



December 3, 2018

# U.S. Oil and Natural Gas Transformation and Effects

## Overview

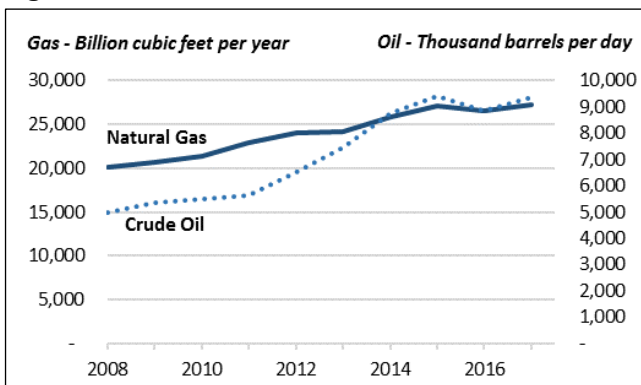
U.S. oil and natural gas production has increased substantially since 2008 (**Figure 1**). These increases have important policy implications for energy markets, infrastructure, security, and the environment. These complex and interrelated implications have been both positive and negative, depending on perspectives, resulting in a variety of conflicts as well as enormous opportunities. Stakeholders, at times, turn to the courts to address conflicts, such as ensuring that fuel production and consumption comply with federal environmental laws.

In the 115<sup>th</sup> Congress, the House and Senate debated major energy legislation addressing expanding production, pipeline permitting, exports, and energy development on federal land, among other topics.

## Oil and Natural Gas

The U.S. oil and natural gas industry has gone through a “renaissance” of production. Technological improvements in hydraulic fracturing and horizontal drilling, among other factors, have unlocked enormous oil and natural gas resources from unconventional formations, such as shale. Oil has surpassed levels of production not seen since the 1970s. Natural gas has set new production records almost every year since 2000. And the United States is the world’s top producer of both commodities.

**Figure 1. U.S. Natural Gas and Crude Oil Production**



Source: Energy Information Administration (EIA). Prepared by CRS.

**Commodity Prices.** The expansion of natural gas supply since 2008 has led to a dramatic drop in prices, with implications for many different sectors, including electricity generation and manufacturing. Over that time, oil prices remained relatively volatile, but dropped in late 2014, and have remained lower since then. Note that while oil is traded on a global market, natural gas is much more of a regional commodity due primarily to transportation challenges. International price disparities for natural gas

have diminished as more liquefied natural gas (LNG) has become available to global buyers.

**Federal Lands.** The rise in production of oil and natural gas has taken place mostly onshore and on nonfederal lands. Crude oil production from nonfederal land has doubled over the past decade. Although production on federal land has increased, it has not grown as fast as oil production on nonfederal land, causing the federal share of total (onshore and offshore) U.S. crude oil production to fall from its peak of nearly 36% in 2009 to about 24% in 2017. U.S. natural gas production shifted even more dramatically, with total U.S. production growing 33% since 2008, whereas gross withdrawals on federal lands (onshore and offshore) declined by almost 32% over the same time period. The federal share of total gross withdrawals decreased from 25% in 2008 to 13% in 2017. Through executive orders and subsequent implementing actions, the Trump Administration has set a federal lands agenda focused on U.S. energy dominance. Even with such a focus, any increases in production on federal lands may be outpaced by increases on nonfederal lands, particularly because the shale formations, where most of the growth is occurring, lie primarily on nonfederal lands.

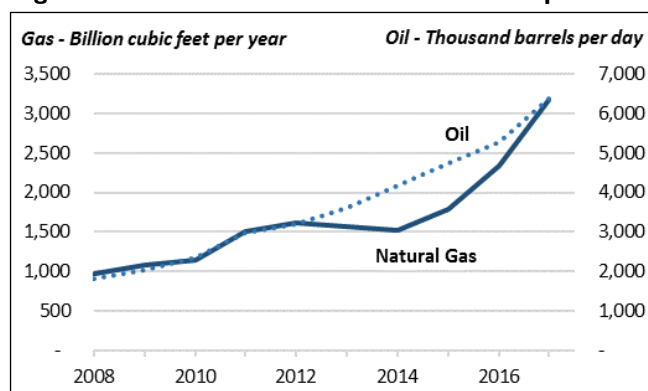
Balancing energy production on federal lands against other resource values has long been a fundamental question for Congress. The 115<sup>th</sup> Congress debated this balance with respect to, among other issues, the Administration’s proposed five-year program (2019-2024) for offshore oil and gas leasing; access to certain onshore federal lands for conventional or renewable energy development (including enactment of an oil and gas program for the Arctic National Wildlife Refuge); proposed changes to environmental and safety regulations; and efforts to streamline permitting. In court, stakeholder groups have challenged, and will likely continue to challenge, the federal leasing program for oil and gas development on federal lands. For example, some lawsuits seek to invalidate federal leases or leasing decisions or require the leasing agency to analyze risks to public health and the environment further.

