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Electricity Price Outlook for June 2022

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The Office of Technical and Regulatory Analysis presents the outlook for wholesale electricity prices on a periodic basis throughout the year. This assessment considers trends in electricity futures markets as well as ***forecasted weather, economic growth, and input fuel prices.***

Key Points in this Month's Outlook

- On June 1, 2022, new Standard Offer Service ("SOS") electric rates took effect. Overall, residential customers saw an average bill increase of 3.7 percent, while small commercial customers saw an average bill increase of 1.9 percent.

- Over the past several years, plentiful natural gas in the PJM region has lowered wholesale electricity prices; however, this dynamic changed in 2022, as natural gas prices have rebounded strongly. Natural gas continues to exceed coal as a generation fuel source in the PJM region.

- **Overall electricity consumption in the United States is projected to <u>increase</u> by 1.9 percent in 2022, as the recovery from the COVID-19 pandemic continues.**
  - The growth of electricity sales in 2022 will be led by industrial sales at 3.5 percent, which represents a slowdown from the 6.7 percent jump in 2021.
  - Residential sales are expected to be essentially flat in 2022.
  - The federal Energy Information Agency (EIA) forecasts commercial sector sales will <u>increase</u> by 2.8 percent in 2022.[1]

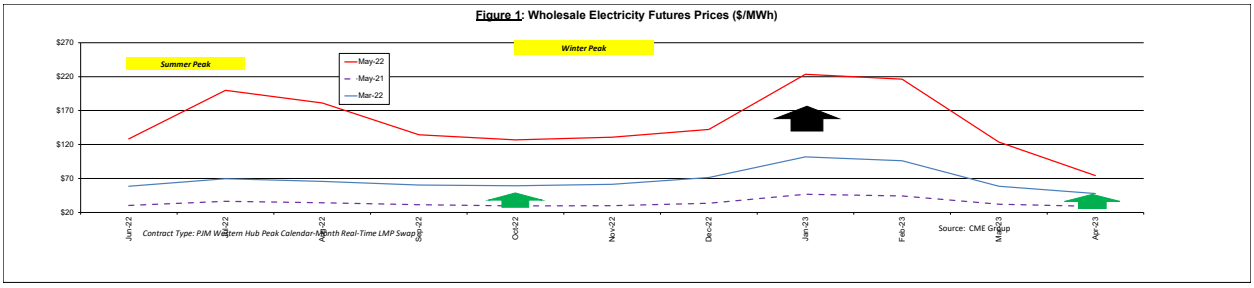
[1] *May 2022 Short-Term Energy Outlook (STEO)* at Table 7b.

Wholesale Electricity Futures Market

Contracts to deliver electricity in future months are traded for the multi-state region that is served by regional transmission operator PJM Interconnection ("PJM"). The PJM region includes the District of Columbia.

- Figure 1 below shows the futures contract "price strips" through April 2023 as settled on March 8, 2022, (blue line), and on May 6, 2022, (red line).[2]

Because electricity cannot be easily stored, the effect of seasonal temperature changes on the price of future delivery contracts stands out sharply, with yearly peaks in the hot summer months and cold winter ones. Prices rise to incentivize high-cost generators to turn on their power plants to meet the high demand to run air conditioning on hot summer days and heating systems on cold winter days.



- In Figure 1 above, the red line shows values for electricity futures contracts traded on May 6, 2022, revealing that price expectations for the next twelve months are significantly above the March level.
- The dashed purple line shows the trading values for the "price strip" from one year ago (May 21, 2021). Futures prices have increased very significantly since last year as investors react to Russia's invasion of Ukraine.
- The trend of winter prices exceeding summer prices continues. The green arrows (see Figure 1 above) point to the "shoulder months" October 2022 and April 2023. During these months, temperatures are moderate, and demand can be met from less expensive generation like nuclear and wind.
- In general, PJM prices reflect higher natural gas prices, since natural gas-fired generation is the predominant bulk power generation fuel used at the margin within PJM. Significant short-term price increases in wholesale power are expected in 2023.

[2] See PJM Western Hub Peak Calendar-Month Real-Time LMP Swap Futures; CME Group.

