for the Fiscal Year Ending September 30, 1993, and for Other Purposes*, H.Rept. 102-901, p. 61.

Congressional oversight of EIA can be conducted by any committee with jurisdiction over energy-related issues or government operations in general. The primary oversight committees for DOE are the House Energy and Commerce Committee and the Senate Energy and Natural Resources Committee, which also has jurisdiction over nominees to be EIA Administrator.

Confirmation hearings for the EIA Administrator often include questions focusing on EIA's appropriate role and standards of operation. For example, Administrator Linda Capuano was asked at her 2017 confirmation hearing whether she believed, in light of statements by President Trump, that global climate change was a real phenomenon and whether EIA would analyze the effects of energy futures contracts and derivatives on oil prices. At the same hearing, Senator Heinrich criticized EIA for bias, saying, "the EIA has consistently and, actually, spectacularly, underestimated growth in clean energy as well as growth in the gas sector." He asked Capuano, "The data and EIA's bias seem to have a chasm between them. Why do you think that is and what do you intend to do about it?" Capuano replied that EIA's "assumptions are always being looked at" and that "there is always room to correct those and improve those" but did not agree that "bias has entered—is inserted into that." She added, "I believe that the information that EIA gives you is high quality and it is credible and that the sources are identified and that they can be improved continuously as the source of data is improved."²⁶

Appropriations hearings also provide a regular opportunity for congressional oversight of EIA policies and activities. For example, the Energy and Water Development Subcommittee of the Senate Appropriations Committee in 2008 held an oversight hearing on EIA's FY2009 budget request and oil and gas price forecasts. Senator Dorgan, the subcommittee chairman, criticized EIA for attributing the recent doubling of oil prices at that time to market forces rather than speculation in the futures markets. However, Senator Domenici, the subcommittee's ranking Republican, agreed with EIA that the price increase was primarily the result of "supply and demand fundamentals in the marketplace."²⁷

Additional oversight had previously been conducted by the U.S. Government Accountability Office (GAO), which had a statutory requirement to conduct annual performance evaluations of EIA until the mandate was repealed by the Federal Reports Elimination and Sunset Act of 1995 (P.L. 104-66).

EIA Functions

EIA's chief functions are to provide energy information and analysis to Members of Congress, industry participants, and the public. In general, EIA's energy information is one of three types: data, estimates, or projections. EIA collects some data directly through standardized surveys to all energy companies operating in a sector. EIA sometimes processes this data, for example by aggregating it into monthly totals. When surveying all energy companies in a sector is impractical or overly burdensome, EIA produces estimates for the full sector based on a sampling of a subgroup of companies in that sector. EIA uses standard statistical methods to produce estimates from that sampling. EIA produces projections for future conditions using its energy system models described in the section "EIA Models." EIA's analysis takes various forms, including identifying trends in its data and ranking energy producers by output.

²⁶ U.S. Congress, Senate Committee on Energy and Natural Resources, *Capuano and Petty Nominations*, S.Hrg. 115-338, December 5, 2017, p. 31.

²⁷ U.S. Congress, Senate Committee on Appropriations, Subcommittee on Energy and Water Development, *Energy Information Administration's Forecasts for Oil and Gasoline Prices*, S.Hrg. 110-768, June 25, 2008, p. 3.

Data Collection

As one of its core functions, EIA collects primary data for many aspects of the U.S. energy sector. EIA's authorizing statute requires the agency to carry out a "central, comprehensive, and unified energy data and information program" covering "data and information which is relevant to energy resource reserves, energy production, demand, and technology, and related economic and statistical information."²⁸ The statute additionally requires EIA's data program to collect information used to determine the adequacy of U.S. energy resources (i.e., whether U.S. energy supply can meet energy demand).

Energy companies are required by law to provide requested information to EIA. EIA must make publicly available the information it collects, except for classified, privileged, or confidential information. EIA presents much of the data it collects in aggregated form so that companies are not disadvantaged in the marketplace.

EIA mostly uses standardized surveys (i.e., forms) to collect information. These surveys are approved every three years by the U.S. Office of Management and Budget (OMB) pursuant to the Paperwork Reduction Act of 1995 (PRA; P.L. 104-13). Stated purposes of the PRA are to minimize the reporting burden on the public and maximize the utility of the information collected. Consequently, EIA occasionally modifies or discontinues its surveys. EIA datasets are described in the section "EIA Domestic Data." Currently active EIA surveys are described in **Appendix A**.

EIA also disseminates energy information collected by other federal agencies. This information does not always coincide with the data EIA collects, as the other agencies may collect data on a different time period or from different sources. Agencies also have different methodologies in their data collection, consolidation, and analysis. Some energy information is collected by the Federal Energy Regulatory Commission (FERC); the Bureau of Economic Analysis (BEA) and the Bureau of Industry and Security (BIS) within the Department of Commerce; the Office of Natural Resources Revenue (ONRR), the Bureau of Land Management (BLM), the Bureau of Ocean Energy Management (BOEM), and the U.S. Geological Survey (USGS) within the Department of the Interior; the Bureau of Labor Statistics (BLS) within the Department of Labor; and the Bureau of Transportation Statistics (BTS) and the Pipeline and Hazardous Material Safety Administration (PHMSA) within the Department of Transportation.

Projections and Forecasts

EIA's projections provide estimates of future energy system conditions based upon stated assumptions. Usually, EIA's projections assume laws, regulations, and industry trends in place when the projection is made will remain unchanged throughout the projection period. EIA often draws a distinction between projections (i.e., estimates based on specified assumptions) and forecasts or predictions (i.e., best guesses about the future).²⁹ Many EIA information users do not draw this distinction, and EIA projections are frequently described as forecasts. EIA analysts have argued that characterizing a projection as a forecast can lead to incorrect and misleading interpretations.³⁰ At the same time, EIA has been criticized for not taking into account potential

²⁸ 42 U.S.C. §7135.

²⁹ For example, EIA, *EIA's Annual Energy Outlook Is a Projection, Not a Prediction*, May 17, 2016, at <https://www.eia.gov/todayinenergy/detail.php?id=26272>.

³⁰ See David Daniels and Chris Namovicz, *On Inaccuracies in a Published Journal Article*, April 20, 2016, in response to Alexander Q. Gilbert and Benjamin K. Sovacool, "Looking the Wrong Way: Bias, Renewable Electricity, and

changes in laws, regulations, and market trends. Some critics argue that this presents a misleading reference upon which many policy and investment decisions are made.³¹

EIA projections typically include a main scenario (i.e., reference case) and alternative scenarios. In the alternative scenarios, certain assumptions (e.g., GDP growth, oil and gas production, policy or technology changes) are changed while others remain the same. These scenarios provide information about the possible range of future energy supply-and-demand conditions, and they can help identify how sensitive the U.S. energy system might be to changes in certain factors such as fuel prices. Scenarios help address the uncertainty that is inherent in any projection of the future.

EIA produces two series of projections:

- The Annual Energy Outlook (AEO) provides a projection for U.S. energy supply, demand, prices, certain air emissions, and other factors over a 25-30 year period. The AEO is released annually.
- The International Energy Outlook (IEO) provides a projection of global energy supply, demand, prices, certain air emissions, and other factors for a 25-30 year time period. The IEO is released annually.

Additionally, EIA produces the Short-Term Energy Outlook, a 1-2 year forecast for U.S. energy supply, demand, and prices. The STEO report is released monthly. In contrast to the AEO and IEO projections, EIA characterizes the STEO as a forecast of the U.S. energy system.³² Upon request, EIA may project potential energy system impacts of policy proposals. Typically, these analyses are requested by the Chair or Ranking Member of a committee of jurisdiction. EIA's models cannot address all topics of interest around policy proposals. For example, EIA's models do not estimate employment in different sectors. Nevertheless, EIA analyses have been used in past legislative debates. A discussion of the models EIA uses for its projections is in the section "EIA Models."

EIA has analyzed potential energy system impacts of proposed energy policies, environmental policies, and tax policies, at the request of Congress. Examples include

- the 2015 study *Effects of Removing Restrictions on U.S. Crude Oil Exports*;
- the 2015 study *Analysis of the Impacts of the Clean Power Plan*;
- the 2012 study *Analysis of the Clean Energy Standard Act of 2012*;
- the 2009 study *Energy Market and Economic Impacts of H.R. 2454, the American Clean Energy and Security Act of 2009*; and
- the 2007 study *Analysis of Alternative Extensions of the Existing Production Tax Credit for Wind Generators*.³³

Energy Modelling in the United States," *Energy*, vol. 94 (January 1, 2016), pp. 533-541.

³¹ See, for example, Dan Gearino, "America's Energy Future: What the Government Misses in Its Energy Outlook and Why It Matters," *Inside Climate News*, January 28, 2019.

