



Environmental Regulatory Update

Environmental Advisory Group

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SENIOR ANALYST



Presentation Overview

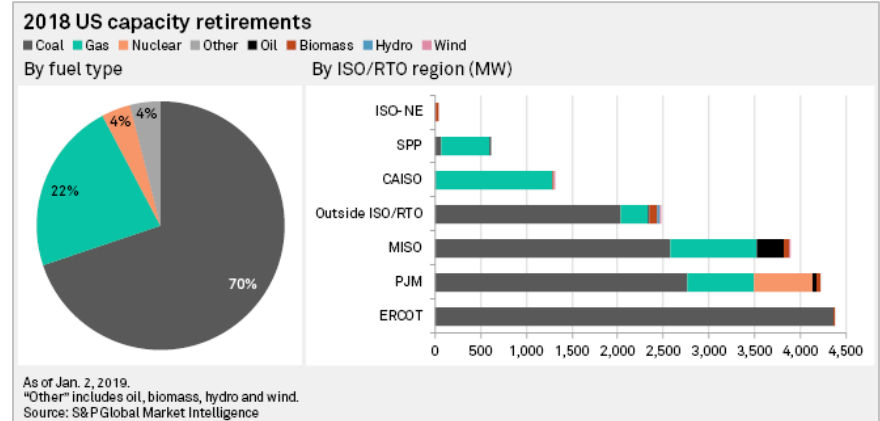
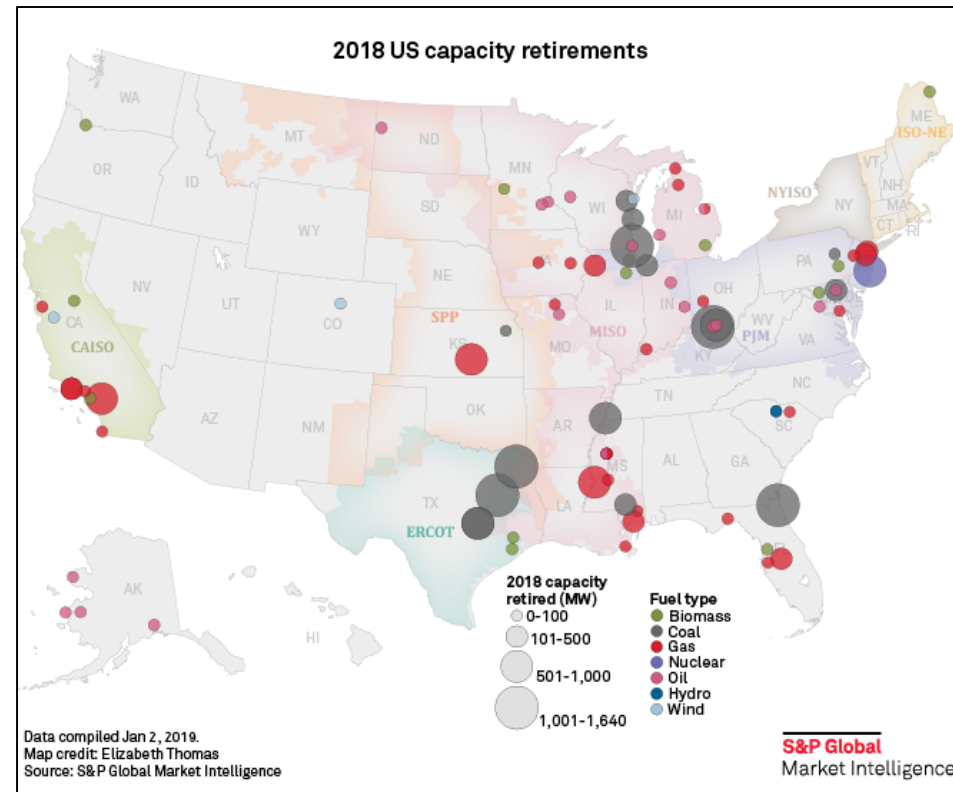
- **National Trends**
- **Regional Trends**
- **Changes in Federal Environmental Regulatory Policy**
 - Major Environmental Rules Related to Coal, Natural Gas, and Nuclear Generation
- **MATS Update**
- **Load-Weighted Real-time Marginal Unit by Month (2017-2018)**



NATIONAL TRENDS

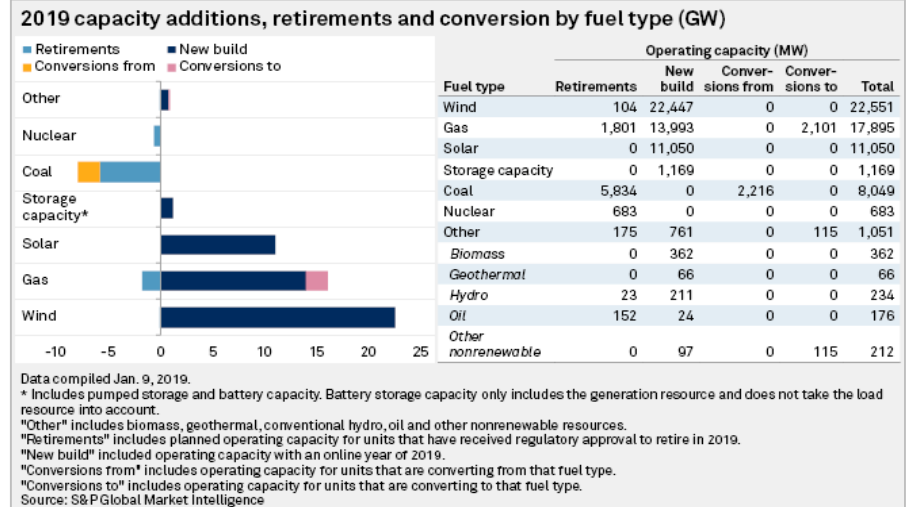
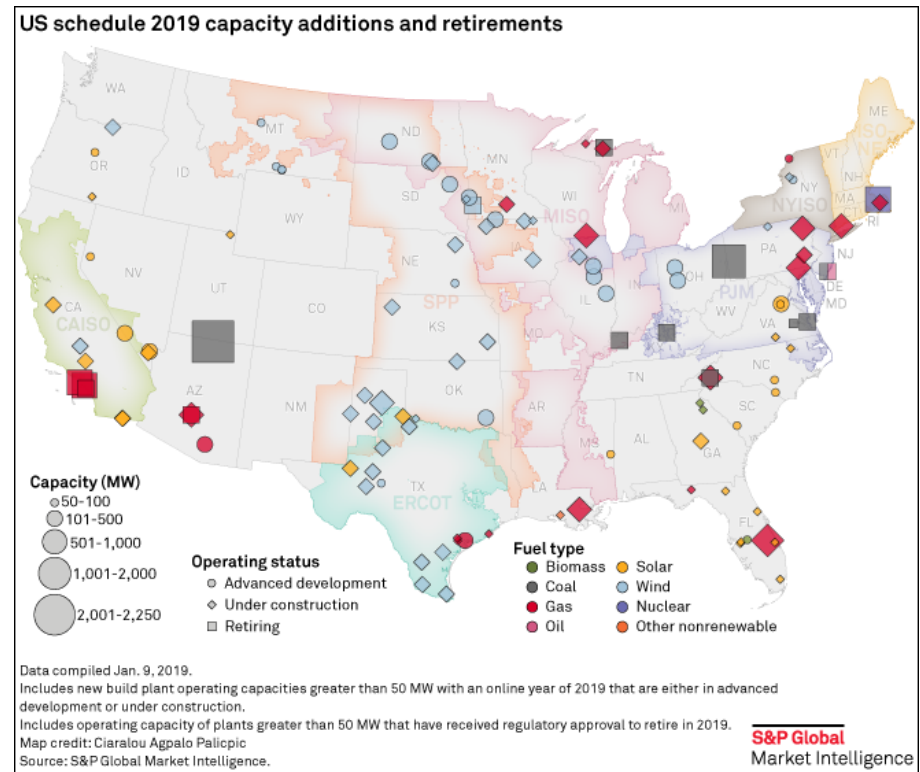
2018 U.S. Capacity Retirements

