

Pennsylvania Electricity Update



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The Independent Fiscal Office (IFO) publishes this research brief to provide a general overview of the Pennsylvania electricity market. This is an update of a research brief published by the IFO in September 2021 and incorporates the latest data published by the U.S. Energy Information Administration (EIA).

Table 1 - Electricity Exports by State (2021)

State	Net Generation				Total	Total Consumption	Net Exports
	Nat. Gas	Coal	Nuclear	Other			
Pennsylvania	127.3	29.3	75.9	9.1	241.6	156.2	85.5
West Virginia	2.7	59.6	--	3.4	65.6	35.3	30.3
Connecticut	24.5	0.2	17.2	2.1	44.1	30.0	14.1
North Carolina	47.1	20.4	43.1	20.6	131.3	145.6	-14.3
New Jersey	29.3	1.0	28.1	2.9	61.4	78.0	-16.6
Maryland	14.7	5.8	15.0	4.1	39.7	63.5	-23.8
New York	57.1	--	31.1	37.0	125.2	150.8	-25.6
Ohio	54.2	45.8	17.5	5.9	123.3	157.5	-34.1
Massachusetts	14.9	--	--	4.5	19.4	54.1	-34.7
Virginia	54.1	3.1	28.6	8.5	94.3	133.2	-38.8

Note: Amounts in millions of megawatt hours. Total consumption includes 2020 amounts for direct use and line losses, which are not yet available for 2021.
Source: U.S. Energy Information Administration.

Table 1 shows net electricity generation by fuel source, total electricity consumption and net exports for Pennsylvania and other regional states. Net generation is broken down into electricity generated from natural gas, coal, nuclear and other sources. Other sources include petroleum, hydroelectric, wind, solar and other renewable sources. Total consumption is the sum of (1) retail sales of electricity to all sectors (residential, commercial, industrial, transportation) within the state, (2) direct use electricity and (3) estimated line losses. Net exports are equal to net generation less total consumption.¹

For 2021, Pennsylvania exported more megawatt hours of electricity than any other state. The state’s net exports were 79.7% higher than Alabama (not shown), the second largest exporter of electricity. Among regional states, Pennsylvania was the largest producer and net exporter of electricity. Nearly all other states shown in Table 1 (except West Virginia and Connecticut) were net importers of electricity. Pennsylvania exported 35.3% of the electricity it generated in 2021, behind only West Virginia (46.1%) among regional states.

Table 2 (next page) shows recent trends in average electricity prices for residential customers in Pennsylvania and regional states. The table shows the average price in 2016, the average price in 2021, and the ratio of other states’ prices to the Pennsylvania price. The residential price in Pennsylvania declined by 0.5% from 2016 to 2021. That trend is due to increasing natural gas production that provided a relatively low-cost input for electricity generators in the state. Moreover, the share of total electricity generation from

¹ This computation generally follows the EIA methodology used to compute net interstate trade.

Table 2 - Residential Electricity Price

State	2016	2021	2016 Ratio	2021 Ratio
Massachusetts	19.00	22.91	1.37	1.66
Connecticut	20.01	21.86	1.44	1.59
New York	17.58	19.44	1.27	1.41
New Jersey	15.72	16.37	1.13	1.19
Pennsylvania	13.86	13.79	--	--
Maryland	14.23	13.14	1.03	0.95
Ohio	12.47	12.78	0.90	0.93
West Virginia	11.44	12.16	0.83	0.88
Virginia	11.36	12.14	0.82	0.88
North Carolina	11.03	11.50	0.80	0.83

Note: Cents per kilowatt hour.

Source: U.S. Energy Information Administration.

Pennsylvania plants that use natural gas increased from 28% to 53% during that period. For the New England states, New York and New Jersey, prices were higher than Pennsylvania in 2016, and the differential widened through 2021. The average residential price in states located south or west of Pennsylvania were lower in 2016 (i.e., the price ratio was below 1.0), and the relative price differential narrowed over time. Maryland is the sole exception to these trends.

Table 3 uses net generation and carbon dioxide emissions from electricity generators to calculate carbon emissions per kilowatt hour for the same states for 2007 and 2021. Calendar year 2007 was used because that year marks the recent peak of power sector carbon dioxide emissions for Pennsylvania. During that period, Pennsylvania generation increased by 6.9%, but carbon emissions declined by 37.4%. Among the states shown, the average reduction in emissions per unit from 2007 to 2021 was 32.2%. Pennsylvania's carbon emissions per unit decreased by 41.4%, notably higher than the average. This outcome is due to the significant shift from coal to natural gas in the state's electricity generation mix over that period.

Table 3 - Electricity Generation Carbon Dioxide Emissions

State	Generation		Emissions		Emissions per Unit	
	2007	2021	2007	2021	2007	2021
New York	145.9	125.2	53.7	28.7	0.37	0.23
New Jersey	62.7	61.4	20.8	14.5	0.33	0.24
Connecticut	33.2	44.1	10.5	10.6	0.32	0.24
Virginia	78.4	94.3	47.2	27.3	0.60	0.29
North Carolina	130.1	131.3	79.4	40.5	0.61	0.31
Pennsylvania	226.1	241.6	129.3	81.0	0.57	0.34
Maryland	50.2	39.7	31.5	15.2	0.63	0.38
Massachusetts	47.1	19.4	25.8	8.4	0.55	0.43
Ohio	155.2	123.3	132.0	68.7	0.85	0.56
West Virginia	93.9	65.6	87.3	58.4	0.93	0.89

Note: Generation in million megawatt hours. Emissions in million metric tons.

Source: U.S. Energy Information Administration. 2021 Emissions are estimated by the IFO based on 2021 generation and 2020 emissions per unit.

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