³² EIA uses different language to discuss the STEO, compared to the AEO and IEO, reflecting the fact that the STEO is the agency's forecast. For example, EIA lists "Forecast Highlights" on its STEO webpage, including changes that "EIA forecasts" and "EIA expects." In contrast, in the AEO and IEO reports, EIA describes changes that occur "in the reference case." In the introductory language in each report, EIA states that the AEO and IEO are not predictions of what will happen. EIA, *Annual Energy Outlook 2020*, p. 3, and EIA, *International Energy Outlook 2019*, p. 7.

³³ These, and other, analyses in response to congressional requests are available on EIA's website in the Analysis & Projections section, at <https://www.eia.gov/analysis/>.

EIA projections may support activities in other agencies as well. For example, in implementing the Renewable Fuel Standard, the U.S. Environmental Protection Agency must use EIA projections of relevant fuel volumes.³⁴

EIA's different projections and forecasts serve different purposes. The two U.S. products, the AEO and STEO, cover different timescales (long-term and short-term) and are updated with different frequency (annually and monthly). Monthly updates as provided by the STEO may be useful in understanding near-term conditions, but may have limited usefulness in understanding long-term changes. This may affect the policy questions the STEO can effectively address, as some questions may be best understood in a near-term context while others may be best understood in the long term. For example, some policies may seek to affect energy prices in the near term while other policies may seek to affect long-term investments in the energy sector. Long-term policy questions may be better addressed in the AEO projections. The international projections in the IEO satisfy EIA's statutory obligation to analyze "international aspects, economic and otherwise, of the evolving energy situation" and "long-term relationships between energy supply and consumption in the United States and world communities."³⁵

Most EIA projections include an assessment of uncertainty, including how sensitive the model results are to the assumptions used (i.e., whether small changes in assumptions lead to big changes in results). Modelers often caution against using specific projected values for policymaking; instead, they often recommend basing policy decisions on trends and insights that projections reveal.³⁶ In part, modelers base this advice on the fact that projections always have some amount of uncertainty. Uncertainty tends to increase over longer time periods, such as the 25- to 30-year timespan covered by the AEO. Structural changes or major shocks can cause large changes in the energy system (and frequently lead to legislative action), but these kinds of events are rarely anticipated by energy system models. Increased computing resources or advanced methods might reduce some uncertainties in model projections, but other sources of uncertainty (e.g., future energy policy) remain regardless of the sophistication of any model. As a result, realized (i.e., actual) values rarely match projected values.

Every other year, EIA produces an AEO Retrospective Review. This internal analysis evaluates differences between AEO projections and realized values. EIA notes several factors that regularly lead to differences between AEO projections and realized values, including variations in oil prices, economic activity, industry-specific market conditions, technology changes, and new laws or regulations.³⁷

Analysis

State Energy Profiles

The State Energy Data System (SEDS) is EIA's main database with information for state-level energy production, consumption, prices, and expenditures.³⁸ The database has information for

³⁴ 42 U.S.C. §7545(o)(3)(A). For more information on the Renewable Fuel Standard, see CRS Report R43325, *The Renewable Fuel Standard (RFS): An Overview*, by Kelsi Bracmort.

³⁵ 15 U.S.C. §790a.

³⁶ For example, H.G. Huntington, J.P. Weyant, and J.L. Sweeney, "Modeling for Insights, Not Numbers: The Experiences of the Energy Modeling Forum," *Omega*, vol. 10, no. 5 (August 1982), pp. 449-462.

³⁷ EIA, *AEO Retrospective Review, 2018*, December 12, 2018.

³⁸ Expenditures are the total amount of money paid by consumers for energy, and are generally calculated as the amount of energy consumed times the price of each unit of energy. For example, a consumer's monthly expenditure for

U.S. states from 1960 to the present. SEDS also has information for the District of Columbia and U.S. territories, though only for more recent years. EIA makes adjustments in the database to allow “apples-to-apples” comparisons. For example, data collection practices have changed from the 1960s to today. EIA has developed methods to account for these differences so that data can be compared between years.

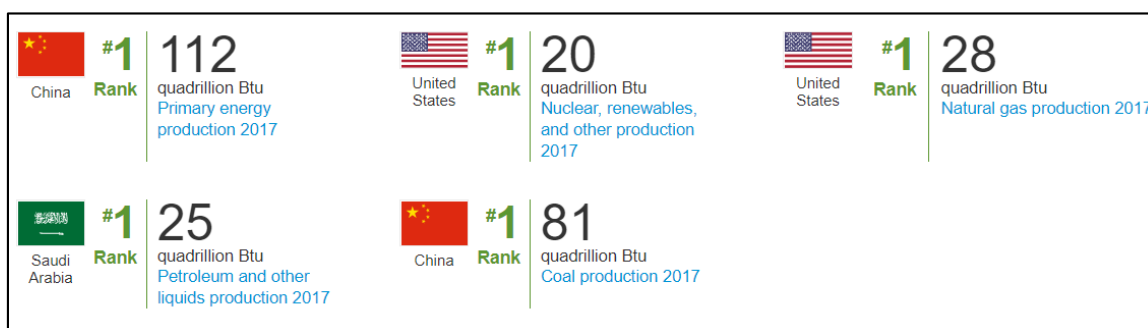
The SEDS provides state rankings, quick facts about energy production and consumption in each state, maps of energy infrastructure in each state, and other information.³⁹ Data are updated annually, with an approximate 18-month time lag to allow for data processing.

Country Analysis

EIA produces periodic *Country Analysis Briefs* containing data and analysis for energy production and consumption in many countries. These publications use internal EIA analysis as well as information from other organizations (e.g., foreign governments, news reports). The database also includes information on country rankings, including data on the top energy consumers and producers (**Figure 3**).

Figure 3. Energy Production Country Rankings

Based on 2017 energy production data



Source: EIA, “Rankings About Energy in the World,” at <https://www.eia.gov/international/overview/world>.

EIA’s databases of international statistics also include country-specific energy production, energy consumption, gross domestic product (GDP), population, and carbon dioxide emissions.

Today in Energy

Today in Energy articles are timely, short pieces with energy information and analysis designed to educate the public.⁴⁰ The Today in Energy series gives all energy topics an outlet for timely data and analysis. The series also links to larger reports and other data providing the reader with additional background information. The reader can access information about the latest energy trends supported by EIA analysis.

EIA created the Today in Energy daily energy series as a public-facing daily report on timely energy data. EIA has published the series nearly every day since the series began on February 9,

gasoline is the total amount of money spent on gasoline in one month.

³⁹ Rankings include U.S. states and the District of Columbia. Quick facts and maps are available for U.S. states, the District of Columbia, and U.S. territories.

⁴⁰ EIA, “About Today in Energy,” available at <https://www.eia.gov/todayinenergy/about.php>.

2011.⁴¹ The series built upon a previously internal daily energy report that EIA issued beginning on August 28, 2009. The internal product was designed to be a single page of information for briefing high-level EIA staff.⁴² It provided quick and easily accessible data all on one page, instead of having to go to various sources. These one-page reports typically included analytical text with a graphic or data visual to illustrate and contextualize the daily topic.

Energy Subsidy Reports

Since 1992, EIA has produced a series of reports on U.S. energy subsidies in response to congressional requests. These reports estimate the value of federal energy subsidies based on direct expenditures to producers and consumers, tax expenditures, research and development activities, and federal electricity support. Federal electricity support includes electricity sold by the Tennessee Valley Authority, Bonneville Power Administration, and other Power Marketing Administrations as well as loans and loan guarantees made by the U.S. Department of Agriculture's Rural Utilities Service.⁴³

EIA Domestic Data

EIA collects and estimates primary data for many aspects of U.S. energy. These data are discussed in more detail below. The groupings used for domestic energy information below are the same groupings of "Sources & Uses" that EIA provides on its website. EIA also publishes some energy industry data collected by other federal agencies.

EIA primarily publishes data on its website according to energy sources and use: Petroleum & Other Liquids, Natural Gas, Electricity, Consumption & Efficiency, Coal, Renewables & Alternative Fuels, Nuclear & Uranium, and Total Energy. Within each category, information is divided between Overview, Data, and Analysis & Projections tabs of the relevant section of the website. The Overview tab provides general information on the energy source or use. The Data tab breaks the data into relevant categories. The Analysis & Projections tab provides different reports that EIA undertakes with the data it collects.

Petroleum & Other Liquids

The Petroleum & Other Liquids category contains the most data and reports of all the different fuels EIA covers. Data are divided into categories: Summary, Prices, Crude Reserves and Production, Refining and Processing, Imports/Exports, Movements, Stocks, and Consumption/Sales. Within each of these categories are additional sub-categories. Further, EIA uses the data to produce its analytical reports. As the oil industry changes, EIA may modify its collection of data. As an example, EIA currently breaks out oil production to include data for tight oil,⁴⁴ which now makes up most of U.S. oil production.