Retail Residential Electricity Prices

Factors other than generation costs are included in the retail residential prices reported by EIA, including the costs of continued investment in transmission and distribution infrastructure.

- The EIA reports that retail residential electricity prices across the nation are expected to increase by 4.3 percent in 2022.[3]

On March 23, 2022, the Public Service Commission of the District of Columbia approved the results of the annual competitive auction for new electric generation rates for default service, called Standard Offer Service ("SOS"), which went into effect on June 1, 2022.

- On average, the generation portion of the bill for SOS for a residential customer (excluding Master Metered Apartment customers) increased by about $2.94 per month for the average user of 632 kWh/month.
- The residential SOS customer's generation rate during the summer increased from 6.4 cents per kWh to 6.5 cents per kWh, while the winter generation rate increased from 6.6 cents per kWh to 7.4 cents per kWh.
- On average, the generation portion of the bill for small commercial SOS customers increased by about $4.22 per month for the average user of 1,519 kWh/month.
- Overall, residential customers saw an average total bill increase of 3.7 percent, while small commercial customers saw a total bill increase of 1.9 percent.[4]
- Pepco's transmission costs, which are regulated by the Federal Energy Regulatory Commission, have also risen over the past year.

The figure below shows the overall trend of prices in the PJM wholesale market where SOS generation is sourced, including EIA's projections for 2022 and 2023.

- EIA shows an increase of 86 percent for PJM wholesale prices in 2021 over 2020, followed by an expected 79 percent increase in 2022, reflecting a short-term 2022 spike in natural gas-fired generation costs. Prices are then expected to decline in 2023, as natural gas costs subside.
- EIA's projections are subject to higher-than-normal uncertainty because of recent disruptions in global energy markets.

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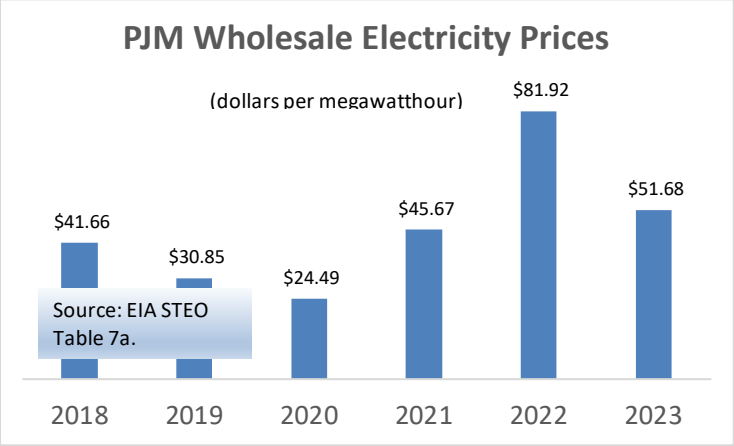
3 *May 2022 Short-Term Energy Outlook (STEO)*; Table 7c; http://205.254.135.24/forecasts/steo/.

4 Formal Case No. 1017; Order No. 21133 (March 23, 2022).

- In the District of Columbia, the Commission oversees an auction for a three-year contract supplying one third of the residential and small commercial SOS load each year. This has the effect of protecting consumers by "smoothing" the impact of year-to-year fluctuations in the PJM wholesale market. Current residential and small commercial SOS rates are "locked in" through May 31, 2023, which will reduce the impact of short-term fluctuations in the PJM wholesale market.



The following sections discuss some of the factors affecting this month's outlook, including the three-month weather forecast, the overall economic outlook, and the prices of fuels used in power generation.

Weather Outlook

Sea-surface temperatures in the equatorial Pacific Ocean influence weather patterns across North America; these so-called *La Niña/El Niño* conditions are the primary factor in the three-month temperature outlook which, in turn, impacts investor expectations about future electricity prices.

- The National Oceanic and Atmospheric Administration's May 12th *El Niño* watch indicates that though *La Niña* is favored to continue, the odds for *La Niña* decrease into the late Northern Hemisphere summer (58% chance in August-October 2022) before slightly increasing through the Northern Hemisphere fall and early winter 2022 (61% chance).[5] (*La Niña* reduces the likelihood of extreme weather in the summer months.)