- U.S. power generation capacity retirements continued from 2017 (11.5 GW) through 2018 (16.9 GW):
 - 11.8 GW in coal-fired capacity retirements (70%)
 - 3.78 GW in gas-fired capacity retirements (22.4%)
- Retired fossil capacity tended to have lower capacity factors (53.7% for coal, 10.6% for natural gas in 2017)
- Unfavorable economic conditions driving fossil and nuclear retirements nationwide
- Cumulative coal retirements (74,722 MW 2010-2018) expected to have limited impact on national emission trends



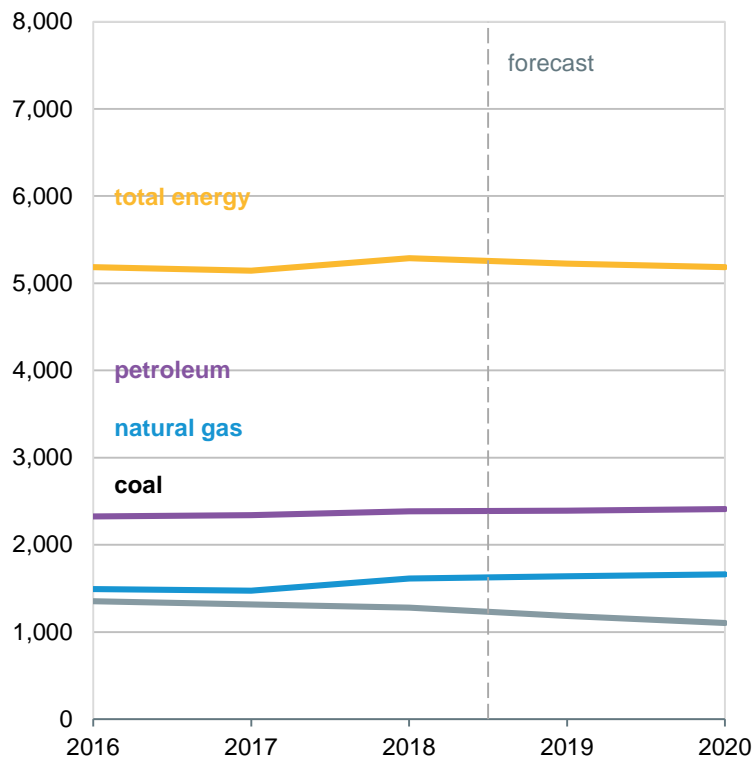
2019 Forecast U.S. Capacity Changes

- In 2019, changes expected in U.S. generating capacity include:
 - 49,420 MW in new capacity expected to enter service
 - 22,447 MW of wind
 - 13,993 MW of natural gas
 - 11,050 MW of solar
 - 8,597 MW expected to retire:
 - 5,834 MW of coal
 - 1,801 MW of natural gas
 - 683 MW of nuclear
 - 2,216 MW fuel switching
- In New England 1,572 MW in new natural gas, oil, solar, wind capacity expected, while 683 MW in nuclear capacity retires

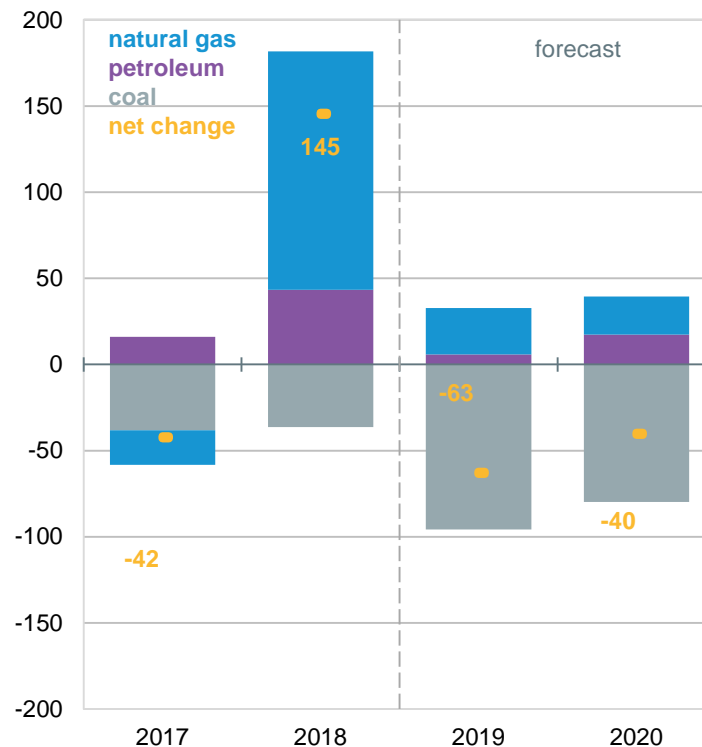


EIA Forecasts U.S. Energy-Related Carbon Dioxide Emissions Increased 2.8% in 2018

U.S. annual carbon emissions by source
million metric tons



Components of annual change
million metric tons



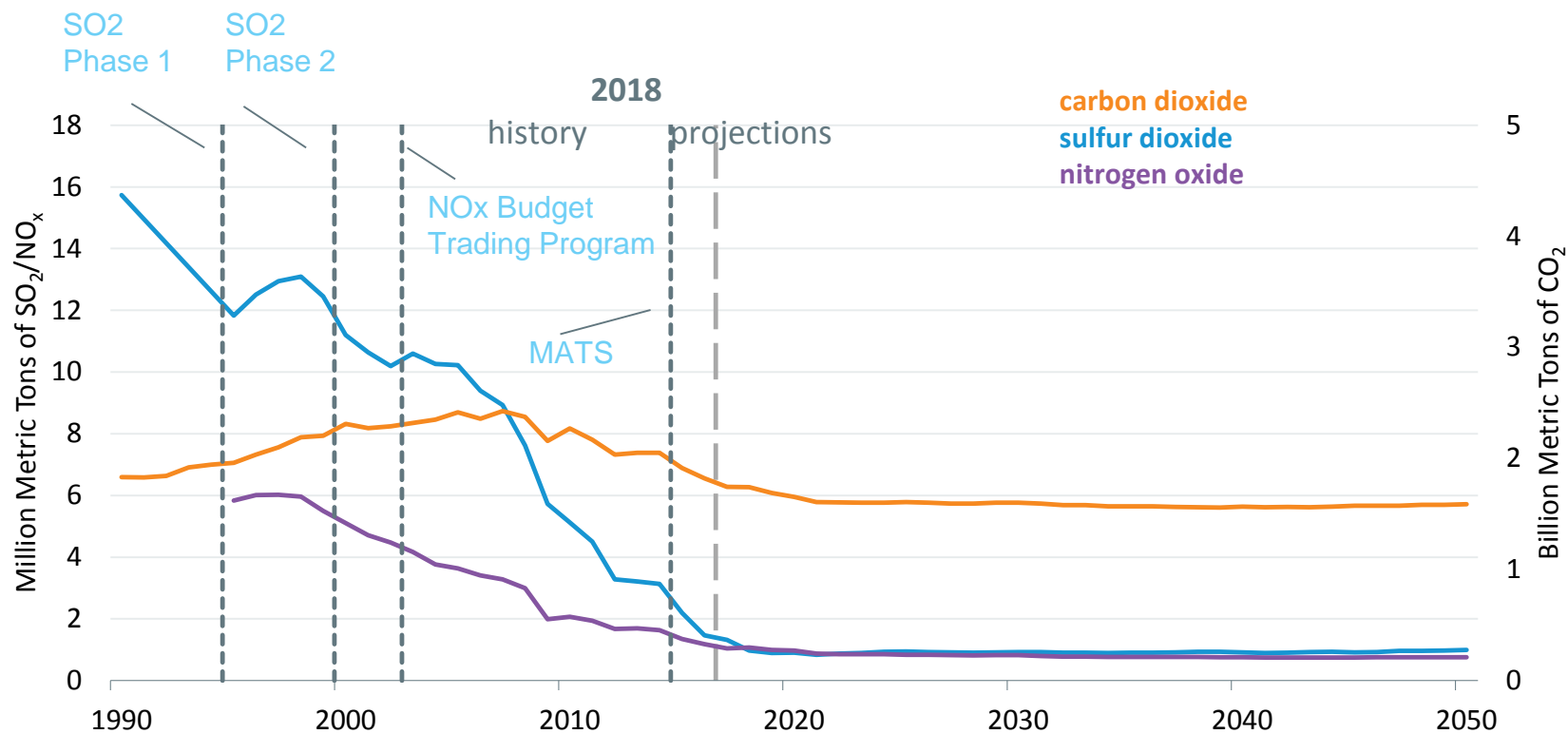
Source: Short-Term Energy Outlook, January 2019