⁴¹ EIA, "Today in Energy, February 2011," available at <https://www.eia.gov/todayinenergy/archive.php?my=Feb2011>.

⁴² Telephone call with Owen Comstock, Management Lead, EIA, May 28, 2020.

⁴³ For background on Power Marketing Administrations, see CRS Report R45548, *The Power Marketing Administrations: Background and Current Issues*, by Richard J. Campbell. For background on the Rural Utilities Service, see the section "USDA Rural Utilities Service (RUS)" in CRS Report RL31837, *An Overview of USDA Rural Development Programs*, by Tadlock Cowan.

⁴⁴ Tight oil is oil contained in formations that have low permeability and porosity, such as shales, and need artificial stimulation through techniques like hydraulic fracturing.

Natural Gas

Natural gas's share of the U.S. energy mix has grown since EIA's establishment (see **Figure 1**), and EIA has increased its analysis of the sector and the data it collects. EIA's Natural Gas data is broken down into the following categories: Summary, Prices, Exploration & Reserves, Production, Imports/Exports, Pipelines, Storage, and Consumption. Within each category are sub-categories to make the data easier to search.

Electricity

EIA's electricity data cover the following aspects of the electric power industry:

- Power plant characteristics (e.g., location, generating capacity, energy source, environmental control equipment, first year of operation);
- Power plant operations (e.g., generation, fuel consumption, air emissions);
- Sales to customers, including net metered electricity;⁴⁵
- Electricity imports and exports; and
- Electricity flows between regions within the United States (i.e., interchange).

EIA collects and releases these data over different timescales, such as hourly (interchange only), monthly, or annually. Most data cover all U.S. states and the District of Columbia. EIA collects some electricity data for U.S. territories as well. Interchange data only cover the contiguous United States.

EIA occasionally changes electricity data collection based on changes in the industry. For example, EIA began collecting information about small-scale solar (i.e., solar power plants with less than one megawatt capacity) in 2014.

Consumption & Efficiency

EIA estimates energy consumption in buildings, primarily through three surveys: the Commercial Buildings Energy Consumption Survey (CBECS), the Manufacturing Energy Consumption Survey (MECS), and the Residential Energy Consumption Survey (RECS). Each survey takes several years to complete.⁴⁶ The surveys collect nationally representative information about building characteristics, energy use, and other factors.

Coal

EIA collects data on U.S. coal production, consumption, exports, imports, stocks, and prices. These data are collected quarterly and annually. EIA also produces weekly estimates of coal production, based on historic trends and information collected by the U.S. Mine Safety and Health Administration (MSHA). Coal data is broken down by state or region, coal type (e.g., steam coal, metallurgical coal), and end user (e.g., power plants, metal manufacturing).

⁴⁵ More information about net metering is available in CRS Report R46010, *Net Metering: In Brief*, by Ashley J. Lawson.

⁴⁶ EIA, *EIA's Residential and Commercial Studies Require Significant Data Collection and Analysis*, February 7, 2017, at <https://www.eia.gov/todayinenergy/detail.php?id=29852>.

Renewables & Alternative Fuels

EIA collects data on the main renewable energy sources used in the United States: biomass (including biofuels), geothermal, hydropower, solar, and wind. These renewable energy sources are used by many economic sectors for many different purposes. This variability influences EIA's data collection methods. Renewable energy sources with a few large producers or consumers can be surveyed directly. These include biodiesel producers and wind farms. Other renewable energy sources are either so small or so diverse that they require estimation. These include wood for home heating and geothermal heat pumps.

EIA's collected renewable energy data covers:

- Biodiesel production, stocks, and sales (monthly biodiesel production survey);
- Densified biomass fuel (e.g., wood pellets) production, employment, and sales;
- Fuel ethanol production, stocks, and imports;
- Electricity generated from renewable energy (also reported as Electricity data);
- Geothermal energy for direct use and in heat pumps; and
- Solar thermal for direct use (e.g., solar water heaters).

EIA collects and releases these data over different timescales. Fuel ethanol data is mostly collected weekly, along with other related transportation fuel data.⁴⁷ Other renewable energy data is collected monthly or annually. Most data cover all U.S. states and the District of Columbia.

EIA previously collected data related to alternative fuel use for transportation, including alternative fuel production and the size of the alternative fuel vehicle (AFV) fleet. EIA's fleet survey had covered federal and state government fleets, transit agency fleets, and fuel provider fleets. EIA suspended this survey in 2019 because it determined the survey scope no longer reflected the U.S. AFV fleet.⁴⁸ Specifically, EIA determined that the private sector and households owned most AFVs by 2019, and are outside EIA's survey scope.

Nuclear and Uranium

U.S. nuclear energy data reported by EIA includes nuclear power generation and capacity, nuclear power plant outages, and spent nuclear fuel discharges and storage. Uranium statistics from EIA include U.S. mine production, mill production of uranium concentrate, exploration drilling and costs, mining and milling employment, reserves, and prices. EIA also reports uranium industry-related data, such as the operating status of U.S. uranium mines and mills and their capacity, types of mines and mills, mine and mill ownership, and foreign and domestic uranium purchases.

EIA's nuclear power generation statistics come from monthly and annual surveys of all types of U.S. power producers, including non-utility generators. A separate EIA survey provides data on nuclear power plant capacity and ownership. Spent fuel data comes from an EIA survey of all U.S. nuclear power plant owners, including non-utility generators. According to EIA, "Data are collected on all discharged nuclear fuel assemblies, projected assembly discharges, nuclear fuel

⁴⁷ Ethanol used for transportation is primarily blended with gasoline. EIA collects data on gasoline and other petroleum products weekly.

⁴⁸ EIA, *Changes to Form EIA-886, Annual Survey of Alternative Fueled Vehicles*, at https://www.eia.gov/survey/form/eia_886/form.pdf.

storage capacities and inventories, reactor operating history, other fuel and nonfuel radioactive waste, and low-level waste resulting from decommissioning operations.”⁴⁹

Uranium data reported by EIA come primarily from an annual domestic uranium production survey, which includes uranium milling and in-situ leach processing, feed sources, mining, employment, drilling, expenditures, and reserve estimates. EIA also conducts a survey on uranium contracts and deliveries. Because of the small number of currently active U.S. uranium mining and milling companies, the information in many categories in EIA’s uranium reports is “withheld to avoid disclosure of individual company data.”⁵⁰

EIA International Data

EIA collects data from numerous different sources to compile international data, including the International Energy Agency, the World Bank, and the United Nations, as well as data reported by governments directly. The United States is a member of several of these international organizations, and EIA, on behalf of the United States, submits U.S. energy data. The way each organization utilizes the data and their methodologies differ and thus, despite having the same data, they may produce different projections. Furthermore, some organizations focus narrowly on certain sectors; for instance, the International Atomic Energy Agency publishes data on nuclear energy.

EIA’s international database includes information collected from over 200 countries, as well as “Regions of Interest” and “Special Topics.” Not all country data sets contain analysis, as the sources are secondary and the available data and information ranges in depth and quality. Further, EIA methodology is dependent on when these sources publish data and therefore the timeliness of the information varies.⁵¹

EIA’s international database is searchable by energy topics (e.g., petroleum and other liquids, electricity) and by selecting a country or region. Some of these data are available on a monthly basis, while other data is updated less frequently, due to the nature of secondary data sources noted above.

EIA Models

EIA has developed and maintains several energy sector models, described below. Generally, the EIA models take a microeconomic approach, finding an equilibrium between factors of energy supply and energy demand. The level of detail involved in estimating energy supply and energy demand varies by model.⁵²

EIA’s models support several EIA functions, including providing projections of U.S. energy supply and demand; providing projections of international energy supply and demand; and conducting policy analysis requested by Congress. EIA projections rely primarily on three models: the National Energy Modeling System (NEMS), the Short Term Energy Outlook model

⁴⁹ EIA, “Survey” website, Nuclear Fuel Data Survey, GC-859, viewed May 27, 2020, at <https://www.eia.gov/survey/#gc-859>.

⁵⁰ EIA, *2019 Domestic Uranium Production Report*, May 2020, at <https://www.eia.gov/uranium/production/annual/pdf/dupr2019.pdf>.

⁵¹ Email communication with EIA.

⁵² For further discussion of energy system model design and potential applications, see CRS In Focus IF11628, *Using Models in Energy Policymaking*, by Ashley J. Lawson.

