

States Seeking Shift to Renewables Unable to Shake Reliance on Gas Power

Regulators Worry about Grid Reliability as Natural Gas Production Breaks New Records

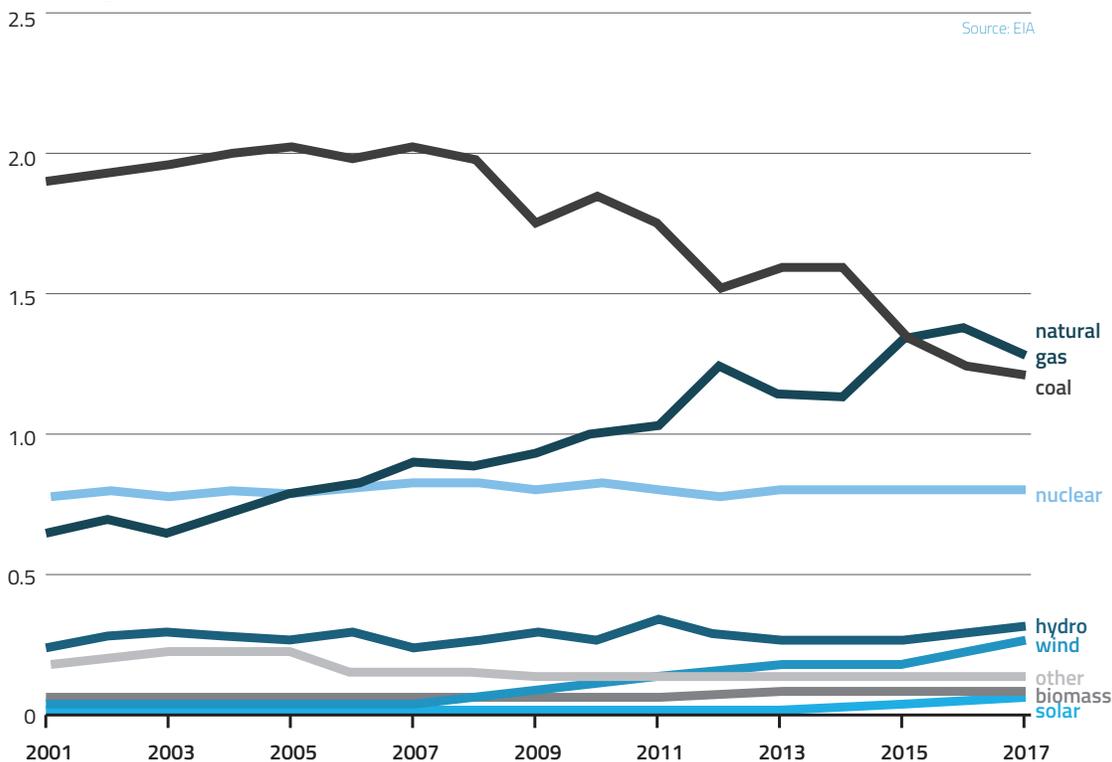
Industry Insight

The U.S. power market is **undergoing two major shifts**, namely, the rapid growth in renewables and the fight between coal and natural gas for staying the number one generation source. On the one hand, the **low price of natural gas makes it the go-to choice for ensuring reliability** in several states where renewables have captured a large market share. For instance, New York is counting on natural gas to replace a retiring 2 GW nuclear plant. On the other hand, the dominance of **natural gas in the power sector is facing a backlash in states that are aggressively pushing for renewable resources**. For example, in Arizona, regulators banned new large gas-fired plants to assess the long-term resource plans of the state utilities. In both cases, however, **regulators have become increasingly more concerned about grid reliability as the share of natural gas in the fuel mix continues to grow**.