[5] http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/enso_advisory/ensodisc.html. "ENSO" means *El Niño* Southern Oscillation; "ENSO-neutral" means that neither *El Niño* nor *La Niña* conditions are present.

- NOAA notes that normal average temperatures are favored in the mid-Atlantic region through the June-July-August period.[6] NOAA also expects above-normal precipitation during the next three months in the mid-Atlantic region.

Heating-degree days measure the demand for heating during the winter.

- EIA reports that heating degree days in our region are projected to be 7 percent higher in 2022 than in 2021.
- Projected heating degree days for 2022 are expected to be 2 percent higher than the ten-year average.[7]

Cooling-degree days measure the demand for air conditioning during the summer.

- EIA projects cooling-degree days in the Census region that includes the District of Columbia will be about 4 percent lower in 2022 than the ten-year average.
- The projection for 2022 is 2 percent fewer cooling-degree days than 2021.[8]
- The long-term warming trend continues.[9]

Economic Growth and Electricity Consumption

The outlook for economic activity in 2022 is one of strong positive growth.

- Real (inflation-adjusted) gross domestic product (GDP) fell by 3.4 percent in 2020 and increased by 5.7 percent in 2021 and is projected to grow by a further 3.1 percent in 2022 and 2023.[10]
- These figures reflect the expected rebound from the COVID-19 pandemic-induced economic slowdown along with the effects of economic stimulus policies. Strong economic growth is likely to impact electricity price trends positively.

Electricity sales are measured in millions of kilwatthours per day showing useage of electricity.

- EIA forecasts that nationwide residential electricity sales are expected to decrease by 0.5 percent in 2022.

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6 http://www.cpc.ncep.noaa.gov/products/predictions/90day/fxus05.html.
7 *STEO*, Table 9c.
8 *STEO*; Table 9c.
9 NOAA National Centers for Environmental information, Climate at a Glance: National Time Series, published July 2021, retrieved on December 2, 2021 from https://www.ncdc.noaa.gov/cag/global/time-series.
10 *STEO*; Table 1.

- Nationwide electricity sales for all sectors are expected to increase by 1.9 percent in 2022.[11]

Fuel Prices

In recent years, the cost of fuels for electricity generation was restrained, except for petroleum-based fuels where the market is volatile in both directions. This moderate trend was driven by historically low natural gas prices and moderate economic growth. These conditions have changed dramatically in 2022.

- *Following the rebound from the economic dislocation caused by the COVID-19 pandemic in 2020, the cost of natural gas for generation -- which approached the $2 level in 2020 -- rebounded strongly to average nearly $5.00 in 2021 and will rise further in 2022.*[12]

Petroleum

The outlook for international crude oil prices has improved recently along with growth expectations in the wake of the COVID-19 pandemic.[13] Spread of the "omicron" variant of COVID 19 in 2022 was expected to lower the outlook for oil prices, but OPEC and Russia have announced they will stick with plans to raise output only gradually.[14] EIA warns that the uncertainty in its energy price forecasts has increased significantly due to the turmoil in Europe, particularly for petroleum.

As a result of low oil prices in 2020, U.S. shale oil producers cut back on drilling which impacted domestic output of both crude oil and natural gas; shale production recovered slowly in 2021 and is picking up further in 2022.

The latest *Drilling Productivity Report* from the EIA shows a recovery in crude oil output and gas production in the U.S. shale-producing basins surveyed during 2022.[15] Output in shale regions depends on high rates of drilling activity which investors were no longer willing to finance as generously as they had in the past; cutbacks were already visible in 2019.[16]

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11 *STEO*; Table 7b.

12 *STEO*, Table 7a.

13 "Saudi Arabia Set to Raise Oil Output Amid Recovery in Prices," *Wall Street Journal*; February 17, 2021.

14 "OPEC, Russia Agree to Keep Boosting Oil Output, Jolting Prices," *Wall Street Journal*; December 2, 2021.

15 See EIA's monthly *Drilling Productivity Report*; http://www.eia.gov/petroleum/drilling/pdf/dpr-full.pdf.

16 "Schlumberger Plans U.S. Pullback as Shale Oil Drillers Struggle;" *Wall Street Journal*, January 17, 2020.