EIA AEO2019 Reference Case - Electric Sector Emissions

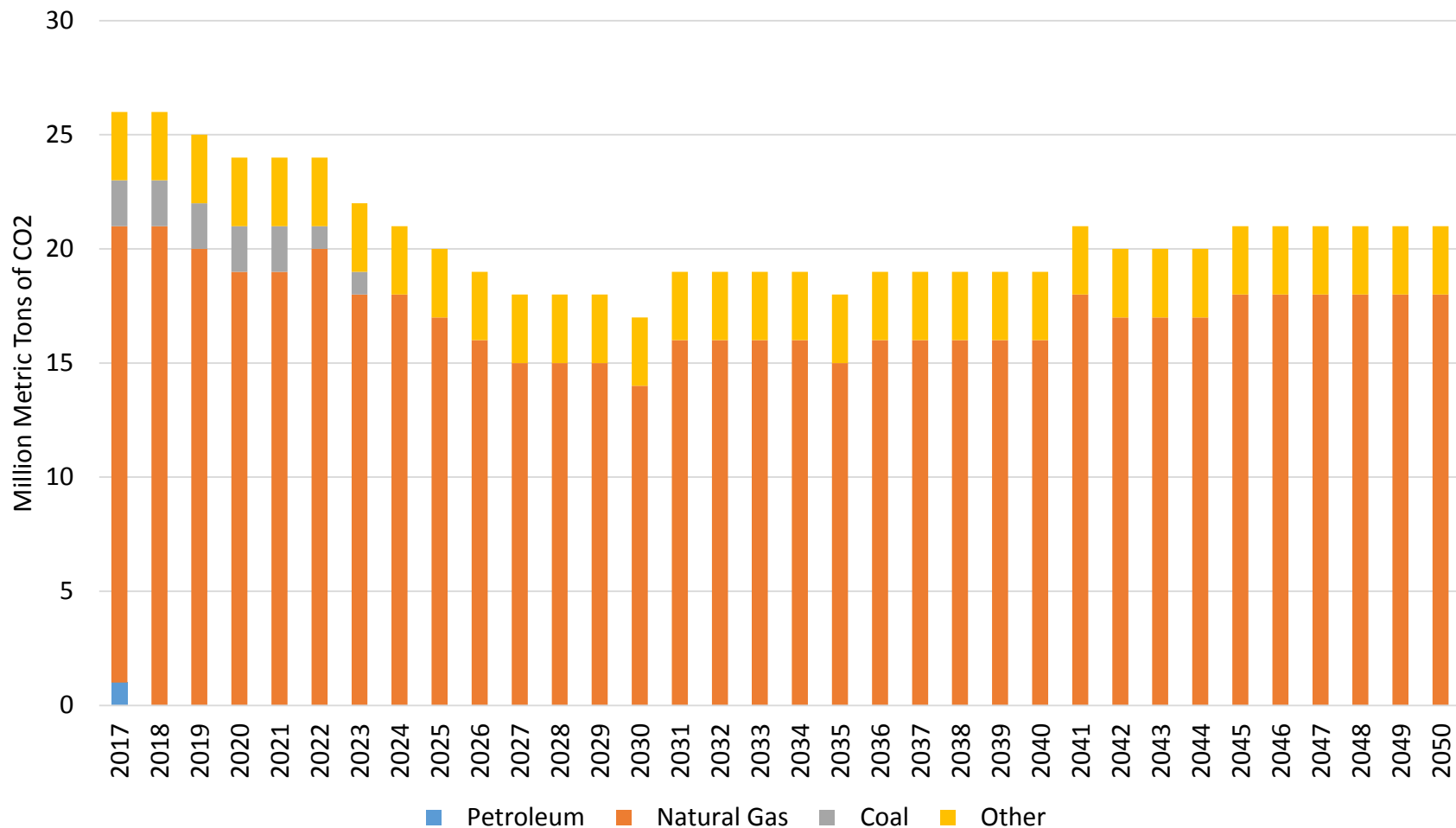
Projections reflect decreasing coal generation, increasing natural gas generation emissions

Electric sector emissions (Reference case)



EIA forecasts the power sector experiences a notable shift in fuels used to generate electricity, driven in part by historically low natural gas prices. Increased natural gas-fired electricity generation; larger shares of intermittent renewables; and additional retirements of less economic coal and nuclear plants occur during the projection period