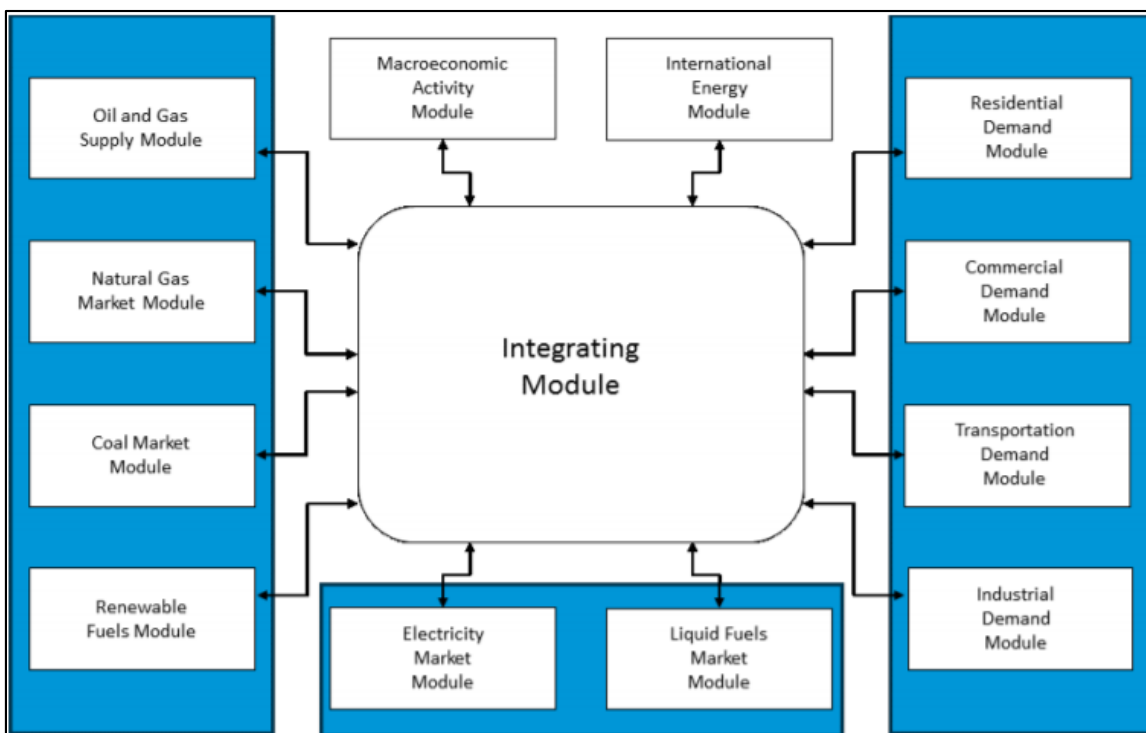
(STEO model), and World Energy Projection System Plus (WEPS+). The first two models are used to develop projections of the U.S. energy system, and the third is used to develop projections of the global energy system.⁵³

National Energy Modeling System (NEMS)

The National Energy Modeling System (NEMS) is an integrated energy model of the United States. EIA uses NEMS to produce the AEO and other projections of the U.S. energy sector, for example policy scenarios requested by Congress. EIA began developing NEMS in the early 1990s to support its missions to provide energy analysis.⁵⁴

Integrated models, like NEMS, explicitly represent the interactions between different parts of the energy system that occur in reality. In contrast, other kinds of models simplify the representation of these interactions by using many assumptions. In NEMS, the supply and demand balance in one area of the energy system (e.g., U.S. natural gas production) affects the supply and demand balance in other areas (e.g., U.S. natural gas consumption for electricity generation).⁵⁵

Figure 4. National Energy Modeling System (NEMS) High-Level Structure



Source: EIA, *The National Energy Modeling System: An Overview 2018*.

⁵³ Full model documentation for the National Energy Modeling System (NEMS), the Short Term Energy Outlook model, and WEPS+ is available on EIA's website at <https://www.eia.gov/outlooks/aeo/nems/documentation/>, <https://www.eia.gov/reports/index.php#T1601,T1139>, and <https://www.eia.gov/outlooks/ieo/weps/documentation/>, respectively. The model documentation describes the modeling approach, structure of the model, and key assumptions.

⁵⁴ National Research Council, *The National Energy Modeling System*, 1992.

⁵⁵ EIA, *Annual Energy Outlook 2016 Appendix E: NEMS Overview and Brief Description of Cases*, 2016.

The model represents these interactions through different interconnected modules (**Figure 4**).⁵⁶ This modelling architecture generally allows the model to solve for quantity and price based on economic optimization within and between parts of the energy system. For example, one module of NEMS estimates future U.S. oil and gas production, based on assumptions about the resource base in different regions of the country, production technologies and techniques, and other factors. This module's estimate for future natural gas production is used as an input for a module that estimates natural gas prices based on natural gas supply (from the first module) and demand (from other modules). Most NEMS outputs are the result of economic constraints in the model. For example, production will stop at an oil field in the model if it is not profitable. EIA adds policy constraints to the model as well. For example, a power plant will stop operating if it exceeds regulatory air emissions limits, even if operating the power plant is otherwise profitable in the model.

NEMS does not estimate macroeconomic variables such as GDP or employment. EIA acquires forecasts for these variables from a vendor and uses them as input to NEMS.

EIA makes publicly available NEMS input data and most of the computer code used to run the model (some components of the model use proprietary software from vendors). According to EIA, a few external organizations use NEMS, or modified versions of it, for policy analysis and other applications, but the more common external use is as a data source.⁵⁷

STEO Model

The STEO model is used to produce the monthly Short Term Energy Outlook. The STEO model takes a different approach than NEMS to estimating future U.S. energy supply and demand. The STEO model is an econometric model, meaning it uses observed historical relationships between different variables (e.g., temperature and natural gas used for heating) to estimate future outcomes. EIA collects and maintains some of the datasets used by the STEO model, but it also uses external data from both public and private sector organizations. EIA also uses software from a vendor to run the STEO model.⁵⁸

The STEO model can respond relatively quickly to changes in energy markets because it is updated monthly. For example, EIA provided its first analysis of the energy impacts of the novel coronavirus pandemic in its March 2020 STEO edition, soon after energy impacts appeared in the United States. The STEO can also provide insight into seasonal variations that the timescale of the AEO does not capture. For example, the STEO includes estimates for seasonal (e.g., summer, winter) fuel prices, while the AEO primarily estimates annual values.

⁵⁶ In an integrated model, the output of one module becomes the input for another module. The modules interact multiple times until they reach equilibrium, that is, when the change in output of a model upon sequential calculations is no longer large enough to significantly change the output of another. The process is time-intensive. EIA reports that a complete run of NEMS takes 12-18 hours using the computer equipment it had available in 2019. Computing power (e.g., memory, processor speed) can affect the time it takes to run any computer model. Generally, systems with greater computing power can run the same model in less time than those with less computing power. EIA, *Availability of the National Energy System Modeling (NEMS) Archive*, 2019.

⁵⁷ EIA, *Availability of the National Energy System Modeling (NEMS) Archive*, 2019.

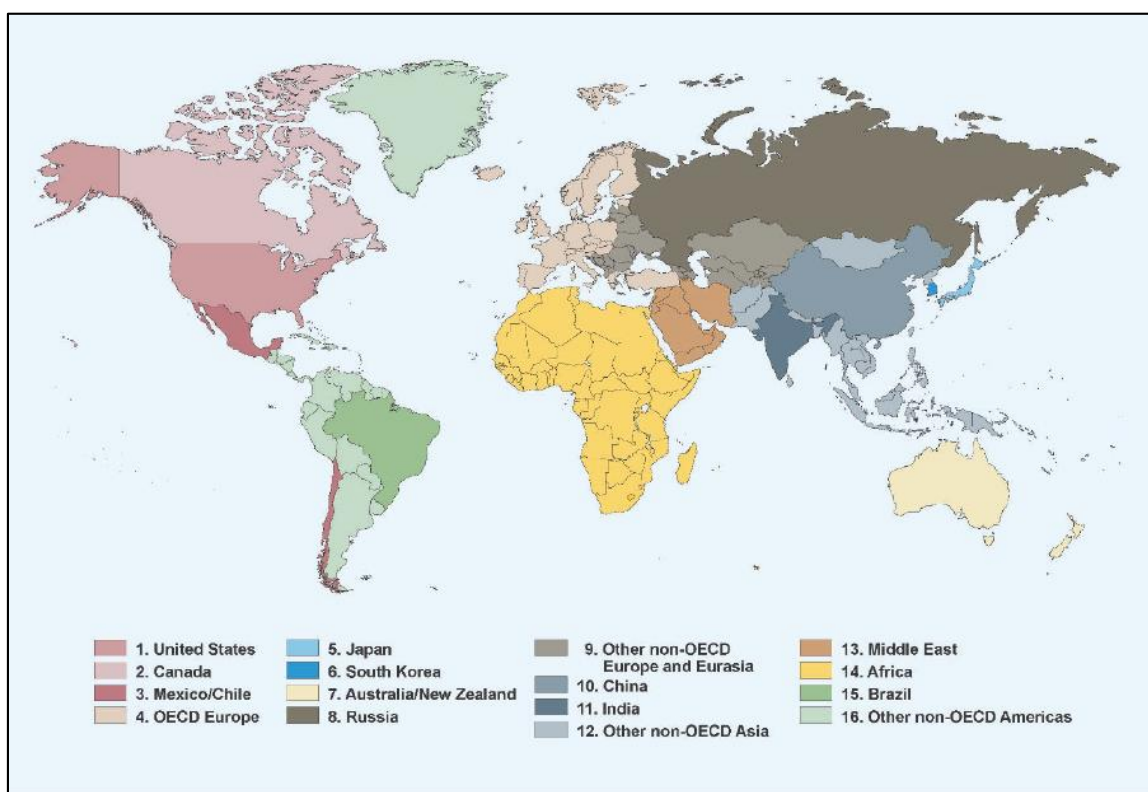
⁵⁸ EIA developed over 2,000 equations to represent different parts of the U.S. energy system in the STEO model. EIA uses software developed by the firm IHS Markit to solve many of these equations. EIA, *Short-Term Energy Outlook Model Documentation*.