Net liquid fuel imports to the United States peaked at over 60 percent of domestic supply in 2005 and then fell to three percent in 2019 – the lowest level since 1970; this represented a major shift in the structure of world oil markets.[17] EIA reports the net import share fell below zero in 2020. EIA expects net imports to remain below zero through 2023 – this means the U.S.A. is a net exporter of petroleum.[18]

Only time will tell whether rising domestic petroleum output will be able to moderate the price of crude oil in the face of the massive disruption in global oil markets resulting from the Russian invasion of Ukraine.

- Petroleum fuels supplied less than one percent of PJM generation during 2021.[19]

Natural Gas

Natural gas prices are significantly below 2008 levels when the Henry Hub price averaged $8.94 per one million British Thermal Units (MMBtu).[20] The price of natural gas is volatile – EIA reports it fell below $2.25 during the second quarter of 2020.[21]

Natural gas prices in the spot market result from the interaction of trends in domestic production, growing gas-fired generation of electricity, and expected winter heating needs; expanding natural gas exports also may impact prices in the future.

- EIA reports that Henry Hub spot prices averaged $3.91/MMBtu in 2021 and projects $7.42 in 2022.[22] *Henry Hub natural gas prices are not projected to fall below 2021 levels in 2023.*

The Henry Hub spot price typically is more volatile than the cost of natural gas actually paid by electricity generators where long-term contracts are typically involved.

- EIA reports that the cost of natural gas for power generation fell to $2.39 during 2020 and rose to an annual average of $4.97 in 2021 and projects an average of $7.95 in 2022.[23]
- Increased LNG exports to Europe will support prices in the future.

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17 *STEO*; Table 4a. *EIA Monthly Energy Report*; July 2018; Table 3.1; http://www.eia.gov/totalenergy/data/monthly/pdf/mer.pdf.

18 *STEO*, Table 4a.

19 *STEO*; Table 7d.

20 EIA; *2011 Annual Energy Outlook*; page 115.

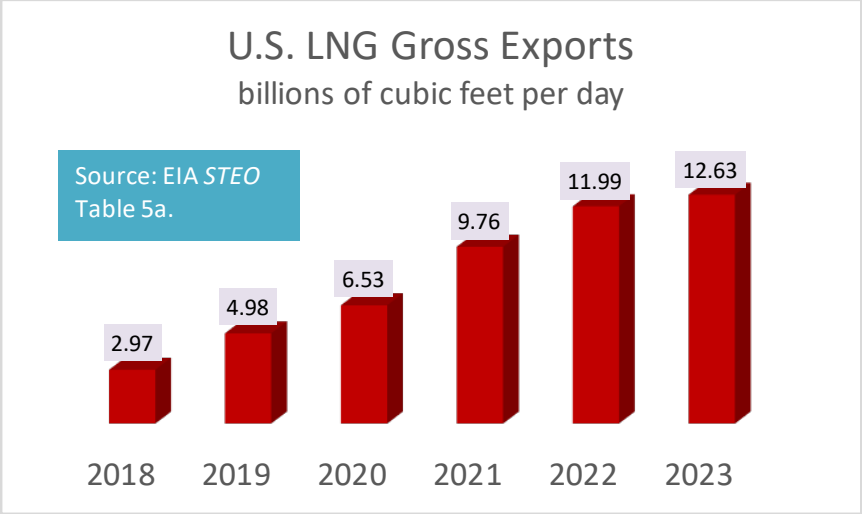
21 *STEO*; Table 2.

22 *STEO*; page 2.

23 *STEO*; Table 7a.

EIA expects exports to grow faster than domestic production, which could eventually put modest upward pressure on natural-gas prices; EIA reports that LNG export capacity grew through 2025.[24]

The gap between projections for LNG export capacity (above) and projected gross export amounts (below) shows that exports are catching up with new capacity. EIA expects additional LNG export capacity to come on line in 2022 and 2023.



