



U.S. Energy Information  
Administration

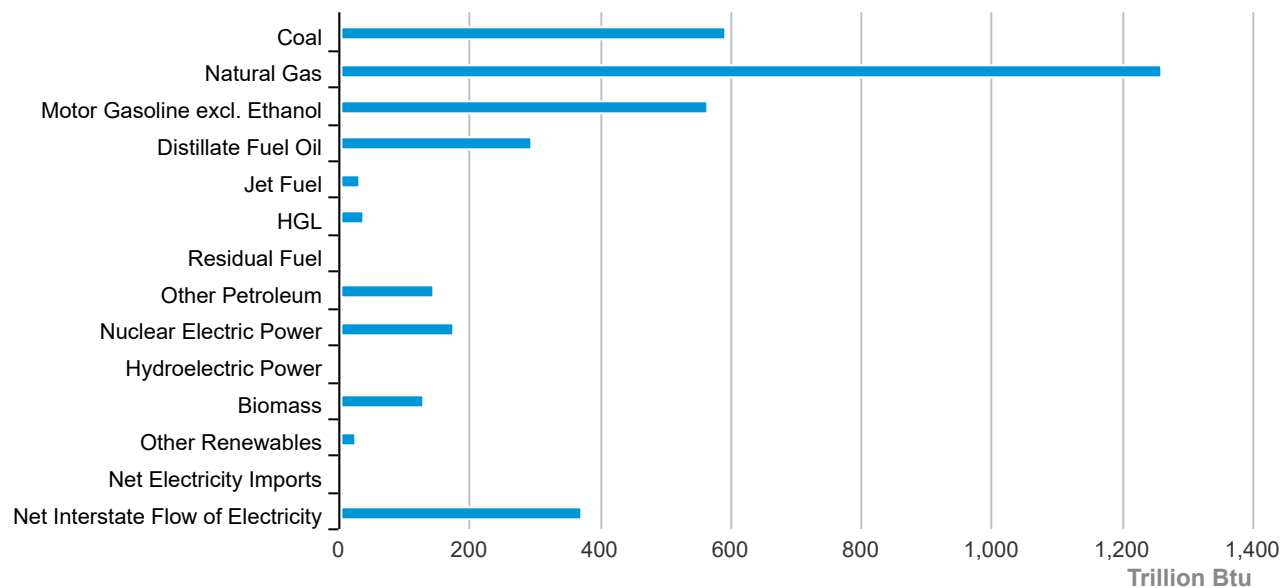
## Ohio State Energy Profile

### Ohio Quick Facts

- Production from the Utica Shale accounts for almost all of the rapid increase in Ohio's natural gas output, which was more than 30 times higher in 2020 than in 2010.
- Ohio is the eighth-largest ethanol-producing state in the nation, and its seven ethanol plants have a production capacity of more than 700 million gallons per year.
- Ohio has the sixth-largest crude oil-refining capacity in the nation, and the state's four refineries can process a combined total of nearly 601,000 barrels of crude oil per calendar day.
- Ohio is one of the top 10 coal-consuming states in the nation. Three times as much coal is consumed in Ohio as is produced in the state.
- In 2020, Ohio was the fourth-largest electricity consumer among the states and ranked among the top 10 states in electricity net generation. Natural gas has fueled the largest share of Ohio's in-state net generation since 2019.

Last Updated: July 15, 2021

### Ohio Energy Consumption Estimates, 2019



Source: Energy Information Administration, State Energy Data System

## Data

**Last Update:** December 16, 2021 | **Next Update:** January 20, 2021

### Energy Indicators

Demography	Ohio	Share of U.S.	Period
Population	11.7 million	3.5%	2020
Civilian Labor Force	5.7 million	3.5%	Oct-21
Economy	Ohio	U.S. Rank	Period
Gross Domestic Product	\$ 675.0 billion	7	2020
Gross Domestic Product for the Manufacturing Sector	\$ 106,918 million	3	2020
Per Capita Personal Income	\$ 53,296	33	2020
Vehicle Miles Traveled	114,694 million miles	7	2019
Land in Farms	14.0 million acres	21	2017
Climate	Ohio	U.S. Rank	Period
Average Temperature	53.0 degrees Fahrenheit	25	2020
Precipitation	42.3 inches	23	2020

