Independent Statistics & Analysis
U.S. Energy Information Administration

Short-Term Energy Outlook Supplement: Summer 2020 Electricity Industry Outlook

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Overview

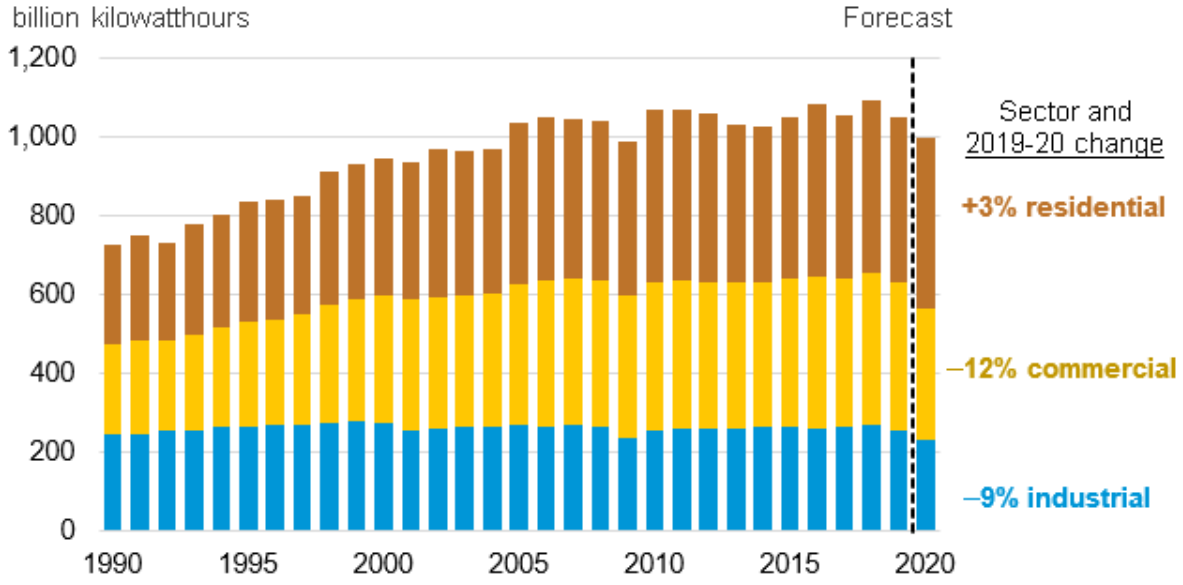
The U.S. Energy Information Administration (EIA) is publishing this supplement with its June *Short-Term Energy Outlook* (STEO) to provide more detail about its forecasts for electricity consumption, generation, and prices during the summer of 2020 (June, July, and August). As a result of changing market economics and regulatory policy, the United States has been undergoing a substantial transition over the past few years regarding how its electricity is supplied. Improvements in energy efficiency and other changes in consumption patterns have tended to slow the growth in electricity demand. Sustained low costs for natural gas and the production and investment tax credits for wind and solar power have led to increased generation from these energy sources, while generation from coal has fallen. These changes in the supply and demand of electricity have been reflected in electricity prices over time.

The current economic slowdown and changes in social patterns resulting from mitigation efforts to control the disease caused by the SARS-CoV-2 virus (COVID-19) are also affecting the electric power industry. Although it is still too early to determine with certainty how the efforts to reduce the spread of COVID-19 are affecting the industry, EIA's short-term forecasts provide some perspective about trends over the next few months. Electricity industry demand and supply patterns during the summer months are highly dependent on the realized weather, which can differ substantially from initial expectations. The disruptions caused by COVID-19 mitigation efforts add additional uncertainty to EIA's forecast.

Electricity Consumption

EIA expects U.S. retail electricity sales across all sectors to total 998 billion kilowatthours during June, July, and August 2020. This level of total electricity demand would be the lowest since 2009, which was during the most recent recession, and is 5.2% lower than last summer. However, there are differences in the expected year-over-year change among the residential, commercial, and industrial sectors.

Figure 1. U.S. retail sales of electricity by sector, summer (June–August) 1990–2020



Source: U.S. Energy Information Administration, June 2020 *Short-Term Energy Outlook*

Typically, summer weather is the primary factor for electricity demand in the residential sector. According to EIA's *Residential Energy Consumption Survey*, 87% of homes in the United States used some form of air conditioning in 2015; however, the overall level of usage varies significantly in different regions of the country, depending on temperature and humidity patterns. The National Oceanic and Atmospheric Administration (NOAA) forecasts that U.S. cooling degree days between June and August of 2020, a measure of summer warmth, will be 1.1% lower than during last summer, which would indicate slightly less residential electricity demand this summer, assuming normal patterns of household electricity use.