World Energy Projection System Plus

EIA's World Energy Projection System Plus model is used to produce the annual International Energy Outlook. WEPS+ is a modular energy model of the world. This architecture differs from NEMS. Modules in WEPS+ are indirectly connected to each other, while modules in NEMS are directly connected to each other. Both solve for supply and demand equilibrium, but they arrive at that solution in different ways.

The countries and country groupings in WEPS+ are broadly divided according to whether they are members of the Organization for Economic Cooperation and Development (OECD) or not. According to EIA, some modules in WEPS+ may use more detailed regional data for calculations.⁵⁹

Figure 5. World Energy Projection System Plus (WEPS+) Model Regions
Used in EIA's International Energy Outlook



Source: EIA, *International Energy Outlook 2019*.

Notes: OECD = Organization for Economic Cooperation and Development.

The modules in WEPS+ independently estimate energy supply or demand using input data which may come from other modules or from external sources. EIA uses a vendor for projections of GDP by country, which are then used as input for WEPS+. EIA runs the modules iteratively (i.e., repeatedly) until an equilibrium between supply and demand is reached.

⁵⁹ EIA, *World Energy Projection System Plus (WEPS+): Overview*, December 2019.

Selected Criticisms

EIA's models and projections, especially NEMS and the AEO, are prominent in the energy sector. Their wide use suggests they have value for many energy sector participants and observers. They also, however, have attracted criticisms.

Most criticisms concern the assumptions EIA makes when using its models to produce projections, usually arguing that EIA insufficiently accounts for policy or technology changes. Examples in recent years come from the wind and solar industries—each of which began experiencing rapid technology cost declines and market growth when proponents raised criticisms of EIA's assumptions.⁶⁰ EIA updates its assumptions each year, potentially providing an opportunity to address some of its critics' complaints.⁶¹

Other criticisms concern the models themselves. EIA has modified the structure of NEMS, or modules within it, multiple times over the model's nearly 30-year lifetime.⁶² DOE has proposed a multi-year effort, beginning in FY2021, to “modernize its energy modeling capabilities” with the aim of achieving “greater agility in EIA's modeling system to address key current and emerging trends, for example, the increased prominence of natural gas in the U.S. domestic energy profile, growing penetration of renewables, and more flexible options for modeling energy-related CO₂ emissions.”⁶³

EIA Information Users

As noted above, EIA information is widely used in the energy industry and among policymakers and the general public. EIA primarily disseminates information through its website <https://www.eia.gov>. In 2019, the site had over 47.3 million page views on its approximately 207,000 web pages.⁶⁴ **Figure 6** shows a breakdown of EIA web users by sector, based on a survey EIA conducted in 2019.⁶⁵ A majority (54%) of the approximately 27,000 respondents were in the private sector, including the categories business/industry, research/consulting, and finance.

⁶⁰ For example, Silvio Marcacci, “Just How Off Is EIA's Renewable Energy Outlook? How About 20+ Years?,” *CleanTechnica*, April 16, 2014; Noah Kaufman, *Annual Energy Outlook Projections and the Future of Solar Photovoltaic Electricity*, Institute for Policy Integrity, April 22, 2014, at https://policyintegrity.org/files/publications/annual-energy-outlook-projections_1.pdf; Michael Grunwald, “Why Are the Government's Energy Forecasts So Bad?,” *Politico*, June 24, 2015.

⁶¹ For example, EIA, *Review of Emerging Resources: U.S. Shale Gas and Shale Oil Plays*, July 2011, and EIA, *Wind and Solar Data and Projections from the U.S. Energy Information Administration: Past Performance and Ongoing Enhancements*, March 2016.

⁶² For example, Melinda Hobbs et al., “Rebuilding the Coal Model in the Energy Information Administration's National Energy Modeling System,” *Interfaces*, vol. 31, no. 5 (2001), pp. 24-42.

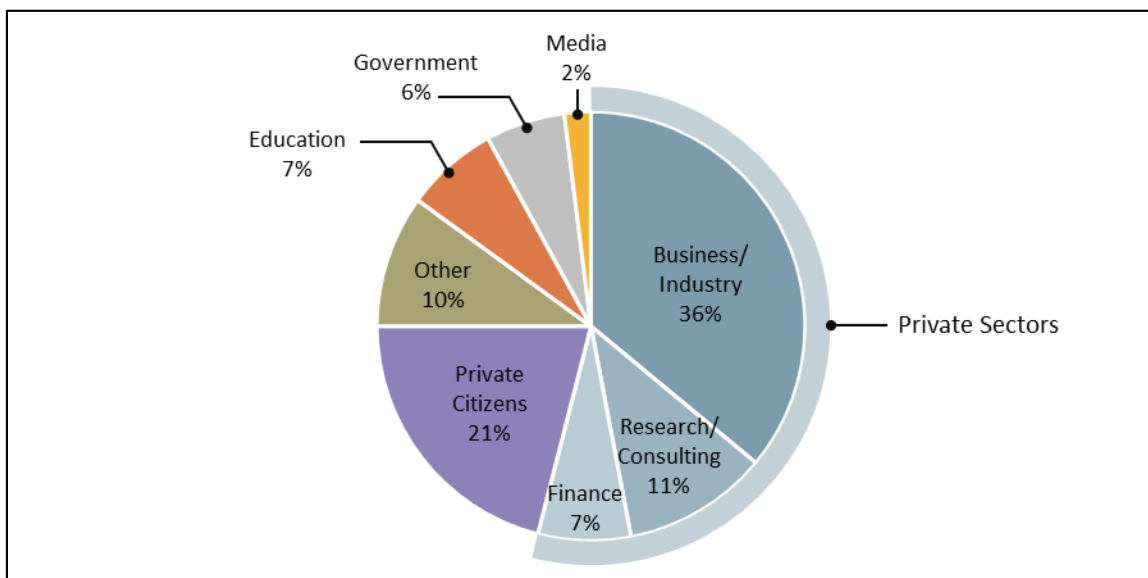
⁶³ DOE, *FY2021 Congressional Budget Request Budget in Brief*, DOE/CF-0167, February 2020, p. 46, at https://www.energy.gov/sites/prod/files/2020/02/f72/doe-fy2021-budget-in-brief_0.pdf.

⁶⁴ Email communication with EIA.

⁶⁵ Email communication with EIA.

Figure 6. EIA Web Users by Sector

Results of a 2019 EIA survey

**Source:** EIA email communication to CRS.**Notes:** Other category includes EIA categories Trade Association and Nonprofit, Library, and Other. Education category includes EIA categories Student and Teacher/Professor.

Private Sector Users

The private sector—producing companies, transportation companies, energy consuming companies, financial institutions, commodity traders, consulting firms, and other market watchers—uses EIA-collected data and EIA-produced analysis in its own analysis and projections. When EIA releases data, related markets may react, especially if the data differ from what the particular market players were anticipating. To some degree, markets for all energy commodities respond to EIA data. Oil and other petroleum liquids have the most mature markets, so those markets may be especially responsive. Some key EIA reports for those markets include weekly inventory or storage reports, the Drilling Productivity Report (DPR), and Petroleum Supply Monthly (PSM). For projections, the Short-Term Energy Outlook and the Annual Energy Outlook are widely used.