EIA AEO2019 Reference Case – New England Electric Sector Projected Emissions



SYSTEM GENERATION, EMISSIONS & WATER USE TRENDS

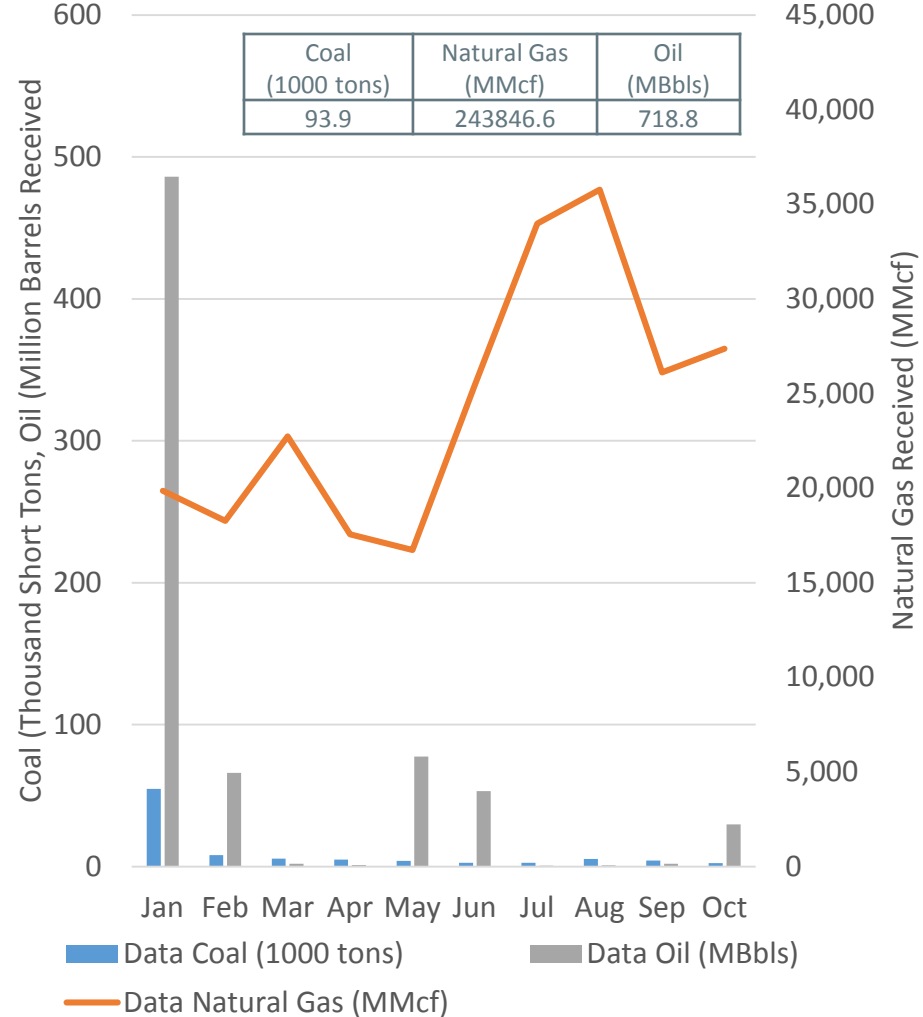
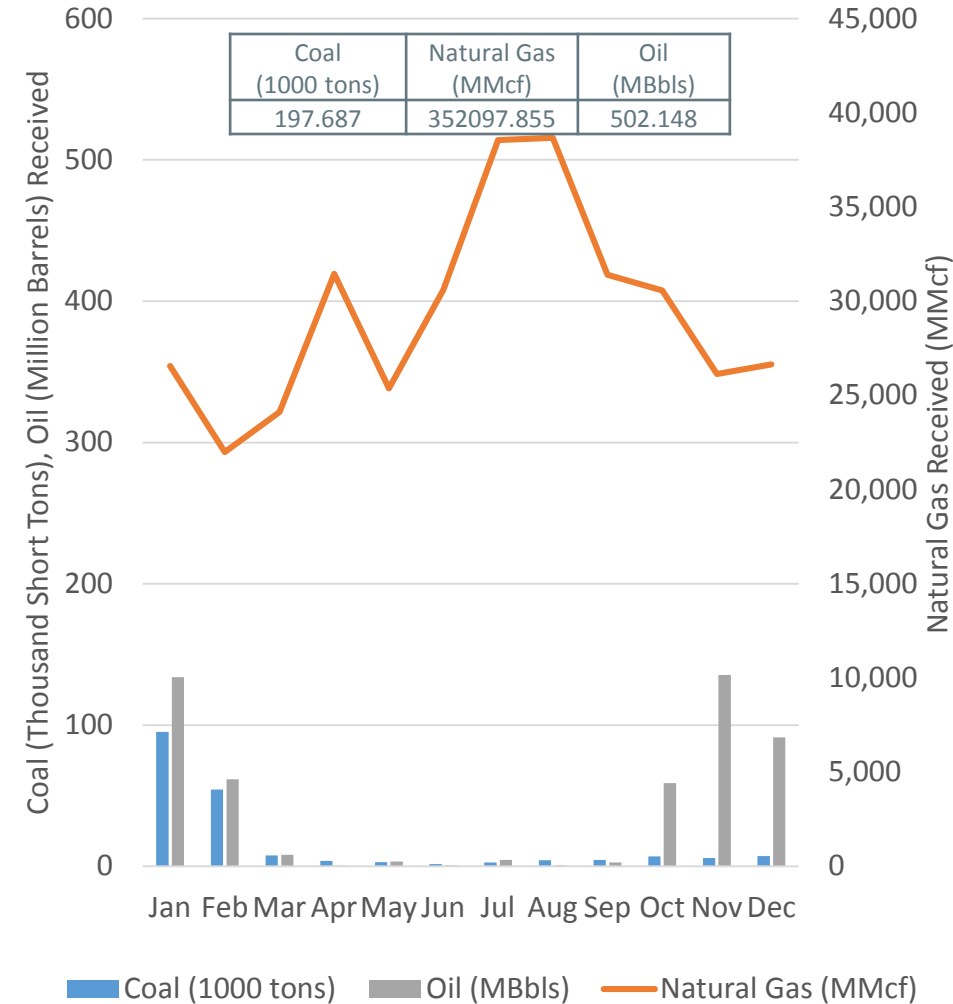
Fossil Fuel Deliveries to New England Power Plants

2017

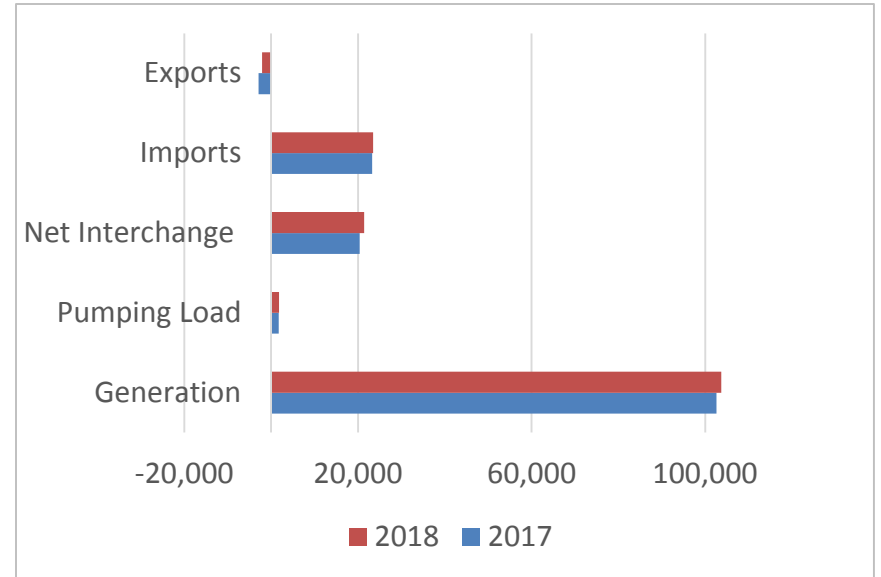
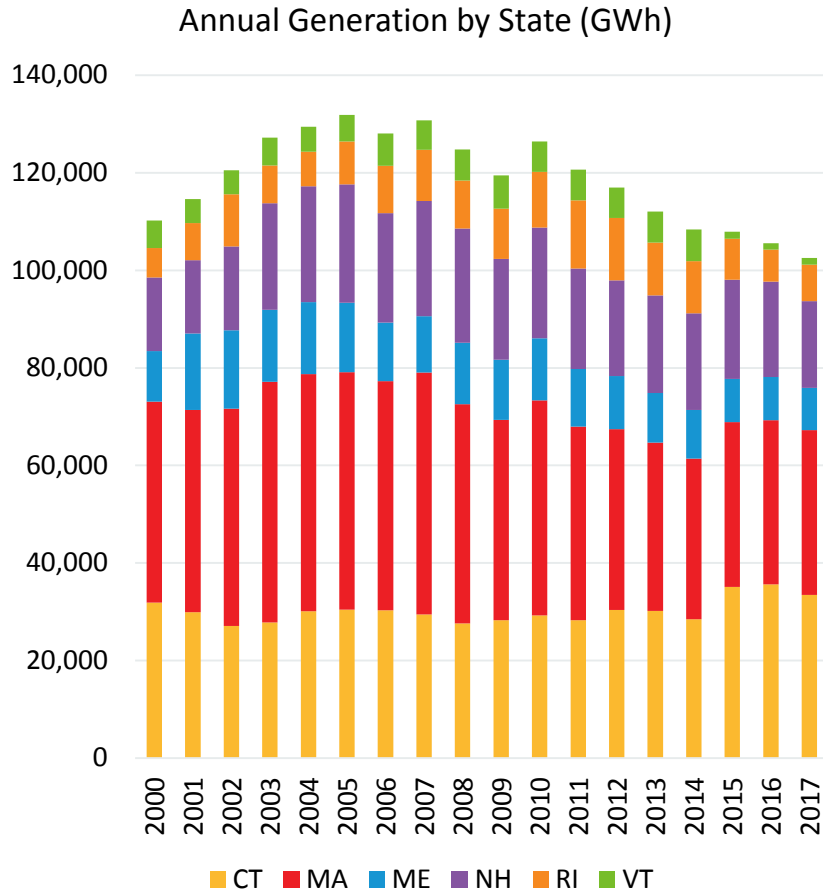
Coal (1000 tons)	Natural Gas (MMcf)	Oil (MBbls)
197.687	352097.855	502.148