The current COVID-19-related social distancing practices have led much of the U.S. population to spend more time at home than normal. Many people who work in offices are now working from home, which will likely result in more residential electricity consumption even with milder summer weather. Current data regarding the effects of COVID-19 mitigation efforts are limited, so EIA has implemented some assumptions about how these behavioral changes may be reflected in residential electricity demand over the coming months. Using the *Annual Energy Outlook*'s (AEO) residential purchased electricity projections for 2020 as a baseline, EIA assumes that during the second quarter, residential customers will use 20% more electricity for computers and electronics than the baseline. EIA assumes 10% more electricity usage than the baseline in the third quarter because some employees will have returned to their regular work locations.

EIA assumes the United States will make use of 5%–10% more residential space cooling than normal between June and August given the temperature forecast, while all other residential uses of electricity will be 1%–2% higher. In the current STEO, EIA forecasts that there will be 2.8% more retail sales of electricity to the residential sector this summer than during the summer of 2019. The forecast growth in residential electricity sales relative to last summer indicates that the effects of people spending more time at home are likely to more than offset the effect from NOAA's projected slightly cooler temperatures this summer.

Table 1. STEO assumed percentage increase above normal residential usage

	Residential usage category		
	Computers and electronics	**Space cooling**	**Other end use**
April	+20%	--	+2%
May	+20%	--	+2%
June	+20%	+10%	+2%
July	+10%	+5%	+1%
Aug	+10%	+5%	+1%
Sept	+10%	--	+1%

Commercial sector electricity consumption is primarily affected by weather and economic conditions. Most office buildings use air conditioning, but electricity use for lighting and computing is also

important. In addition, the electricity that restaurants, hotels, and entertainment venues use is also included in the commercial sector. Retail sales of electricity to the commercial sector are strongly correlated with employment levels. Based on forecasts from IHS Markit, EIA assumes non-farm employment in 2020 will fall by 13% after growing at a relatively steady rate that has averaged 1.6% annually since 2011. This reduction in employment indicates that many commercial establishments are not currently operating and are not consuming electricity.

Even in those business that continue to operate, a large number of currently employed office workers are working at home instead of in their commercial workspaces. EIA assumes this behavioral effect will magnify the macroeconomic effects on commercial electricity consumption by 10%–20% for the next few months. As a result, EIA forecasts that commercial retail sales in June, July, and August will be 12% lower than during the same months in 2019.

In the industrial sector, many types of facilities use electric power for their manufacturing processes. The primary metals and chemical industries are large consumers of electricity. Some of this electricity is self-generated, but a substantial amount is also purchased on the retail market from utilities and power distributors. The industrial sector has experienced supply chain issues and has felt the impact of the overall economic downturn, but overall, the sector has not been as directly affected by social distancing guidelines as the commercial sector. EIA forecasts retail industrial electricity sales this summer will be 9% lower than last summer.

Electricity Generation

Consistent with the expected decline in electricity demand, EIA forecasts that there will be 6.2% less generation by the U.S. electric power sector during June, July, and August 2020 compared with last summer. Forecast summer electricity generation by utility-scale power generators in the industrial and commercial sectors is 12% lower than last summer.

The mix of energy sources used in the United States to produce electricity has been undergoing large shifts during the past decade. One of the most evident trends is the steady decline in the amount of electricity generation from coal-fired power plants since at least 2010, while natural gas generation has generally been rising, albeit with some intermittent declines.