The AEO is widely used in the private sector across energy commodities. Some firms use the AEO's scenarios directly. Others may use the AEO indirectly, since some firms that sell energy forecasts use the AEO as an input to their own models. Some energy sector participants and observers have criticized EIA for inaccurately predicting energy system conditions, arguing that inaccuracies can affect investment decisions and the commercial success of different industries.⁶⁶

Congressional Users

Members of Congress can use EIA data and projections to inform their policy decisions. Other organizations (e.g., trade associations, energy consultants, academic researchers) also provide policy-relevant energy information that Congress can use; however, energy data comparable to EIA's is not generally available from other organizations because of EIA's mandatory data

⁶⁶ For example, Daniel Cohan and Alex Gilbert, "An Energy Agency's Forecasting Flaws," *The Hill*, April 1, 2016.

submission authority. Energy system projections, however, are available from numerous organizations. Members of Congress might choose to use projections from EIA or other organizations. Alternatively, Members of Congress might choose other information to inform policy decisions, given the inherent uncertainty in energy system models.

EIA's website provides maps of some energy-related infrastructure by congressional district. These may be useful in responding to constituent requests and informing policy decisions. These maps are summarized in **Appendix B**.

Concluding Observations

Congress established EIA in the 1970s so that policymakers, regulators, and the public could have more transparency into U.S. energy system conditions. EIA continues to fulfill this role today. EIA can collect information through its statutory authority that private firms might not be able to collect on their own.

The current overall U.S. energy balance is very different than when EIA was established. At that time, the United States had a shortage of energy supply relative to its needs, but now the United States has a net surplus (or close to it).⁶⁷ Congress could choose to evaluate the desired role of EIA given this different context. As the energy mix changes and a wider array of fuels are integrated, EIA might need expand its data collection and analysis to fully cover the U.S. energy sector. Expanding EIA's coverage while maintaining its existing portfolio would likely require additional funding, especially to meet the depth required by the market.

EIA data have become essential for the functioning of U.S. energy markets, with some markets (e.g., the oil market) relying upon EIA data releases for price formation. The consolidation of industry data and the transparency of published data are important components of how market entities currently analyze the sector. The private sector uses EIA data to inform its analysis of different energy commodities. The nature of the energy sector is one of constant change, shifting priorities, new data and information, and varied analysis and interpretations. EIA must constantly evaluate changes for their short, medium, and long term effects and whether or not they require EIA to modify its collection of specific data and analytical reports.

Members of Congress may use EIA projections to inform their decisions. Members of Congress may also use information from other organizations, such as private firms, trade associations, and think tanks. Members of Congress could choose to evaluate EIA's modelling capabilities, compared to other organizations, and determine whether EIA should make changes. Changes to EIA's modelling capabilities could affect its annual appropriation requirement and raise other considerations.

⁶⁷ EIA, "U.S. Total Energy Exports Exceed Imports in 2019 for the First Time in 67 Years," at <https://www.eia.gov/todayinenergy/detail.php?id=43395>.

Appendix A. Active EIA Survey Forms

EIA collects data from energy industry participants through a number a standardized survey forms. These surveys are approved every three years by the U.S. Office of Management and Budget (OMB) pursuant to the Paperwork Reduction Act of 1995 (P.L. 104-13). Stated purposes of the Paperwork Reduction Act of 1995 are to minimize the reporting burden on the public and maximize the utility of the information collected. **Table A-1** lists forms that were active as of May 2020.

Table A-1. EIA Survey Forms

As of May 2020

Fuel	Form	Title	Timing	Summary
Alternative	22M	Monthly Biodiesel Production Survey	Monthly	Form EIA-22M collects information on biodiesel production at U.S. plants.
Coal	3	Quarterly Survey of Industrial, Commercial and Institutional Coal Users	Quarterly	Used to collect coal consumption data from U.S. manufacturers, transformation and processing plants, and commercial and institutional users. Information collected includes coal consumption, stocks, and receipts.
Coal	6	Emergency Coal Supply Survey	Quarterly	Provides coal production and stocks data from U.S. coal mining companies and stocks data from distributors that do not produce coal.
Coal	7A	Annual Survey of Coal Production and Preparation	Annually	Collects data on coal production operations, characteristics of coalbeds mined, recoverable reserves, productive capacity, coal preparation and the disposition of the coal mined. For coal preparation, information collected includes operations, locations, productive capacity, disposition, and coal prepared. The information is disseminated in EIA reports and analyses used by public and private analysts.
Coal	8A	Annual Survey of Coal Stocks and Coal Exports	Annually	Collects coal stocks data for publications, analyses, and statistical reports used by public and private analysts. Data collected include coal stocks by state location, exported coal by origin state, and export revenue of coal sold during the reporting year.
Coal	20	Emergency Weekly Coal Monitoring Survey for Coal Burning Power Producers	Weekly	During coal supply disruptions, would be used to collect information to track coal stocks, receipts, and consumption at electric utilities.

Fuel	Form	Title	Timing	Summary
Electricity	111	Quarterly Electricity Imports and Exports Report	Quarterly	Collects import/export data from importers and exporters of electricity, border balancing authorities, and entities authorized to export electric energy and to construct, connect, operate, or maintain facilities for the transmission of electric energy at an international boundary as required by 10 C.F.R. §§205.308 and 205.325.
Electricity	411	Coordinated Bulk Power Supply Program Report	Annually	Collects information about regional electricity supply-and-demand projections for a 10-year advance period and information on the bulk power transmission system and supporting facilities.
Electricity	417	Electric Emergency Incident and Disturbance Report	As Needed	Sponsored and collected by DOE's Office of Electricity Delivery and Energy Reliability. The form collects information on electric emergency incidents and disturbances for DOE's use in fulfilling its overall national security and other energy management responsibilities.
Electricity	826	Monthly Electric Utility Sales and Revenue Report with State Distributions	Monthly	Collects information from utilities and nonutility companies that sell or deliver electric power to end users, including electric utilities, energy service providers, and distribution companies. Data collected include retail sales and revenue for all end-use sectors (residential, commercial, industrial and transportation). Merged with 861M.
Electricity	860	Annual Electric Generator Report	Annually	Collects data on the status of existing electric generating plants and associated equipment in the United States, and those scheduled for initial commercial operation within 10 years of the filing of this report.
Electricity	860M	Monthly Update to the Annual Electric Generator Report	Monthly	Collects data on the status of proposed new generators within 12 months of the generator beginning commercial production, and proposed changes to existing generators within 12 months of the proposed change being effective as previously reported to EIA on the annual EIA-860.
Electricity	861	Annual Electric Power Industry Report	Annually	Collects information on the status of a sample of electric power industry participants involved in the generation, transmission, and distribution of electric energy in the United States and its territories.

Fuel	Form	Title	Timing	Summary
Electricity	861M	Monthly Annual Electric Power Industry Report	Monthly	Collects information from utilities and nonutility companies that sell or deliver electric power to end users, including electric utilities, energy service providers, and distribution companies. Data collected include retail sales and revenue for all end-use sectors (residential, commercial, industrial, and transportation).
Electricity	861S	Annual Electric Power Industry Report (Short Form)	Annually	Collects data from approximately 1,100 respondents in lieu of the Form EIA-861. The Form EIA-861S collects a limited amount of sales, revenue, and customer count data and, for certain respondents, data on time-based rate customers and advanced meter reading.
Electricity	923	Power Plant Operations Report	Monthly	Collects information from regulated and unregulated electric power plants in the United States. Data collected include electric power generation, energy source consumption, and end of reporting period fossil fuel stocks, as well as the quality and cost of fossil fuel receipts. Data are published for use by public and private analysts.
Electricity	930	Hourly and Daily Balancing Authority Operations Report	Daily	Collects hourly electric system operating data from electricity Balancing Authorities in the contiguous United States. Data collected include system demand, net generation, and interchange and are submitted on an hourly (for demand) and daily (for all data types) basis.
End Use	457 (A-G)	Residential Energy Consumption Survey (RECS)	Quadrennial	Collects national and regional data on energy use in the residential sector of the economy. For the 2015 RECS, respondents completed the household questionnaire by one of three modes: a computer-assisted personal interview (CAPI), a self-administered paper questionnaire, or a self-administered web questionnaire.
End Use	846 (A,B)	Manufacturing Energy Consumption Survey	Quadrennial	Collect information on energy consumption and energy usage patterns of the manufacturing sector of the U.S. economy. The information from this survey is used to publish aggregate statistics on the consumption of energy for fuel and nonfuel purposes, as well as certain energy-related issues such as energy prices, on-site electricity generation, purchases of electricity from utilities and nonutilities, and, occasionally, the capability to switch fuels.