As shown above, the EIA expects the volume of exports to increase further in 2022.[25] In response to the war in Ukraine, the United States and the European Union have announced plans to ramp up exports of U.S. LNG to the EU.[26]

- An LNG export company recently announced that it has secured $12.5 billion in financing to construct the Plaquemines project near New Orleans that will have an export capacity of 20 million metric tons a year. It is expected to begin operation in 2024.[27]

The long-term impact of relatively inexpensive natural gas can be seen easily in PJM wholesale electricity price trends; the recent reversal is also visible. "Figure 3-28" (below) shows the monthly and annual average load-weighted LMP for January 1999 through March 2022.[28] Natural-gas prices are now driving electricity prices upwards.

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[24] See Table 5a and https://www.eia.gov/todayinenergy/detail.php?id=37732. "Bcf/d" is billion cubic feet per day.

[25] "Global Glut Keeps a Lid on Natural-Gas Prices;" *Wall Street Journal*; May 28, 2020.

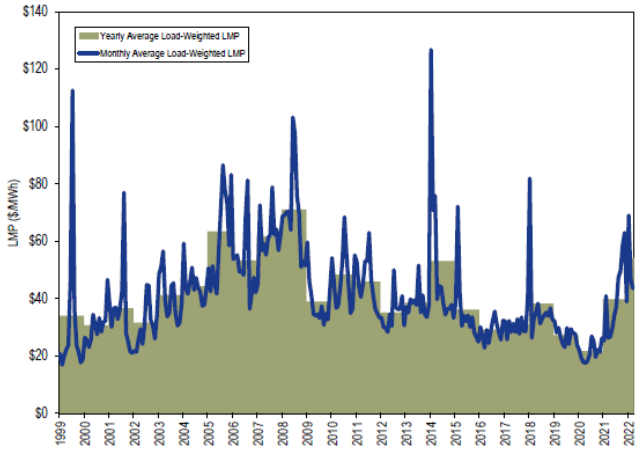
[26] "U.S. to Boost Gas Deliveries to Europe Amid Scramble for New Supplies;" *Wall Street Journal;* March 25, 2022.

[27] "New U.S. Gas-Export Plant Gets Green Light as Europe Thirsts for LNG;" *Wall Street Journal* (May 25, 2022).

[28] Independent Market Monitor; *Q1 2022 State of the Market Report for PJM (May 12, 2022);* page 161. LMP means "locational marginal price" which refers to the price-setting methodology used in PJM's wholesale electricity market.

- Annual average LMP prices have recovered since their recent low in 2020. (Note the January price spike in 2018, the result of extreme winter cold.)

Figure 3-28 Real-time monthly and yearly load-weighted average LMP: January 1999 through March 2022



Natural gas accounted for 38 percent of the PJM generation fuel mix during 2021 and is projected to increase to 40 percent in 2023.[29]

Coal

Coal has been displaced by natural gas and renewables in electricity generation. Nationwide, coal consumption in electric power generation has not returned to the peak level of 2007. [30]

- EIA reports that the delivered price of coal for power generation peaked at $2.39 in 2011.
- EIA estimates the delivered price of generation coal averaged $1.98 per MMBtu in 2021 and is forecasted to average $1.98 in 2022.[31]

In the PJM wholesale market that serves the District of Columbia, the cost of natural gas is a more important factor than coal in setting the overall level of wholesale market prices for electricity.[32]

- Coal represented 22 percent in 2021 and fell to 20 percent in 2022; it is projected to fall further to 18 percent in 2023.[33]

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29 *STEO*; Table 7d.

30 *STEO*; Table 6. Historical data can be found at http://www.eia.gov/totalenergy/data/annual/pdf/sec7_9.pdf.

31 *STEO*; Table 7a.

32 EIA reports prices for coal as delivered under long-term contracts that are less volatile than the spot prices reported for other fossil fuels. See Table 6, *STEO*.

33 *STEO;* Table 7d.

- Coal has fallen to third place behind nuclear and natural gas a share of the PJM fuel mix.

Across the United States, coal-fired generation plants are being retired and new natural gas-fired generation plants are being built, mirroring trends in the PJM region.

- EIA reports that the natural gas share of electricity generation nationwide was 39 percent in 2020 and decreased to 37 percent in 2021; it is projected to be 36 percent in 2022.
- Coal's share of generation nationwide rose from 20 percent in 2020 to 23 percent in 2021; it is projected to be 21 percent in 2022.[34]
- EIA's forecasted generation shares for coal and natural gas are very sensitive to the natural-gas price forecast.