2018

Coal (1000 tons)	Natural Gas (MMcf)	Oil (MBbls)
93.9	243846.6	718.8

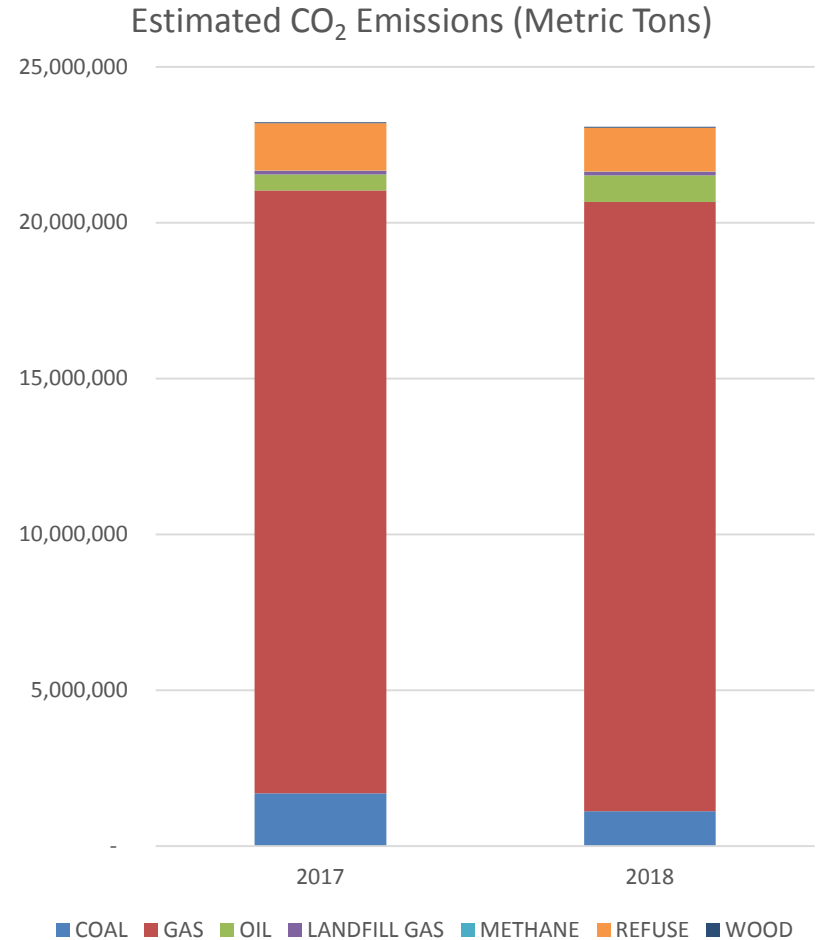
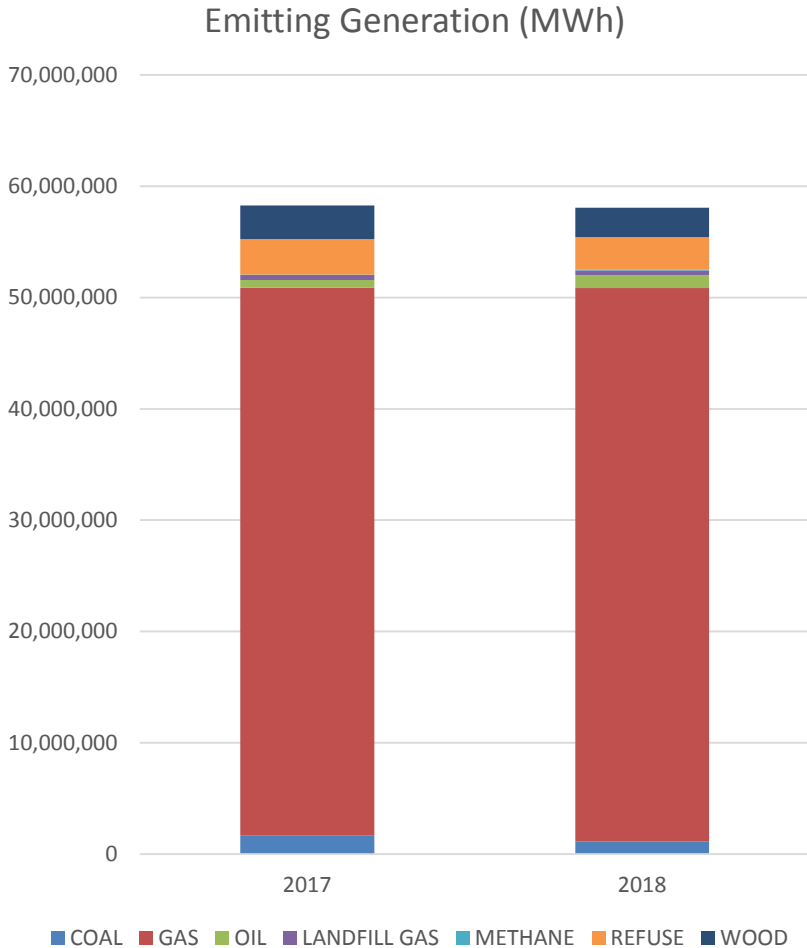


Annual, Monthly Energy Generation (GWh) for New England



Monthly Energy Data (GWh)	2017	2018	Δ
Generation	102,564	103,702	1,138
Pumping Load	1,717	1,804	87
Net Interchange (+ = Import)	20,373	21,409	1,036
Imports	23,260	23,488	228
Exports	-2,887	-2,080	807
Net Energy for Load (GWh) *	121,220	123,307	2,087

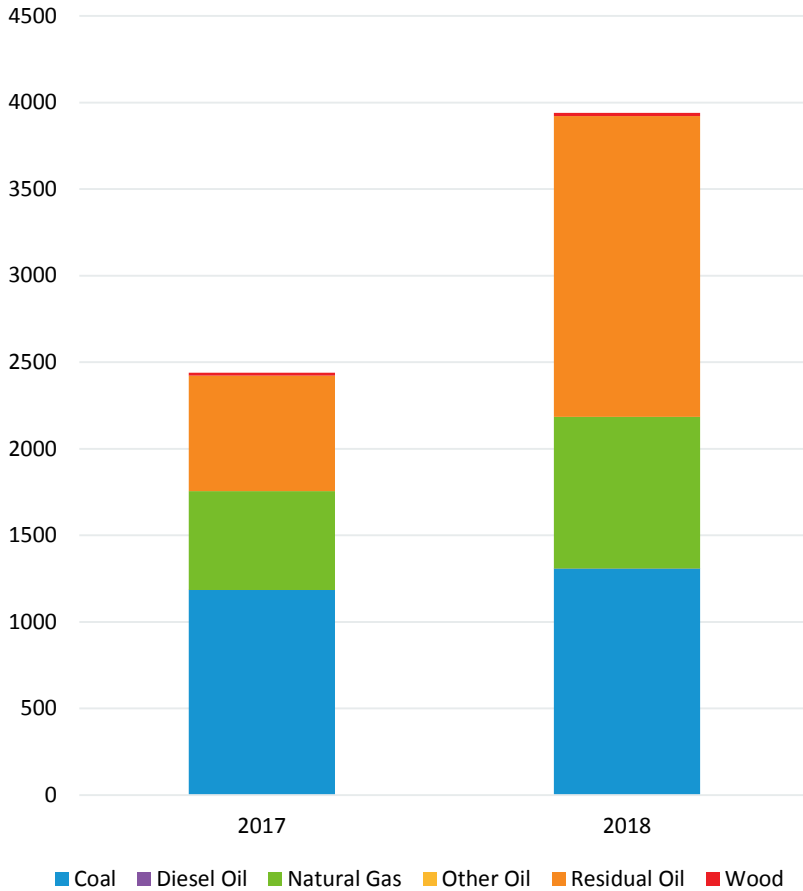
New England Emitting Generation & Estimated CO₂ Emissions (MWh, Metric Tons)