Fuel	Form	Title	Timing	Summary
End Use	871	Commercial Buildings Energy Consumption Survey (CBECS)	Quadrennial	Collects national and regional information on the consumption of, and expenditures for, energy in the commercial buildings sector of the economy as well as the number and square footage of U.S. commercial buildings by various energy-related building characteristics.
Natural Gas	176	Annual Report of Natural and Supplemental Gas Supply and Disposition	Annually	Data collected include the origin of natural gas supplies and the disposition of natural gas on a state basis. Respondents include natural and synthetic gas producers, processors, distributors, and storage.
Natural Gas	191	Monthly Underground Gas Storage Report	Monthly	Working and base gas in reservoirs, injections, withdrawals, and location of reservoirs are reported by operators of all underground natural gas storage fields on a monthly basis.
Natural Gas	746R	Import and Export of Natural Gas	Monthly	On a monthly basis, companies with a permit must report certain basic information to DOE on the imports or exports of the time period. Quarterly, companies must report more detailed information on their imports or exports.
Natural Gas	757	Natural Gas Processing Plant Survey	As Needed	Detailed plant-level information is collected on the capacity, status, and operations of natural gas processing plants to monitor supply constraints during periods of disruption due to a natural disaster, such as a hurricane.
Natural Gas	857	Monthly Report of Natural Gas Purchases and Deliveries to Consumers	Monthly	Volume and cost data on natural gas delivered to residential, commercial, and industrial consumers are reported by a sample of natural gas companies that deliver to consumers in the United States.
Natural Gas	895	Annual Quantity and Value of Natural Gas Production Report	Annually	Annual production data are collected from the appropriate agencies of the natural gas producing states.
Natural Gas	910	Monthly Natural Gas Marketers Survey	Monthly	Collects information on natural gas sales from marketers in selected states that have active customer choice programs. Information on the volume and revenue for natural gas commodity sales and any receipts for distribution charges and taxes associated with the sale of natural gas are requested.
Natural Gas	912	Weekly Underground Natural Gas Storage Report	Weekly	Collects information on natural gas inventories held in U.S. underground storage facilities. Storage estimates are collected for five multi-state regions comprising the lower 48 states.
Natural Gas Liquids	64A	Annual Report of the Origin of Natural Gas Liquids Production	Annually	Collects data that are used to estimate natural gas plant liquids production and reserves by state and region.

Fuel	Form	Title	Timing	Summary
Natural Gas Liquids	816	Monthly Natural Gas Liquids Report	Monthly	Collects information regarding the balance between the supply (i.e., beginning stocks, receipts, and production) and disposition (i.e., input, shipments, fuel use and losses, and ending stocks) of natural gas liquids.
Nuclear	830G	Standard Contract Disposal of Spent Nuclear Fuel and/or High Level Radioactive Waste—Appendix G and Annex A to Appendix G	Quarterly	Form NWPA-830G, Appendix G—Standard Remittance Advice for Payment of Fees and Annex A to Appendix G—Standard Remittance Advice for Payment of Fees are part of the Standard Contract signed by commercial nuclear utilities and other owners of spent nuclear fuel. These forms are designed to transmit data to DOE concerning quarterly payments into the Nuclear Waste Fund of ongoing fees for spent nuclear fuel disposal.
Nuclear	851A	Domestic Uranium Production Report (Annual)	Annually	Collects data on uranium milling and processing, uranium feed sources, employment, drilling, expenditures (for drilling, production, and land/other), and uranium mining. The data are used by public and private analysts to monitor the domestic uranium mining and milling industry.
Nuclear	851Q	Domestic Uranium Production Report (Quarterly)	Quarterly	Collects data on monthly uranium production and sources (mines and other). The data are used by public and private analysts to monitor the domestic uranium in-situ-leach and milling industry.
Nuclear	858	Uranium Marketing Annual Survey	Annually	Collects data on contracts, deliveries (during the report year and projected for the next 10 years), enrichment services purchased, inventories, use in fuel assemblies, feed deliveries to enrichers (during the report year and projected for the next 10 years), and unfilled market requirements for the next 10 years.
Nuclear	859	Nuclear Fuel Data Survey	Quinquennial	Collects data on spent nuclear fuel from all utilities that operate commercial nuclear reactors and from all others that possess irradiated fuel from commercial nuclear reactors. Data are collected on all discharged nuclear fuel assemblies, projected assembly discharges, nuclear fuel storage capacities and inventories, reactor operating history, other fuel and nonfuel radioactive waste, and low-level waste resulting from decommissioning operations.
Oil and Gas	23L	Annual Report of Domestic Oil and Gas Reserves (County Level Version)	Annually	Collects data on U.S. proved reserves of crude oil and natural gas. These data are used to develop national and regional estimates of proved reserves of domestic crude oil, natural gas, and lease condensate, and to facilitate national energy policy decisions.

Fuel	Form	Title	Timing	Summary
Oil and Gas	914	Monthly Crude Oil and Lease Condensate, and Natural Gas Production Report	Monthly	A sample survey to collect state-level crude oil production, API gravity, and natural gas production and sales information from well operators on a monthly basis.
Oil	14	Refiners' Monthly Cost Report	Monthly	Collects data on the weighted cost of crude oil at the regional Petroleum for Administration Defense District (PADD)* level at which the crude oil is booked into a refinery.
Oil	182	Domestic Crude Oil First Purchase Report	Monthly	Collects data on the first marketed price of domestic crude oil streams after production (i.e., wellhead price).
Oil	782A	Refiners'/Gas Plant Operators' Monthly Petroleum Product Sales Report	Monthly	Price and volume data at the state level for 14 petroleum products for various retail and wholesale marketing categories are reported by the universe of refiners and gas plant operators.
Oil	782C	Monthly Report of Prime Supplier Sales of Petroleum Products Sold for Local Consumption	Monthly	Prime supplier sales of selected petroleum products into the local markets of ultimate consumption are reported by refiners, gas plant operators, importers, petroleum product resellers, and petroleum product retailers that produce, import, or transport product across state boundaries and local marketing areas and sell the product to local distributors, local retailers, or end users.
Oil	800	Weekly Refinery and Fractionator Report	Weekly	Collects data on the operations of petroleum refineries and fractionators.
Oil	802	Weekly Product Pipeline Report	Weekly	End-of-week stock levels of selected petroleum products which include stocks of natural gas plant liquids and liquefied refinery gases (including propane/propylene), fuel ethanol, finished motor gasoline, motor gasoline blending components, kerosene-type jet fuel, kerosene, and distillate fuel oil by sulphur content are collected from a sample of petroleum product pipeline companies on a PADD and sub-PADD basis.
Oil	803	Weekly Crude Oil Stocks Report	Weekly	End-of-week crude oil stocks by PADD, stocks of Alaskan crude oil in transit by water, and stocks at Cushing, OK are reported by a sample of gathering and trunk pipeline companies (interstate, intrastate, and intracompany pipelines), terminal operators, storers of crude oil (except refineries), and transporters of Alaskan crude oil by water.

Fuel	Form	Title	Timing	Summary
Oil	804	Weekly Imports Report	Weekly	Imports of crude oil, (including imports for delivery to the SPR), natural gas plant liquids and liquefied refinery gases (including propane/propylene), fuel ethanol, finished motor gasoline, motor gasoline blending components, kerosene-type jet fuel, kerosene, distilled fuel oil by sulfur content, residual fuel oil, and other petroleum products are provided by a sample of importers by PADD and sub-PADD.
Oil	805	Weekly Bulk Terminal Report	Weekly	Input and production of oxygenates, renewable fuels (including fuel ethanol), natural gas plant liquids and liquefied refinery gases, finished motor gasoline, motor gasoline blending components, kerosene-type jet fuel, kerosene, and distillate fuel oil by sulfur content are collected from a sample of terminal blenders.
Oil	809	Weekly Oxygenate Report	Weekly	Denatured and undenatured fuel ethanol production and end-of-week stocks are reported by a sample of all facilities that produce fuel ethanol.
Oil	810	Monthly Refinery Report	Monthly	Collects information regarding the balance between the supply (beginning stocks, receipts, and production) and disposition (inputs, shipments, fuel use and losses, and ending stocks) of crude oil and refined products located at refineries.
Oil	812	Monthly Product Pipeline Report	Monthly	End-of-month stock levels and movements of petroleum products transported by pipeline are reported on a custody basis by all product pipeline companies.
Oil	813	Monthly Crude Oil Report	Monthly	Collects information on end-of-month stocks of crude oil, by PADD, at pipeline/tank farms, in Cushing, OK, and Alaskan crude oil in transit by water. In addition, receipts of domestic crude oil by the Strategic Petroleum Reserve, movements of crude oil by pipeline between PADDs, and storage capacity are collected for working, shell in operation, and shell idle.
Oil	814	Monthly Imports Report	Monthly	Collects data on imports of crude oil and petroleum products. The resulting statistics are used by public and private analysts.