Generation Trends: Sources of Power

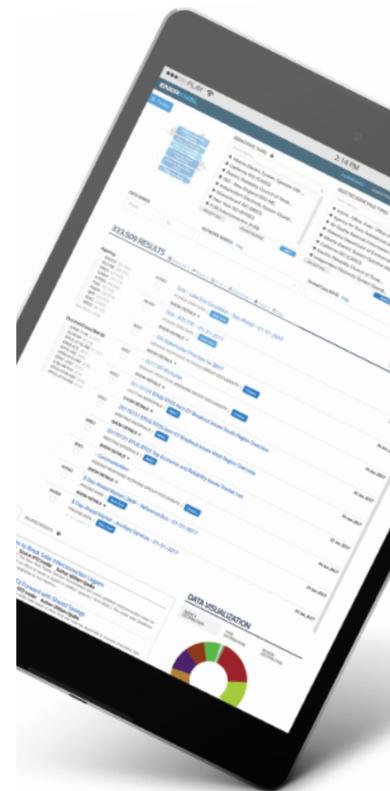
Natural-gas power generation in the U.S. saw **its largest annual decline in 2017**, with net generation falling by 7.7 percent, according to the Energy Information Administration (EIA). Despite these shifts, **natural gas remains the top generation fuel supplying nearly one-third of U.S. electricity in 2017**, and remaining the leading power source for the second consecutive year.

Electricity generation, trillion kWh



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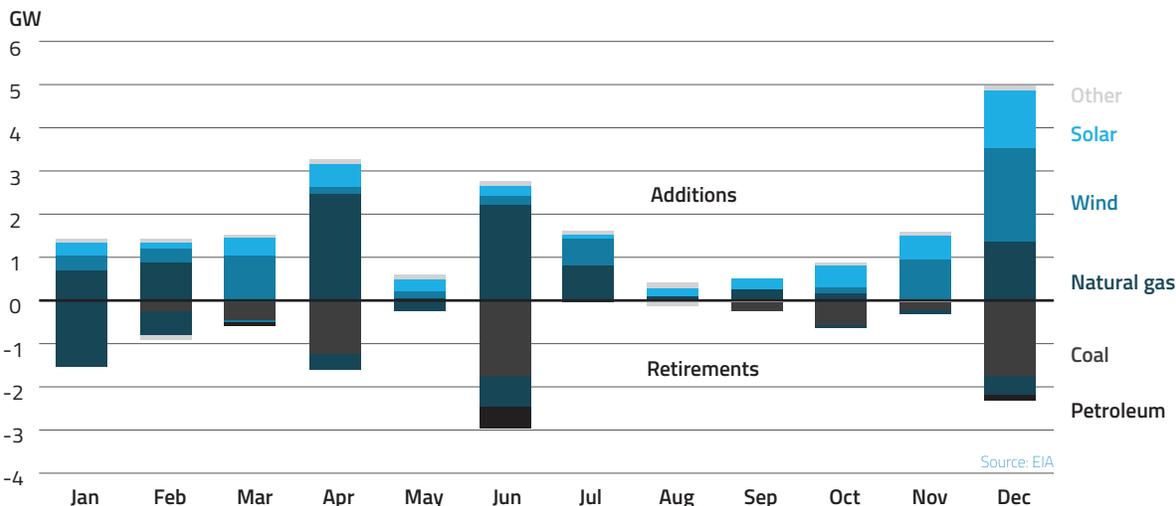


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Generation Trends: Additions and Retirements



For the first time in a decade, **no new coal-fired generators were added in 2017**. Wind and solar accounted for all new U.S. generation capacity in January, according to data from the Federal Energy Regulatory Commission (FERC). Despite these shifts, **natural gas remains the top generation fuel, with 9.3 GW of new generating capacity added in 2017**.