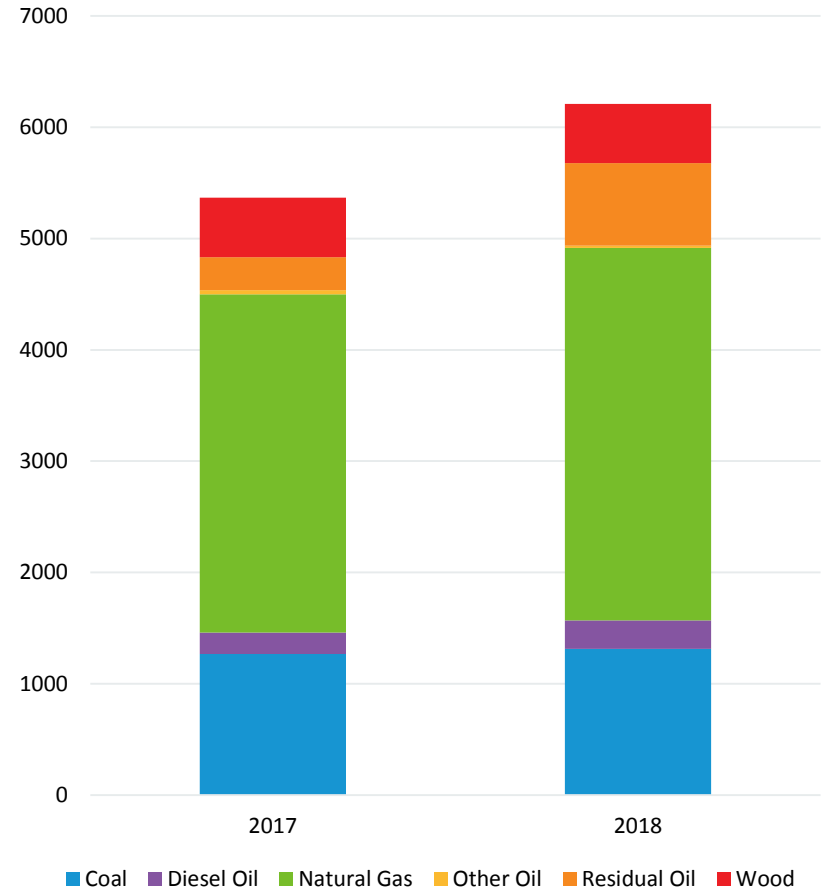
New England 2017 vs. 2018 SO₂ & NO_x Emissions (Short Tons)

2018 emission increases attributable in part to changes in weather, economic growth, energy prices, and fuel mix

SO₂ Emissions

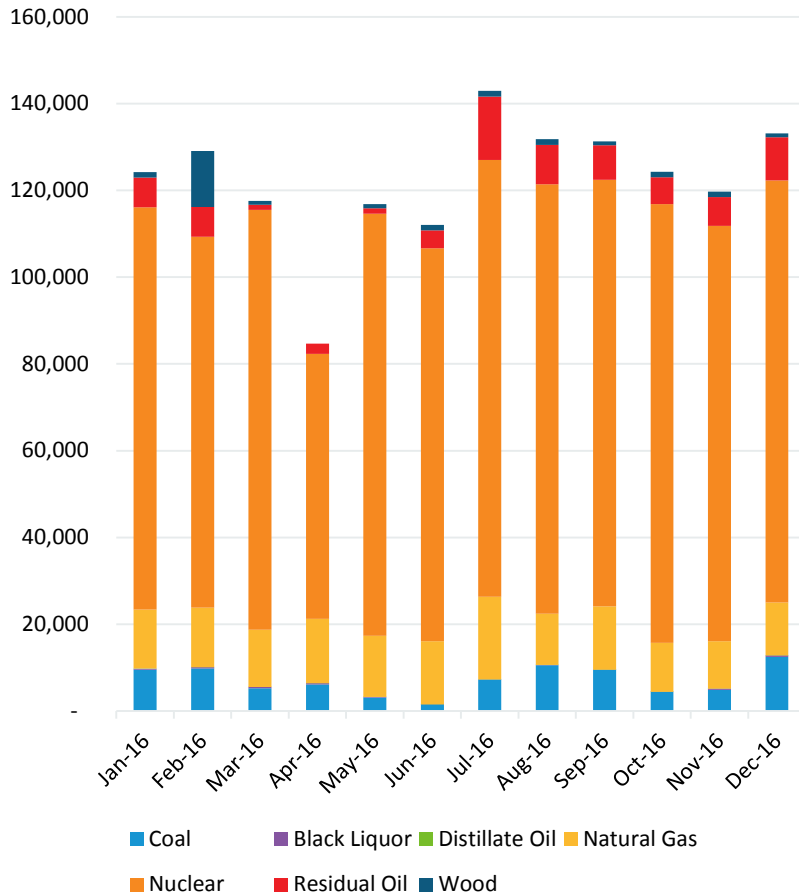


NO_x Emissions

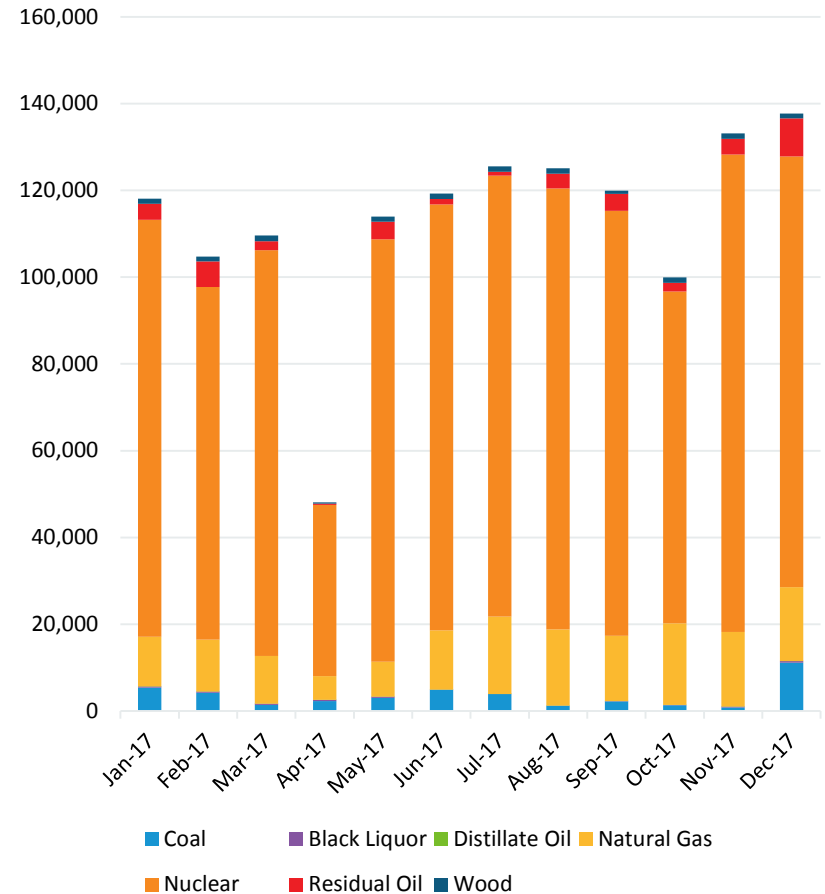


Water Withdrawals for Power Generation by Fuel Type in New England (Million Gallons)