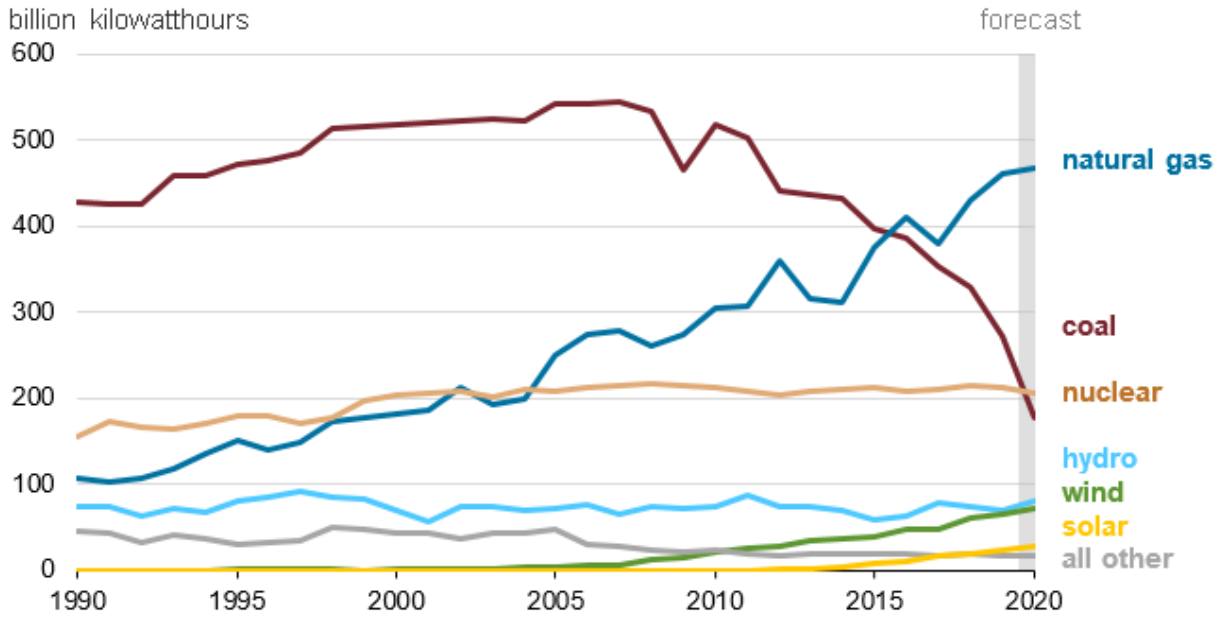
Natural gas-fired power generators have benefited in recent years from consistently low natural gas prices. Between 2015 and 2019, the cost of natural gas delivered to electric generators averaged $3.18 per million British thermal units (Btu), which is equivalent to about $25 per megawatthour (MWh). Natural gas costs in recent years have been relatively competitive with coal costs, which have averaged about $22/MWh since 2015, and were much lower than the average natural gas cost between 2005 and 2014 of about $48/MWh.

The relative costs of different fuel sources have had both short-term effects on the utilization (or dispatch) of existing capacity and longer-term effects on investment and retirement decisions. Historically, coal-fired power plants were generally used to meet the consistent baseload electricity demand that occurred in predictable patterns each day, while natural gas was more often used as an intermediate-load or peaking fuel to meet variable hourly electricity consumption, especially when

cooling demands are high during the day. However, in recent years, natural gas prices have often been low enough to enable the economic dispatch of natural gas-fired generators to satisfy electricity demand for longer periods of the day, including during baseload hours.

Over the long run, the sustained low prices of natural gas have led the industry to retire a significant amount of coal-fired generating capacity and to add more natural gas-fired generating capacity. Many of these new natural gas generating units use modern combined-cycle technology, which is much more efficient than the technology used at older natural gas-fired power plants. The electricity industry has also made significant investments in new generating capacity from renewable energy sources as a result of declining capital costs and policies to encourage development of those technologies.

Figure 2. U.S. electric power sector generation by fuel, summer (June–August) 1990–2020



Source: U.S. Energy Information Administration, June 2020 *Short-Term Energy Outlook*

These trends in fuel costs and generating capacity additions are reflected in the mix of fuels used for generating electricity during the summer months. Coal-fired power plants in the electric power sector generated 518 billion kilowatthours (kWh) of electricity between June and August 2010, equivalent to 45% of total U.S. generation. In the summer of 2019, coal generation had fallen to 272 billion kWh (a generation share of 24%). In contrast, summer natural gas generation rose from 305 billion kWh in 2010 to 460 billion kWh in 2019, representing an increase in generation share from 26% to 41%. Similarly, summer generation from renewable energy sources has grown from 107 billion kWh in 2010 (a 9% generation share) to 171 billion kWh in 2019 (a 15% generation share).