Renewables

Nationwide, EIA projects that all non-hydropower renewables accounted for 12.2 percent of electricity generation in 2020 and may reach 15.4 percent in 2022.[35] Wind generated more electricity than hydropower for the first time in 2019. Growth of renewables is largely driven by policies rather than the relative price of fuel inputs, since wind and solar have zero fuel costs.

Renewable Portfolio Standards ("RPS") enacted by many states are stimulating the rapid growth of solar in the PJM market. This stimulus will intensify as scheduled increases will raise the RPS for solar in coming years, as shown in "Table 8-15" below.[36]

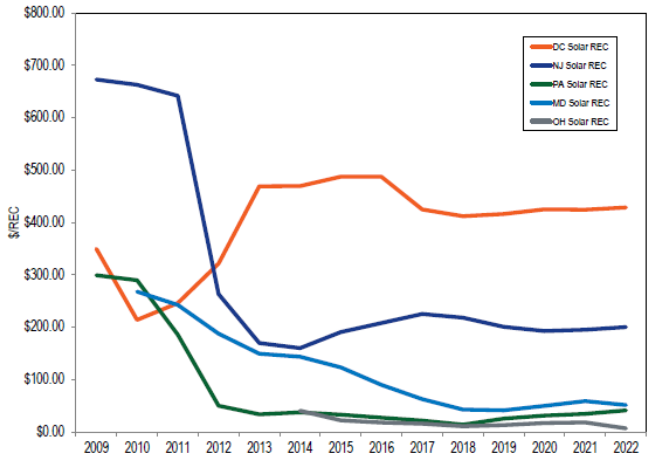
Table 8-15 Solar renewable standards by percent of electric load for PJM jurisdictions: 2021 to 2030[191]

Jurisdiction with RPS	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Delaware	2.50%	2.75%	3.00%	3.25%	3.50%	3.75%	4.00%	4.25%	4.50%	5.00%
Illinois (RECs)	5,500,000	5,500,000	5,500,000	5,500,000	5,500,000	5,500,000	5,500,000	5,500,000	5,500,000	24,750,000
Maryland	7.50%	5.50%	6.00%	6.50%	7.00%	8.00%	9.50%	11.00%	12.50%	14.50%
Michigan	No Minimum Solar Requirement									
New Jersey	5.10%	5.10%	4.90%	4.80%	4.50%	4.35%	3.74%	3.07%	2.21%	1.58%
North Carolina	0.20%	0.20%	0.20%	0.20%	0.20%	0.20%	0.20%	0.20%	0.20%	0.20%
Ohio	No Minimum Solar Requirement									
Pennsylvania	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%	0.50%
Washington, D.C.	2.50%	2.60%	2.85%	3.15%	3.45%	3.75%	4.10%	4.50%	4.75%	5.00%
Jurisdiction with Voluntary Standard										
Indiana	No Minimum Solar Requirement									
Virginia	No Minimum Solar Requirement									
Jurisdiction with No Standard										
Kentucky	No Renewable Portfolio Standard									
Tennessee	No Renewable Portfolio Standard									
West Virginia	No Renewable Portfolio Standard									

Prices for Solar Renewable Energy Credits ("SRECs") are much higher in the District of Columbia than in neighboring jurisdictions, see "Figure 8-6" below.[37]

34 *STEO;* Table 7d.
35 *STEO;* Table 7d.
36 Independent Market Monitor; *Q1 2022 State of the Market Report for PJM (May 12, 2022);* page 438.
37 Independent Market Monitor; *Q1 2022 State of the Market Report for PJM (May 12, 2022);* page 439.