2016 Water Withdrawals (Million Gallons)

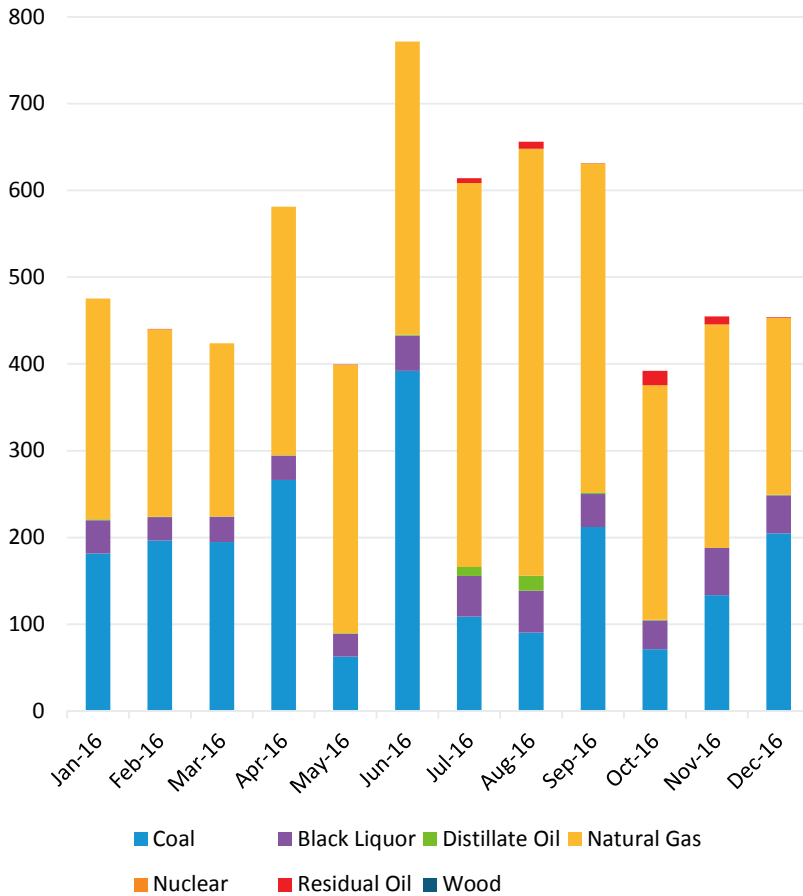


2017 Water Withdrawals (Million Gallons)

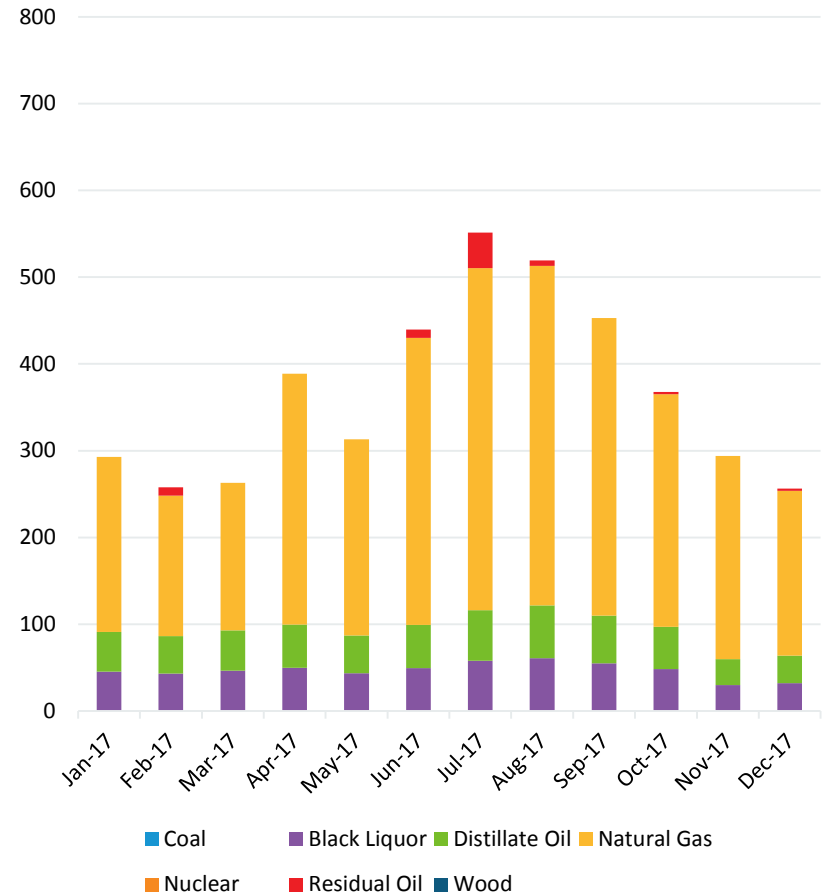


Water Consumption for Power Generation by Fuel Type in New England (Million Gallons)

2016 Water Consumption (Million Gallons)



2017 Water Consumption (Million Gallons)



CHANGES IN FEDERAL ENVIRONMENTAL REGULATORY POLICY

Overview of Federal Environmental Rulemakings Impacting Energy Infrastructure

- **Clean Air Act**
 - New Source Review Applicability changes
 - Clean Power Plan Repeal, Affordable Clean Energy Rule Replacement
- **Clean Water Act**
 - Proposed jurisdictional limit to affected water bodies
 - Wastewater discharge compliance deadlines deferred
- **Endangered Species Act/Migratory Bird Treaty Act**
 - Protections limited for threatened and endangered species and habitats
 - Protections limited for migratory birds
- Most actions intended to either rollback or streamline permitting, licensing, or compliance rules for a range of energy infrastructure
 - Uncertain regional impact, developers see potential adverse impact on levelized costs for various types of energy infrastructure

Overview of Federal Environmental Rulemakings Impacting Energy Infrastructure

- Extended federal government shutdown creating uncertainty for the power sector as closure of various departments and agencies stalls rulemakings, permitting and information gathering and reporting functions
 - Increasing risk of regulatory ‘snapback’ as delays in permitting, rulemaking, guidance or adverse litigation outcomes leave developers with uncertain or conflicting regulatory obligations
 - Bureau of Ocean Management, Environmental Protection Agency unable to move forward during federal shutdown on siting or permitting matters directly impacting development of energy infrastructure in the region

Major Environmental Rules Related to Coal, Natural Gas, and Nuclear Generation

Title	Year Finalized	Years Implemented	Authorizing Statute	Major Provisions	Generation Sources Affected
Cooling Water Intake Rule	2001 (Phase 1) 2003 (revised Phase 1) 2014 (Phase 2)	Phase 2: 2014-2018; 2018 litigation upholds 316(b) rule	Clean Water Act	<ul style="list-style-type: none"> Promulgated under 316(b) of the Clean Water Act. New sources regulated under Phase I and existing sources regulated under Phase II. States consider requirements for power plants on a case-by-case basis Requires controls to reduce mortality to fish and other aquatic organisms 	Coal Natural Gas Nuclear
Cross-State Air Pollution Rule	2011	Phase 1: 2015 Phase 2: 2017	Clean Air Act	<ul style="list-style-type: none"> The Cross-State Air Pollution Rule replaced the Clean Air Interstate Rule starting on January 1, 2015, and requires states to reduce power plant emissions of SO₂ and NO_x that contribute to ozone emissions and fine particle pollution in other states 	Coal Natural Gas
Steam Electric Effluent Limitation Guidelines	1974; policy updates in 1977, 1978, 1980, 1982, and 2015	1982; 2015-; 2017 EPA suspends 2015 rule for review Litigation suspended	Clean Water Act (40 CFR 423)	<ul style="list-style-type: none"> Established limitations on the discharge of toxic and other chemical pollutants and thermal discharges from existing and new steam electric power plants, as well as pretreatment standards. The 2015 update sets the first Federal limits on levels of toxic metals that can be discharged 	Coal Natural Gas