The mix of energy sources for generating electricity will likely follow similar trends this summer. EIA expects the forecast decline in overall electricity demand will be primarily reflected in reduced coal generation. EIA forecasts 178 billion kWh of coal generation this summer, which represents a generation share falling to 17% from a share of 24% last summer. Natural gas prices will remain low in 2020; the forecast cost of natural gas delivered to electric generators is expected to average $2.17 per million Btu

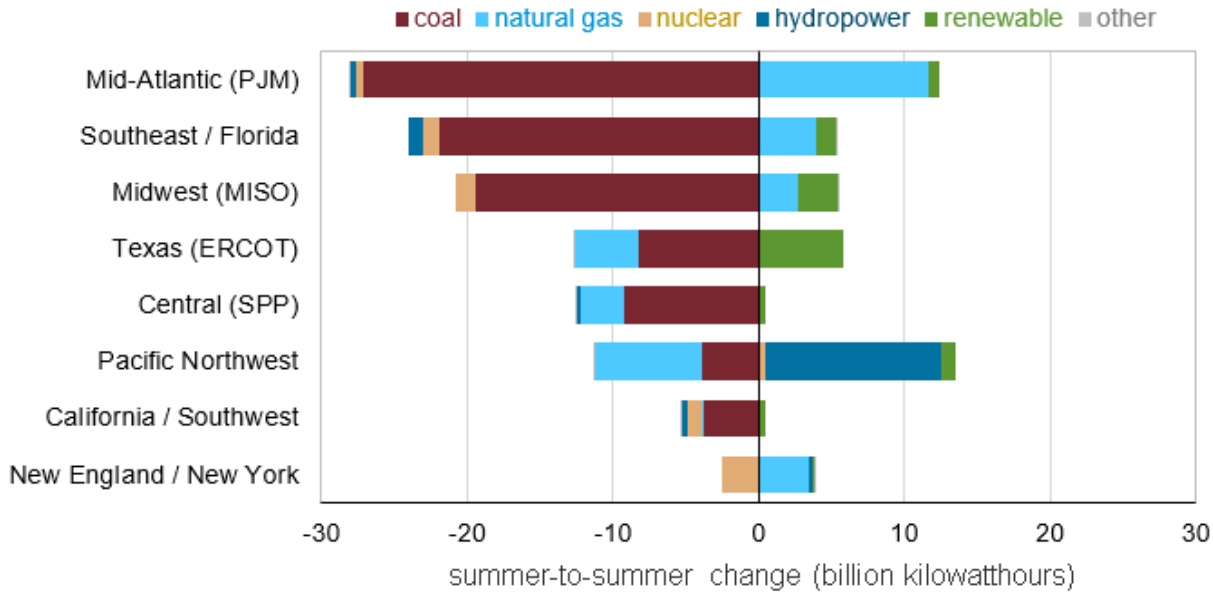
($17/MWh) this year compared with a forecast average cost of $1.98 per million Btu ($21/MWh) for delivered coal. Since natural gas fuel costs remain very competitive with coal, EIA forecasts the U.S. electric power sector will generate 467 billion kWh this summer. The forecast natural gas generation share rises from 41% last summer to 44% this summer.

EIA also expects renewable energy sources will generate more electricity this summer than last summer. The growth in generation from renewables is primarily a result of newly installed utility-scale wind and solar photovoltaic generating capacity. Because renewable energy sources such as wind and solar generally have lower operating costs than fossil fuel-fired power plants, they are dispatched to supply electricity when the resources are available. EIA expects electric power sector renewable energy sources, other than hydropower, will provide 113 billion kWh of generation this summer, which represents 11% of total U.S. generation, up from 9% last summer.

EIA expects more generation from conventional hydropower this summer after last year's dry weather in the western United States resulted in lower-than-normal hydropower generation. Forecast generation from hydropower this summer totals 81 billion kWh, up from 71 billion kWh last summer. This generation level represents about 8% of total U.S. electric power sector generation.

Less nuclear generation is likely this summer as a result of the retirements of reactors at the Three Mile Island and Indian Point nuclear power plants during the past year. However, the forecast U.S. nuclear generation share increases slightly to 20% from 19% last summer because the expected decline in nuclear generation is not as large as the forecast decline in total U.S. electric power sector generation.

Figure 3. Regional change in electricity generation by fuel, summer 2020–summer 2019



Source: U.S. Energy Information Administration, June 2020 *Short-Term Energy Outlook*

The changing patterns of generation vary among different regions of the country (STEO electricity regions are shown in Figure 5). EIA expects coal generation will decline in all areas of the country because natural gas prices have approached near-record lows and some coal-fired generating capacity has been retired in some areas of the country. The largest declines are forecast to occur in the Mid-Atlantic (PJM), Midwest (MISO), and Southeast/Florida regions. In the MISO area and in the Southeast/Florida, most of the forecast decline in coal generation is a result of the expected decline in overall electricity demand in that area. In the PJM region, the decline in coal generation is offset somewhat by a forecast increase in natural gas generation as a result of more favorable fuel costs. The forecast decline in U.S. coal generation also reflects 9.8 gigawatts (GW) of coal-fired generating capacity (about 4% of existing capacity) that has retired since last summer.