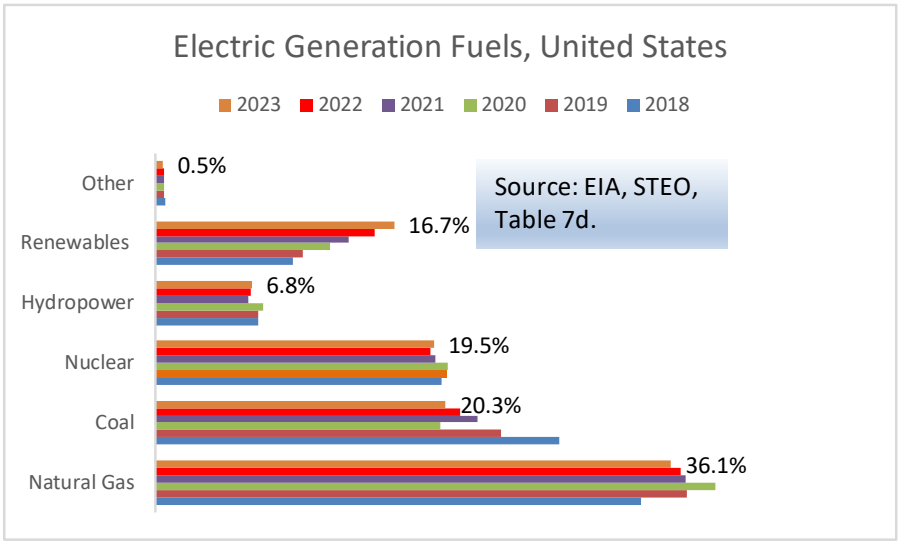
Figure 8-6 Average SREC price by jurisdiction: 2009 through March 2022



Trends in Generation Fuel Mix

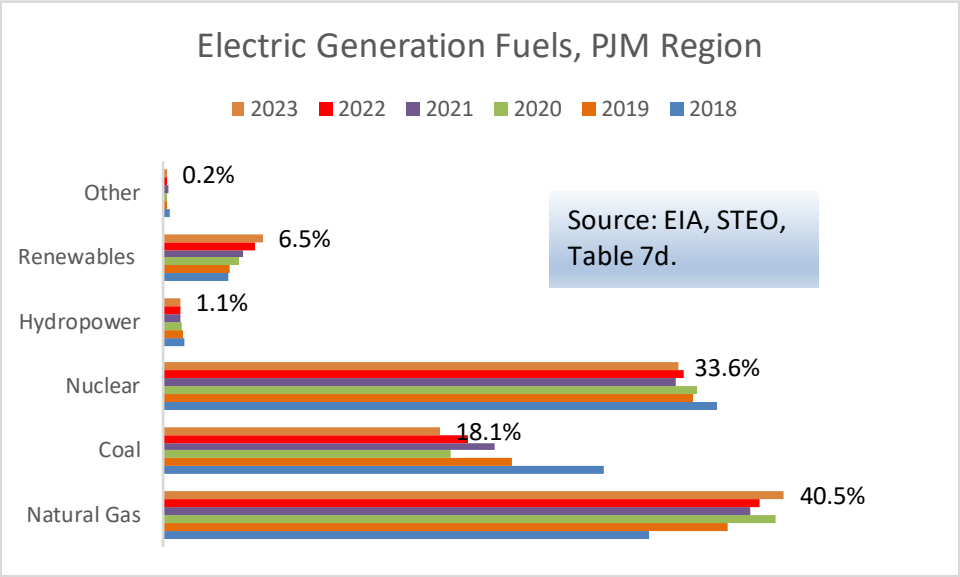
EIA's monthly *Short-Term Energy Outlook* includes forecasts of the fuel sources for electricity generation (natural gas, nuclear, renewables, and so forth).

- Nationwide, the share generated from renewables is projected to increase steadily.
- EIA expects a decrease in coal's share in 2022 and 2023.
- The shares of conventional hydro and nuclear generation are relatively stable.



EIA provides the same information for individual wholesale market regions such as PJM (see below). PJM reflects the national trends with some differences.

- Renewables are a smaller share of the generation mix in the PJM region compared to the nation as a whole; their share is also growing more slowly in the PJM region.
- The natural-gas share is growing in PJM and is projected to be larger than the U.S.-wide share by 2022.
- Coal will be a smaller share of PJM generation than nationwide by 2022.
- PJM has much less hydro capacity than the U.S. overall and a larger proportion of nuclear generation.



Weather Forecast

1. Current for next few days to one week:

   http://www.cnn.com/Weather/

   http://home.accuweather.com/

2. National Oceanic and Atmospheric Administration, Climate Prediction Center Outlook:

   http://www.cpc.ncep.noaa.gov/