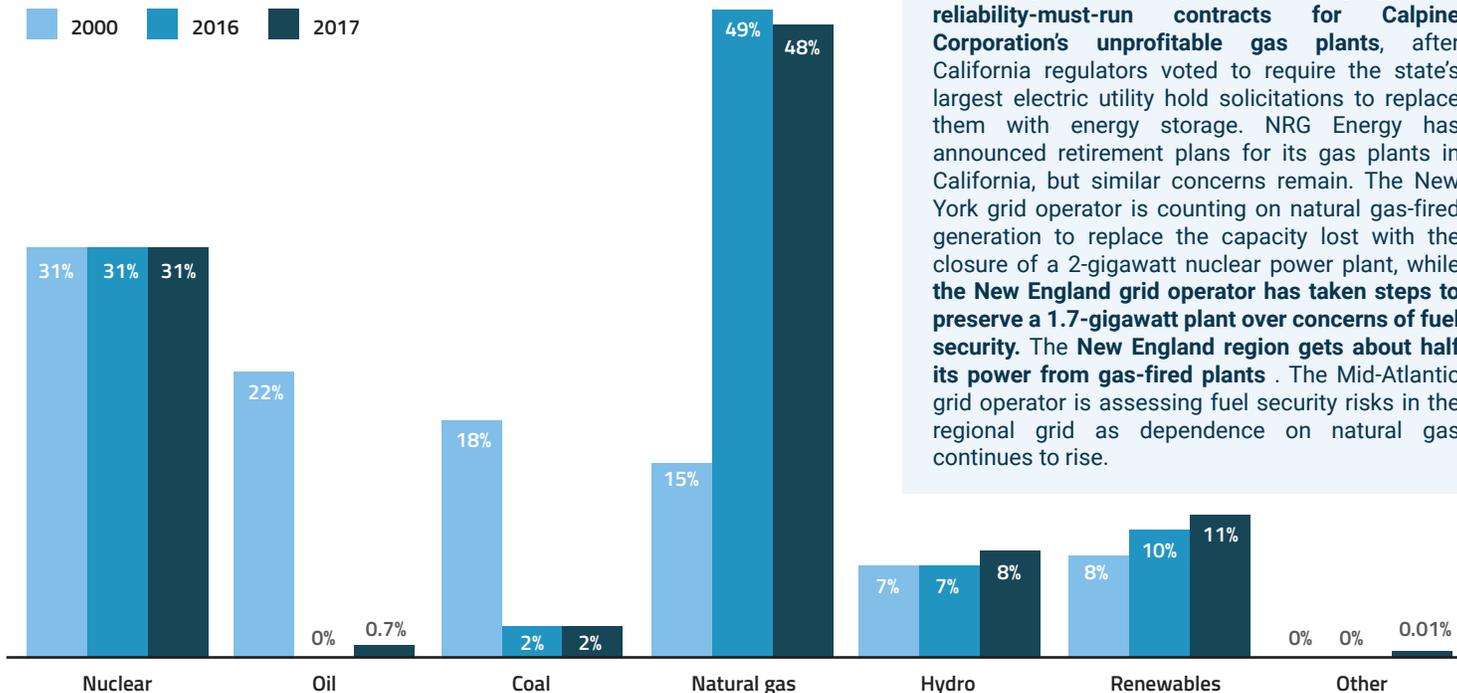
Source: EIA

Natural Gas and Fuel Security in New England and Elsewhere



Percent of total electricity production by fuel type in ISO-NE

2000 2016 2017

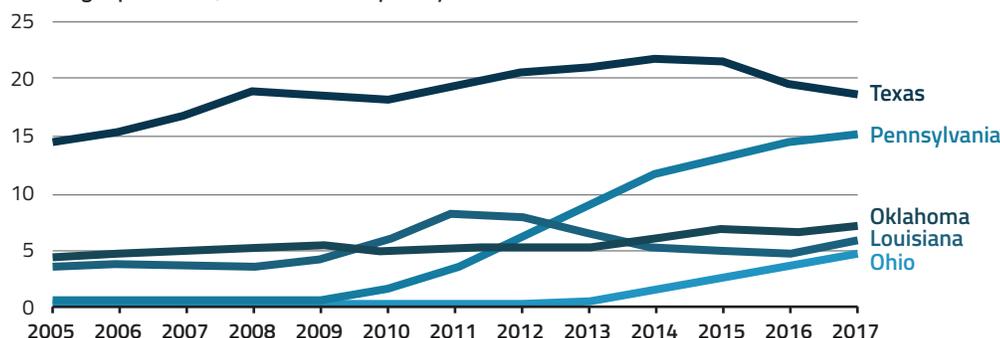


Source: ISO-NE

In several instances, retiring plants have been identified as necessary to support system reliability. For example, **federal regulators recently approved reliability-must-run contracts for Calpine Corporation's unprofitable gas plants**, after California regulators voted to require the state's largest electric utility hold solicitations to replace them with energy storage. NRG Energy has announced retirement plans for its gas plants in California, but similar concerns remain. The New York grid operator is counting on natural gas-fired generation to replace the capacity lost with the closure of a 2-gigawatt nuclear power plant, while **the New England grid operator has taken steps to preserve a 1.7-gigawatt plant over concerns of fuel security**. The New England region gets about half its power from gas-fired plants. The Mid-Atlantic grid operator is assessing fuel security risks in the regional grid as dependence on natural gas continues to rise.