Major Environmental Rules Related to Coal, Natural Gas, and Nuclear Generation

Title	Year Finalized	Years Implemented	Authorizing Statute	Major Provisions	Generation Sources Affected
New Source Review	1980; policy updates in 1996 and 2002	1980; 2002 updates 2018 EPA revises applicability	Clean Air Act	<ul style="list-style-type: none"> Affects stationary sources of air pollutants. Requires that a new or modified power plant obtain a pre-construction permit to ensure, among other things, that modern pollution control equipment is installed. Requirements differ depending on whether or not the plant is located in an area that meets the requirements under the National Ambient Air Quality Standards 	Coal Natural Gas
Mercury and Air Toxics Standards	2012	2015-2016 Implemented 2017 Litigation suspended 2018 EPA proposes rollback	Clean Air Act	<ul style="list-style-type: none"> Set mercury, arsenic, acid gases, and other toxic pollutants emissions limits for coal- and oil-fired power plants Operators had until April 2015 to comply with many plants receiving additional multi-year extensions 	Coal Oil
Coal Combustion Residuals Rule	2015	2015-2018; 2018 rule revised, court overrules changes	Resource Conservation and Recovery Act	<ul style="list-style-type: none"> Addresses groundwater contamination risks from coal combustion residuals (i.e., “coal ash”) disposal in unlined landfills and surface impoundments by establishing national standards for disposal 	Coal

Major Environmental Rules Related to Coal, Natural Gas, and Nuclear Generation

Title	Year Finalized	Years Implemented	Authorizing Statute	Major Provisions	Generation Sources Affected
Regional Haze Rule	1999; policy revisions in 2017	Implemented Revised state plans due in 2021, some plans under review	Clean Air Act	<ul style="list-style-type: none"> Requires states to develop long-term strategies, including enforceable measures to improve visibility in 156 national parks and wilderness areas Aims at returning visibility to natural conditions by 2064 	Coal Oil Natural Gas
Carbon New Source Performance Standards	2015	2016 Litigation suspended pending EPA review 2018 EPA proposes changes	Clean Air Act	<ul style="list-style-type: none"> Carbon New Source Pollution Standards established CO₂ emission standards for new fossil fuel-fired generators under Clean Air Act section 111(b) 	Coal Oil Natural Gas
Clean Power Plan	2015	2018 EPA proposes repeal	Clean Air Act	<ul style="list-style-type: none"> The Clean Power Plan, establishes CO₂ emission standards for existing power plants under section 111(d) of the Clean Air Act 	Coal Oil Natural Gas

MERCURY AND AIR TOXICS STANDARDS (MATS)

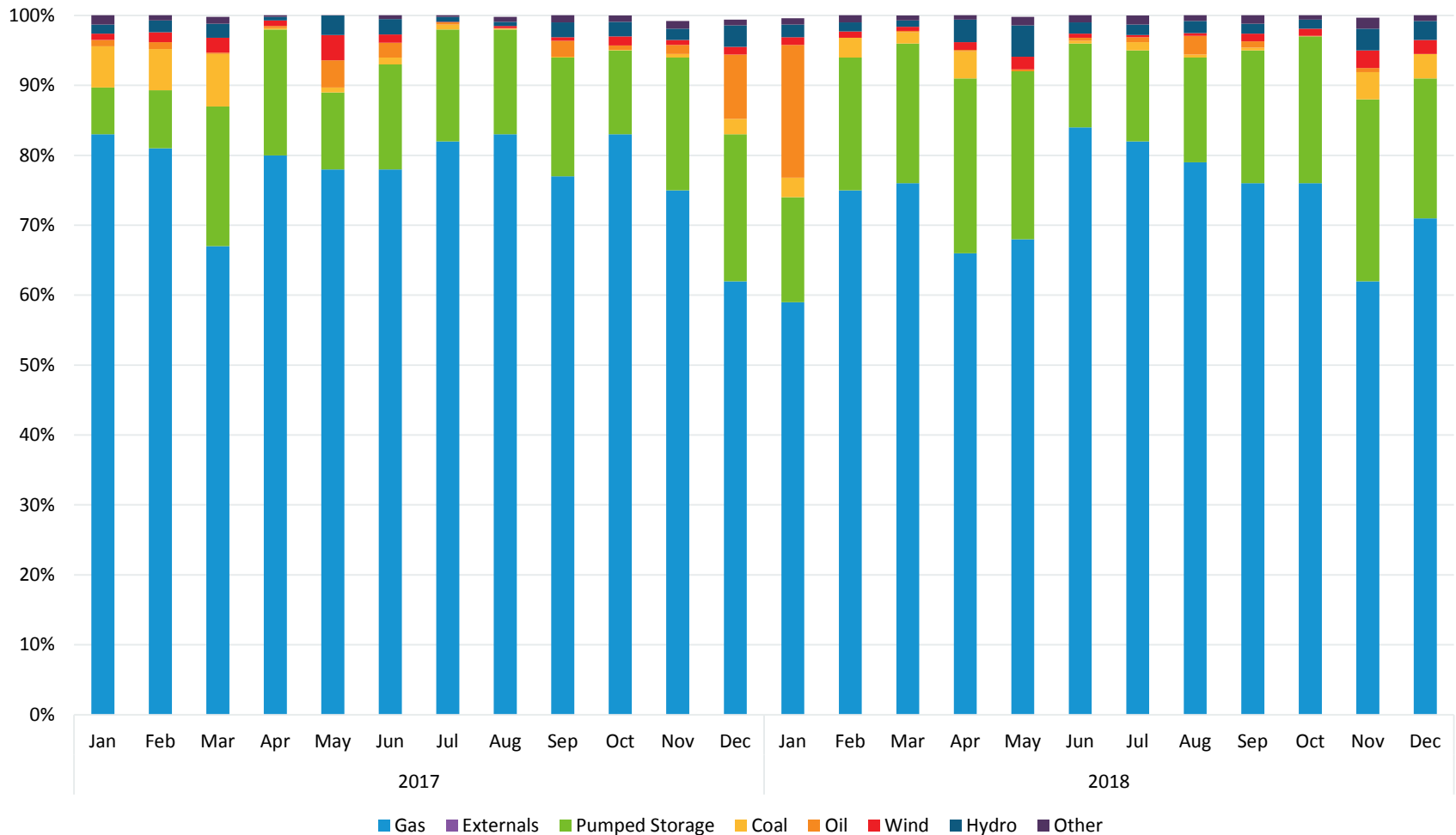
EPA proposes changes to Mercury and Air Toxics Standards (MATS)

- **December 2018:** EPA proposes changes to Mercury and Air Toxics Standards (MATS) which limited mercury and other toxic pollutant emissions from existing coal- and oil-fired steam thermal generators
 - MATS imposed hazardous air pollutants (HAPs) emissions from coal- and oil-fired generators, requiring reductions of 90% in mercury emissions and reductions in acid gases and particulate matter emissions
 - Any modification or reversal of the 2016 Supplemental Notice could undermine the MATS requirements and jeopardize some affected generators' ability to recover capital costs incurred with the required pollution control retrofits
 - Any modifications to the cost benefit analyses for this rulemaking will likely establish a precedent for other rulemakings
- No regional impact expected, affected generators remain subject to independent state air toxics limits
- EPA scheduled to propose the MATS Residual Risk and Technology Review and Cost Review for public comment late in 2019

LOAD-WEIGHTED REAL TIME MARGINAL UNIT FUEL DATA BY MONTH (2017-2018)

Load-Weighted Real time Marginal Unit Fuel Data by Month (2017-2018)

In this time period, on average, the marginal unit was: natural gas (75%); pumped storage (17%); oil (2%); coal (1.9%); hydro (1.9%); wind (1.1%); and, other (1%)



Questions