Although EIA expects there to be more natural gas generation this summer than last summer across the entire United States, some regions will see increases while others experience decreases. The forecast low natural gas fuel costs stimulate increased generation from natural gas-fired power plants in the East Coast. The retirement of reactors at the Three Mile Island nuclear plant in Pennsylvania and the Indian Point plant in New York is also likely to stimulate increases in regional natural gas generation. Areas of the country with sizable increases in renewable generation will generally experience offsetting declines in natural gas generation. EIA forecasts there will be 41% more conventional hydroelectric generation in the Northwest between June and August 2020 compared with last summer, which leads to a similar expected decline in generation by the region's natural gas-fired power plants.

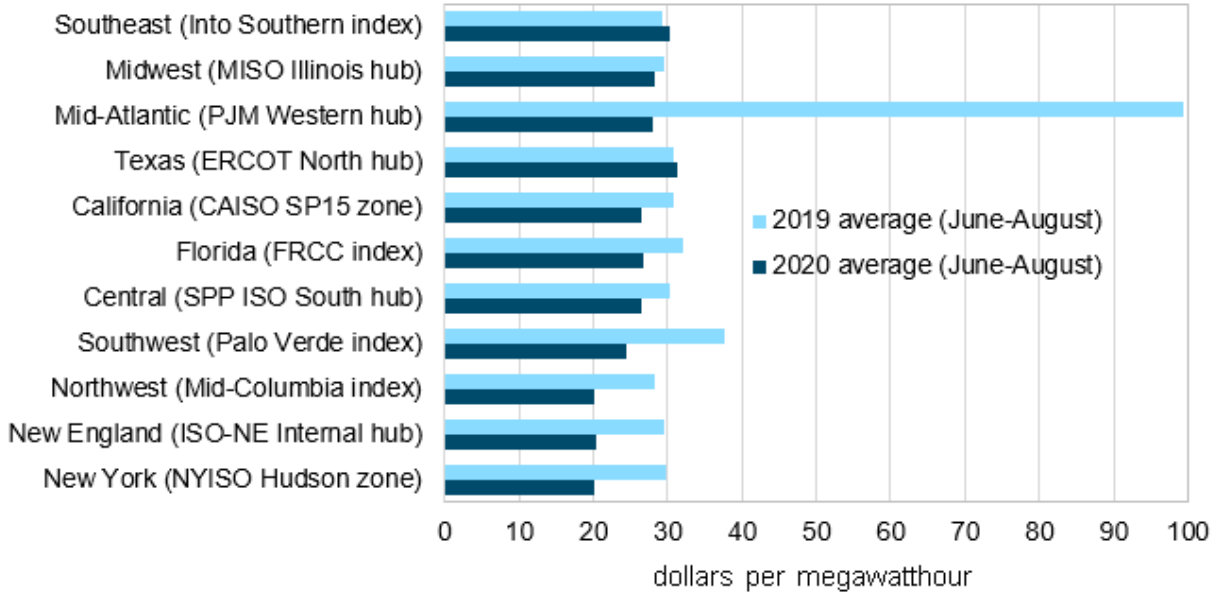
EIA expects the largest increase in non-hydro renewables generation this summer will occur in the Texas (ERCOT) and Midwest (MISO) electricity supply regions. New wind power capacity additions are the main driver of this forecast increase. The electric power industry has built an estimated 8.8 GW of new wind generating capacity in the United States since September 2019, about 30% of which was built in ERCOT and about 40% in MISO. EIA expects that wind will produce 20% of total electricity generation in ERCOT this summer, up from 16% during the summer of 2019. The share of generation from wind in MISO grows from 6% last summer to a forecast 9% this summer.

The electric power sector is also currently building a significant amount of utility-scale solar photovoltaic generating capacity. Since September 2019, the industry has added an estimated 6.5 GW of solar capacity. New capacity is being built throughout the United States, but the Southeast/Florida, California/Southwest, and Texas (ERCOT) supply regions account for about two-thirds of the solar capacity that has come online since last summer. Despite these additions, utility-scale solar is expected to provide less than 3% of total U.S. generation in June, July, and August 2020.