In the **gas-friendly states of Pennsylvania, Ohio, and West Virginia**, the combined share of U.S. natural gas production soared to 27 percent in 2017, up from just 2 percent in 2008, driven by consumption in the power sector. Pennsylvania, the second-biggest producer of natural gas in the U.S. behind Texas, is projected to see a ten-fold jump in gas-fired generation through 2050.

Natural gas production, billion cubic feet per day



Source: EIA

Natural Gas on the Rise: Records and Statistics



December 4, 2017: EIA Projects the U.S. Northeast and Midwest Gas Production to Triple since 2012

Natural gas production in the **Marcellus and Utica shale plays in the Appalachian region soared to 23.8 billion cubic feet per day in October, up from 7.8 billion cubic feet just five years ago.** The agency attributed the increase to “efficiency improvements” in horizontal drilling and hydraulic fracturing practices.

January 17, 2018: EIA Confirms Natural Gas Remains the Leading Power Source for the Second Year

Natural gas accounted for **32% of U.S. power generation and exceeded the share of coal (30%)** amid low costs and plentiful supplies of the fuel. **Lower volatility in natural gas prices** kept wholesale electricity prices stable in most of the U.S.

January 22, 2018: U.S. to Add 20 GW of Gas-Fired Capacity in the Largest Boost in 10 Years

EIA expects natural gas to remain the nation's primary source of electricity for the next two years. The move comes as **the average cost of delivered gas is projected to drop 2% this year, while costs for coal will rise 5%.**

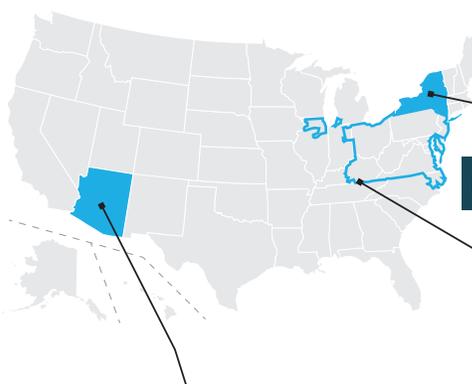
April 19, 2018: U.S. Becomes Net Gas Exporter for the First Time since 1958 Thanks to LNG Shipments

The U.S. became a net exporter of natural gas in 2017 **for the first time since 1958**, amid surging shipments of LNG as well as pipeline deliveries to Mexico. **LNG exports rose to 2.19 billion cubic feet per day, up from to 0.63 billion cubic feet in 2016, with Mexico as the top market destination.** Natural gas pipeline flows to the nation's southern neighbor also grew, topping 4.2 billion cubic feet per day on average in 2017, a rise of about 0.5 billion cubic feet from the prior year. **In total, about 12 billion cubic feet per day of capacity and 773 miles of natural gas pipelines went into service last year across the U.S.,** with many projects linking the Marcellus and Utica shale fields to markets in the Northeast and Midwest, and boosting transportation to the Gulf Coast.

April 23, 2018: Pennsylvania Gas Production Hits New Records as Pipeline Capacity Expands

Pennsylvania accounted for about 20% of the U.S. natural gas production last year reaching a record 15 billion cubic feet per day. The drilling rig count **increased to an average of 33** in 2017, up from 20 rigs in 2016. The agency said that pipeline projects that went into service in recent years have alleviated the constraints of transporting gas to other regions and a continued increase in production indicates a need for more capacity. Pennsylvania is now the second biggest producer of natural gas in the U.S. behind Texas, according to EIA.