Fuel	Form	Title	Timing	Summary
Oil	815	Monthly Bulk Terminal and Blender Report	Monthly	Collects information on the balance between the supply (beginning stocks, receipts, and production), and disposition (inputs, shipments, fuel use and losses, and ending stocks) of refined products and renewable fuels from bulk terminals. In addition, storage capacity is collected for working, shell in operation, and shell idle for several major product groupings.
Oil	817	Monthly Tanker and Barge Movement Report	Monthly	Shipments of crude oil and petroleum products between PADDs are reported by all companies that have custody of crude oil or petroleum products transported by tanker or barge.
Oil	819	Monthly Oxygenate Report	Monthly	Collects information on fuel ethanol production capacity, fuel ethanol production, ending stocks, gasoline blending at fuel ethanol plants and production and ending stocks of other oxygenates, and storage capacity of fuel ethanol.
Oil	820	Annual Refinery Report	Annually	Collects data on fuel, electricity, and steam purchased for consumption at the refinery; refinery receipts of crude oil by method of transportation; and current and projected capacities for atmospheric crude oil distillation, downstream charge, and production.
Oil	821	Annual Fuel Oil and Kerosene Sales Report	Annually	Sales of distillate and residual fuel oils and kerosene by end use and state of destination are reported by a sample of fuel oil dealers in the 50 states and the District of Columbia.
Oil	856	Monthly Foreign Crude Oil Acquisition Report	Monthly	Costs of foreign crude oil acquired for importation into the United States and its territories and possessions are reported by all firms reporting previously on Form ERA-51, "Transfer Pricing Report," as of June 1982, and all other firms importing 500,000 barrels of foreign crude oil during the report month.
Oil	863	Petroleum Product Sales Identification Survey	Quadrennial	Information is collected on size, type, and geographic location of No. 2 distillate and residual fuel oil dealers, motor gasoline resellers, and propane resellers.
Oil	877	Winter Heating Fuels Telephone Survey	Weekly	Residential prices of No. 2 heating oil are reported by selected retailers in PADDs 1 and 2; residential propane prices are reported by selected retailers of PADDs 1, 2, 3, and 4.
Oil	878	Motor Gasoline Price Survey	Weekly	The retail cash price of self-serve, unleaded gasoline by regular, midgrade, and premium grades are reported by a sample of retail motor gasoline stations.

Fuel	Form	Title	Timing	Summary
Oil	888	On-Highway Diesel Fuel Price Survey	Weekly	The retail cash price of self-serve, No. 2 ultra-low sulfur diesel fuel and low sulfur diesel fuel sold for on-highway use are reported by a sample of companies which sell diesel fuel through truck stops and service stations.
Renewables	63B	Monthly/Annual Photovoltaic Module Shipments Report	Monthly/ Annually	Collects information on shipments of photovoltaic modules/cells. Large firms report monthly and small firms report annually.
Renewables	63C	Densified Biomass Fuel Report	Monthly	Collects information on production, sales, and inventory of pellet fuel and other densified biomass.

Source: EIA, at <https://www.eia.gov/survey/>.

Notes: The table lists survey forms that were active as of May 2020. *PADDs or Petroleum Administration for Defense Districts are geographic aggregations of the 50 States and the District of Columbia into five districts; see <https://www.eia.gov/todayinenergy/detail.php?id=4890>.

Appendix B. EIA Maps

EIA provides visualizations of some of its energy information in interactive maps. Selected mapping tools are described below.

U.S. Energy Mapping System

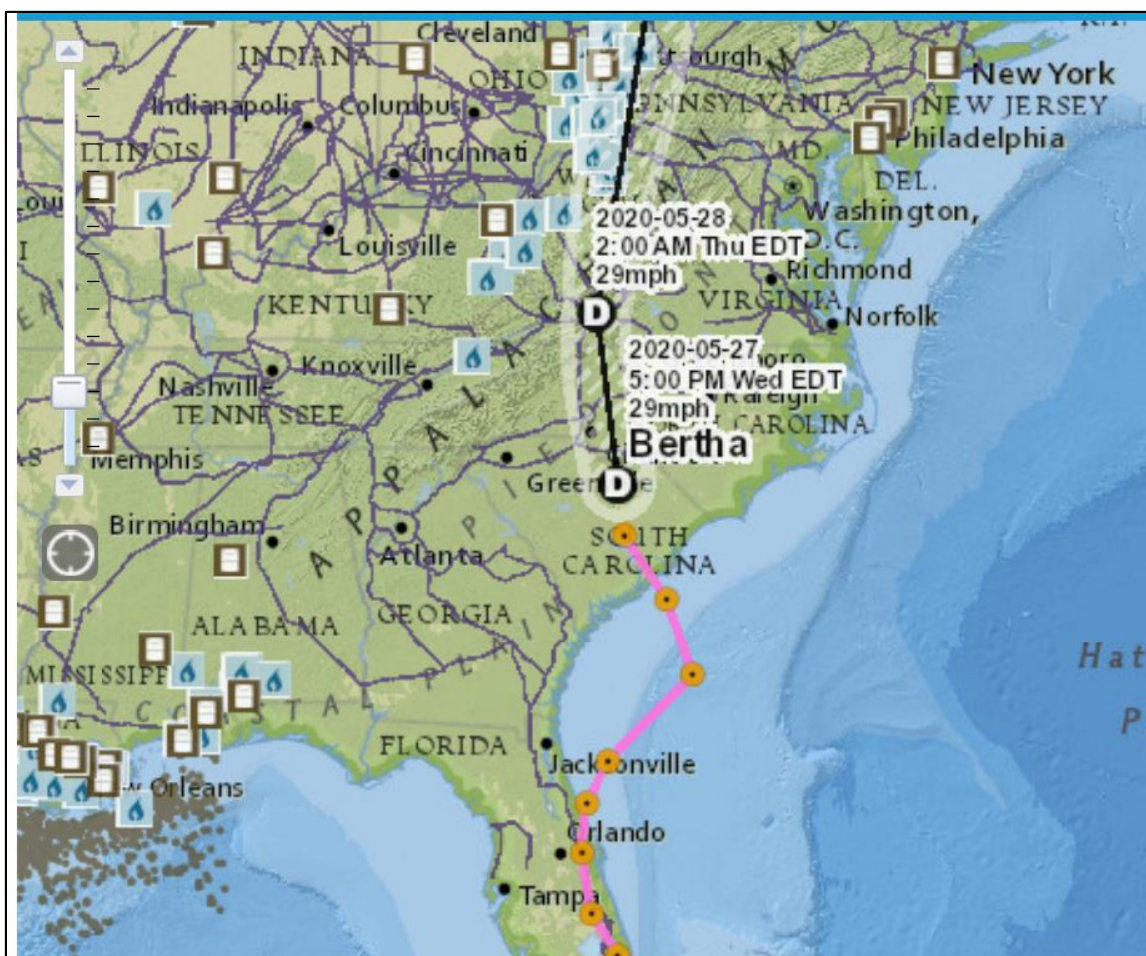
EIA's U.S. Energy Mapping System shows the location of a variety of energy infrastructure and natural resources, including power plants, oil refineries, pipelines, Strategic Petroleum Reserve sites, and tight oil/shale gas plays. It is available at <https://www.eia.gov/state/maps.php>.

The U.S. Energy Mapping System includes a Congressional District layer that will superimpose current Congressional District boundaries over selected maps of energy infrastructure.

Energy Disruption Map

EIA's Energy Disruption map shows selected energy infrastructure, mostly related to oil and gas refining and transport, alongside positions and forecasts for active severe storms (e.g., hurricanes). The tool is available at <https://www.eia.gov/special/disruptions/>.

Energy Disruption maps can be customized to show desired storm and energy information at different scales. As an example, **Figure B-1** shows the historic and forecast track of Tropical Storm Bertha that affected the South Carolina coast and other areas in late May 2020. The map also shows the location of some oil and gas infrastructure.

Figure B-1. Example Energy Disruption Map

Source: EIA, <https://www.eia.gov/special/disruptions/>, accessed May 27, 2020.

Notes: Petroleum refineries are indicated by white oil barrels on a brown background. Natural gas processing plants are indicated by blue flames on a lighter blue background. Pink line with orange circles indicates the observed position and track of Tropical Storm Bertha. Black line indicates the forecast storm track at the time the map was created.

Flood Vulnerability Assessment Map

EIA's Flood Vulnerability Assessment Map shows flood hazard information from the Federal Emergency Management Agency (FEMA) in addition to energy infrastructure location. It is available at <https://www.eia.gov/special/floodhazard/>.

When zoomed in to street level, the maps can show FEMA's flood hazard assessment for many energy infrastructure sites. **Figure B-2** illustrates features of the Flood Vulnerability Assessment Map.

Figure B-2. Example Flood Vulnerability Assessment Map



Source: EIA, *Quick Guide*, at <https://www.eia.gov/special/floodhazard/>.

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