Electricity Prices

Many factors can affect wholesale electricity prices, but the level of hourly electricity demand and the cost of fuel for power generators are particularly important. EIA expects both of these factors to be lower in the summer of 2020 than last summer, which contributed to EIA's forecast that average wholesale electricity prices will be lower in most areas of the country. The forecast summer wholesale prices range from an average of $20/MWh for the New York ISO to an average of $30/MWh for the Southeast region.

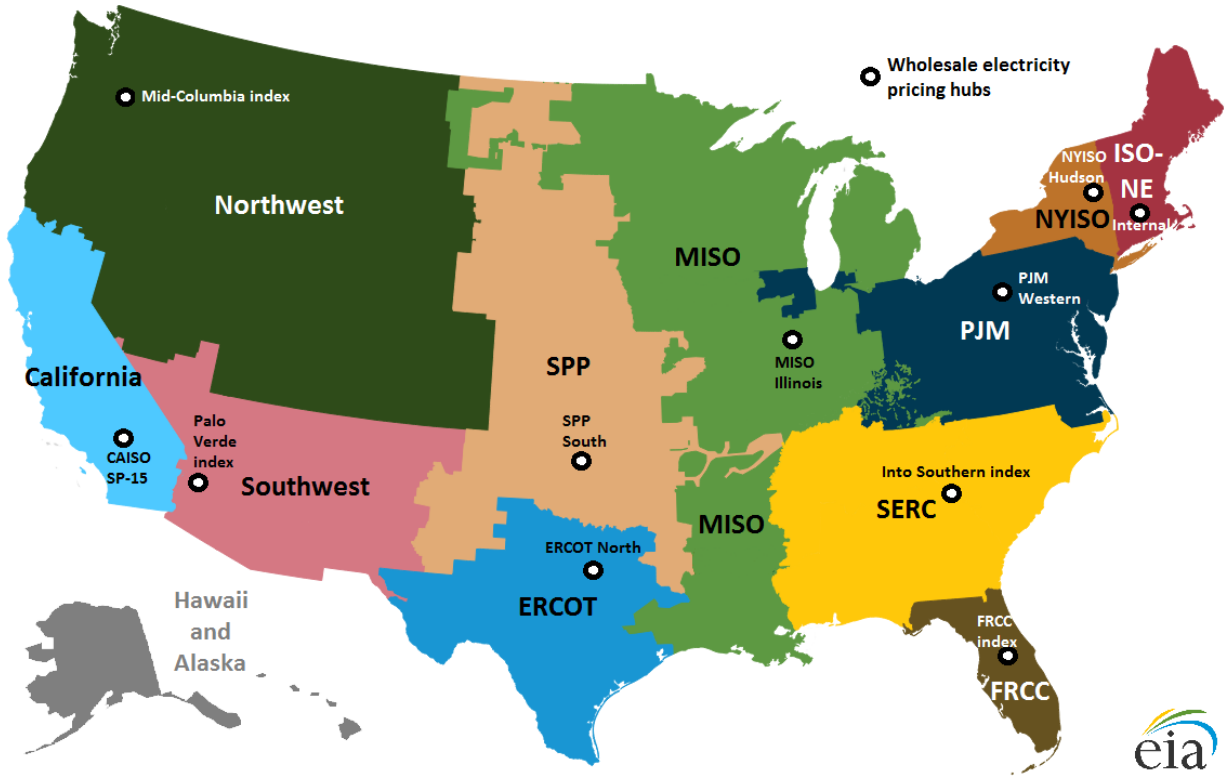
Figure 4. Average peak-hour wholesale electricity prices, summer (June–August) 2019–2020



Source: U.S. Energy Information Administration, June 2020 *Short-Term Energy Outlook*

Although wholesale price forecasts can provide information about expected trends in the cost of electricity, realized prices can be extremely volatile, so EIA's average price forecasts are quite uncertain. Electricity prices can spike when electric power systems become constrained, such as under conditions of extremely high peak-hour loads or unexpected outages of generating capacity. In August 2019, high levels of electricity demand caused day-ahead electricity prices at the ERCOT North hub to exceed $1,000/MWh for a handful of hours. These price spikes contributed to an average summer wholesale electricity price of nearly $100/MWh. Such extreme scenarios are difficult to foresee.

Figure 5. *Short-Term Energy Outlook* (STEO) electricity supply regions



Source: U.S. Energy Information Administration