Natural Gas and Long-Term Planning



NY NYISO Counts on Gas to Replace Retiring Nuclear Capacity at Indian Point

13 December 2017

The NYISO found that the addition of at **least three large gas-fired power plants will be sufficient to replace the capacity lost with the closure of Energy Corp.'s 2-GW Indian Point nuclear power plant units in 2020 and 2021.**

PJM Mid-Atlantic Grid Operator to Assess Fuel Security Risks

30 April 2018

PJM will analyze fuel security risks as the traditional generation mix is evolving due to public policies, lower fuel prices, and technology advancements, according to an April 30 press release. **PJM said it would allow different resource types to compete to meet fuel security criteria, with reforms in place for the next capacity auction if needed.** PJM said that the grid is currently reliable but pointed to its 2017 analysis finding that “heavy reliance on one resource type” raises questions about system resilience. **PJM plans to complete a vulnerability assessment in six months.**

AZ Arizona Bans New Natural Gas Plants Larger than 150 MW

13 March 2018 E-00000V-15-0094

The AZ CC instituted a **nine-month ban on the construction of new natural gas plants larger than 150 MW** as part of its review of utilities' integrated resource plans. The ban comes as the commission is considering an energy policy overhaul to pursue 80 percent clean energy with a focus on energy storage to meet peak power with clean sources.

New Gas-Fired Plants



FL 1,700 MW Approved
8 May 2018 20170266-EC

The two approved plants will use existing transmission and water infrastructure, allowing the utility to save money. **Seminole Electric Cooperative's 1,122-MW facility in Putnam County** plans to become operational in December 2022. **Shady Hills Energy Center LLC, a subsidiary of General Electric Company, will build a 573-MW facility in Pasco County** to begin service in December 2021 and sell its power output to Seminole.



MI 1.1 GW for \$1 Billion
27 April 2018 U-18419

The MI PSC awarded DTE Electric Company a permit to construct a 1,100-MW combined cycle natural gas plant at the site of the utility's Belle River Power Plant and **to recover \$952 million through rates for its construction** after finding the facility is the most prudent option for meeting the region's short-term electricity demand. The plant, which would be located in **St. Clair County, is scheduled to start as early as 2022.**

NY 132 MW Upgrade
22 March 2018 ER18-1161-000

The NYISO, Consolidated Edison Company of New York, and Bayonne Energy Center filed an **interconnection agreement with FERC to add 132 MW of capacity to the existing 512-MW Bayonne facility owned by Macquarie Infrastructure Corporation.** The applicants said that the agreement supersedes the previous agreement that the commission accepted in December 2013.

WV First Gas-Fired Plant
20 February 2018 17-0521-E-CS

The WV PSC granted Energy Solutions Consortium's subsidiary, ESC Brooke County Power, a siting certificate for the construction and operation of an **830-MW facility.** Construction is expected to be complete in late 2020, with the plant in service by January 2021. **West Virginia, which relies on coal plants for 85% of its generation, has no new combined-cycle gas-fired units financed or in construction,** according to the agency, despite the presence of prolific shale reserves.

Keeping Old Plants for Reliability



FERC Cost-Service Compensation for Reliability in New England
16 May 2018 ER18-1639-000

Exelon subsidiary Constellation Mystic Power asked FERC to approve its agreement with Exelon Generation Company and ISO-NE seeking **cost-of-service compensation for the continued operation of the Mystic 8 and 9 units.** Following **Exelon's bids to retire the facility in 2022 due to uneconomic operations,** the grid operator (ER18-1509-000) asked the commission for waivers to maintain the units to ensure fuel security for the New England region for the period of June 1, 2022 to May 31, 2024. The grid operator said that the two combined cycle generators that do not depend on pipeline **gas would deprive the system of 1,700 MW of winter generating capacity with on-site fuel, and also cause the Distrigas LNG terminal to lose its biggest customer.** Exelon plans to acquire Distrigas for reliable supply of fuel to the Mystic units to meet their existing capacity supply obligations.



FERC Out-of-Market Payments for Calpine
30 April 2018 ER18-230-001

FERC approved a settlement between Calpine Corporation, Pacific Gas and Electric Company, and CAISO establishing reliability-must-run agreements to prevent the retirement of three Calpine gas plants needed to meet local reliability. The plants are **Yuba City Energy Center and Feather River Energy Center which are peaking plants each having a capacity of 47.6 MW, and the 580-MW Metcalf Energy Center.** The California grid operator's board approved the measures last November, but **the CA PUC, which has opposed them, allowed Pacific Gas and Electric to hold competitive solicitations for energy storage or preferred resources to address local area needs** in areas previously served by those plants.

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