**Exports.** As domestic production rose, industry sought to export more U.S. oil and natural gas (see **Figure 2**). The long-term prospects for further increases in either export remain unclear. With growing U.S. crude oil production and falling prices, there was interest in Congress in eliminating a 40-year limitation on exports of most U.S.-produced crude oil. In December 2015, Congress passed the Consolidated Appropriations Act for FY2016, which included a repeal of the oil export ban. Since the ban was lifted, exports of crude have reached over a million barrels per day or 10% of production. Additionally, U.S. exports of petroleum products, which were not limited by the law, have also increased significantly, almost tripling during the

time period to 5.2 million barrels per day from almost zero. Total U.S. exports of 6.4 million barrels per day are still less than exports from Saudi Arabia.

The first U.S. LNG exports from the lower-48 states began in February 2016, but most LNG export projects remain in the construction or planning phases. Nevertheless, the United States became a net natural gas exporter in 2017, the first time in more than 50 years, mainly driven by increased pipeline exports to Mexico. Proposals have been introduced in the 115<sup>th</sup> Congress to expedite DOE's approval process.

**Figure 2. U.S. Natural Gas and Petroleum Exports**



**Source:** Energy Information Administration (EIA). Prepared by CRS.

**Notes:** Natural gas exports include LNG and pipeline. Petroleum exports include crude oil and petroleum products.

**Infrastructure.** Increased North American oil and gas production, particularly in areas that historically were not major producers, has led to growth in demand to transport those commodities to market. Oil shipments by rail and barge have increased significantly. Massive investments have been made in oil and gas pipelines, although controversy has arisen around projects such as the Dakota Access Pipeline and the Keystone XL Pipeline. As noted above, many projects aim to export LNG: these projects would encompass new terminal facilities at U.S. ports. In the 115<sup>th</sup> Congress, various bills would have amended rail safety standards, approved the Keystone XL pipeline, or promoted other oil and gas infrastructure. In addition, various legal challenges have tried to halt construction of pipelines and terminals to ensure adequate environmental review prior to construction.

**Environmental Concerns.** The use of unconventional oil and gas production has resulted in some significant environmental benefits (e.g., reduced air pollution from the substitution of natural gas for coal in power generation), but it has also raised concerns about other potential environmental and health effects. These concerns centered initially on water quality issues, including the potential contamination of groundwater and surface water from hydraulic fracturing and related production activities. Concerns have since incorporated other issues, such as water management practices (both consumption and discharge), land use changes, endangered species impacts, induced seismicity, and air pollution. Others have raised concerns about potential long-term and indirect impacts from reliance on fossil fuels and resulting greenhouse gas (GHG) emissions.

States are the primary regulators of oil and gas production on nonfederal lands, but various federal environmental statutes can apply to certain activities in the sector. (For example, the Clean Water Act regulates surface discharges of water associated with natural gas drilling and production as well as contaminated storm water runoff from production sites; the Safe Drinking Water Act regulates the underground injection of wastewater from crude oil and natural gas production and the underground injection of fluids used in hydraulic fracturing if the fluids contain diesel fuel; and the Clean Air Act limits emissions from associated engines and gas processing equipment as well as some natural gas extraction, production, and processing activities.) However, legislative proposals to address federal regulation have been highly controversial. Some advocates of a larger federal role point to a wide range of differences among state regulatory regimes and argue that a national framework is needed to ensure a consistent minimum level of protection. Others argue against more federal involvement and point to the long-established state regulatory programs, regional differences in geology and water resources, and concern over regulatory redundancy.

While congressional debate continues, the Trump Administration has pursued a number of deregulatory initiatives to promote oil and gas production. Executive Order 13783, “Promoting Energy Independence and Economic Growth” directs federal agencies to “review existing regulations that potentially burden the development or use of domestically produced energy resources and appropriately suspend, revise, or rescind” them. The executive order specifically cites several Obama-era rulemakings that regulated oil and gas production activities (e.g., the Environmental Protection Agency’s methane standards and the Bureau of Land Management’s waste prevention rule). Several states and other stakeholders have sought judicial review of the Trump Administration’s efforts to delay, revise, or repeal existing environmental regulations.

## States’ Roles

Many decisions about energy markets, infrastructure, and regulation are implemented at the state level. Regardless of whether the federal government takes a more or less active role in the future, state and regional decisions often have national impacts. For example, California’s 2002 decision to regulate GHG emissions from automobiles has affected other states. The interaction of state and local policies with national decisions is often complex and can raise constitutional issues regarding the relationship between state and federal laws.

For more information, see CRS Report R44854, *21st Century U.S. Energy Sources: A Primer*.

**Michael Ratner**, [mratner@crs.loc.gov](mailto:mratner@crs.loc.gov), 7-9529

**Laura B. Comay**, [lcomay@crs.loc.gov](mailto:lcomay@crs.loc.gov), 7-6036

**Richard K. Lattanzio**, [rlattanzio@crs.loc.gov](mailto:rlattanzio@crs.loc.gov), 7-1754

**Linda Tsang**, [ltsang@crs.loc.gov](mailto:ltsang@crs.loc.gov), 7-2645

IF11036