### Prices

Petroleum	Ohio	U.S. Average	Period	<a href="#">find more</a>
<a href="#">Domestic Crude Oil First Purchase</a>	\$ 65.93 /barrel	\$ 69.08 /barrel	Sep-21	
Natural Gas	Ohio	U.S. Average	Period	<a href="#">find more</a>
<a href="#">City Gate</a>	\$ 6.24 /thousand cu ft	\$ 6.25 /thousand cu ft	Sep-21	<a href="#">find more</a>
<a href="#">Residential</a>	\$ 32.28 /thousand cu ft	\$ 20.22 /thousand cu ft	Sep-21	<a href="#">find more</a>
Coal	Ohio	U.S. Average	Period	<a href="#">find more</a>
<a href="#">Average Sales Price</a>	\$ 38.49 /short ton	\$ 31.41 /short ton	2020	
<a href="#">Delivered to Electric Power Sector</a>	W	\$ 2.01 /million Btu	Sep-21	
Electricity	Ohio	U.S. Average	Period	<a href="#">find more</a>
<a href="#">Residential</a>	13.12 cents/kWh	14.19 cents/kWh	Sep-21	<a href="#">find more</a>
<a href="#">Commercial</a>	10.06 cents/kWh	11.76 cents/kWh	Sep-21	<a href="#">find more</a>
<a href="#">Industrial</a>	6.85 cents/kWh	7.71 cents/kWh	Sep-21	<a href="#">find more</a>

**Reserves**

<b>Reserves</b>	<b>Ohio</b>	<b>Share of U.S.</b>	<b>Period</b>	<a href="#">find more</a>
Crude Oil (as of Dec. 31)	88 million barrels	0.2%	2019	<a href="#">find more</a>
Expected Future Production of Dry Natural Gas (as of Dec. 31)	34,056 billion cu ft	7.3%	2019	<a href="#">find more</a>
Expected Future Production of Natural Gas Plant Liquids	--	--	2019	<a href="#">find more</a>
Recoverable Coal at Producing Mines	54 million short tons	0.4%	2020	<a href="#">find more</a>
<b>Rotary Rigs &amp; Wells</b>	<b>Ohio</b>	<b>Share of U.S.</b>	<b>Period</b>	<a href="#">find more</a>
Natural Gas Producing Wells	27,225 wells	5.6%	2020	<a href="#">find more</a>
<b>Capacity</b>	<b>Ohio</b>	<b>Share of U.S.</b>	<b>Period</b>	
Crude Oil Refinery Capacity (as of Jan. 1)	601,800 barrels/calendar day	3.2%	2020	
Electric Power Industry Net Summer Capacity	28,141 MW	2.5%	Sep-21	

**Supply & Distribution**

<b>Production</b>	<b>Ohio</b>	<b>Share of U.S.</b>	<b>Period</b>	<a href="#">find more</a>
Total Energy	3,606 trillion Btu	3.6%	2019	<a href="#">find more</a>
Crude Oil	44 thousand barrels per day	0.4%	Sep-21	<a href="#">find more</a>
Natural Gas - Marketed	2,378,902 million cu ft	6.6%	2020	<a href="#">find more</a>
Coal	3,587 thousand short tons	0.7%	2020	<a href="#">find more</a>
<b>Total Utility-Scale Net Electricity Generation</b>	<b>Ohio</b>	<b>Share of U.S.</b>	<b>Period</b>	<a href="#">find more</a>
Total Net Electricity Generation	10,372 thousand MWh	3.0%	Sep-21	
<b>Utility-Scale Net Electricity Generation (share of total)</b>	<b>Ohio</b>	<b>U.S. Average</b>	<b>Period</b>	
Petroleum-Fired	0.1 %	0.3 %	Sep-21	<a href="#">find more</a>
Natural Gas-Fired	37.5 %	39.6 %	Sep-21	<a href="#">find more</a>
Coal-Fired	42.2 %	22.7 %	Sep-21	<a href="#">find more</a>
Nuclear	14.9 %	18.5 %	Sep-21	<a href="#">find more</a>
Renewables	3.9 %	18.3 %	Sep-21	

**Supply & Distribution**

<b>Stocks</b>	<b>Ohio</b>	<b>Share of U.S.</b>	<b>Period</b>	<a href="#">find more</a>
<a href="#">Motor Gasoline (Excludes Pipelines)</a>	815 thousand barrels	6.0%	Sep-21	
<a href="#">Distillate Fuel Oil (Excludes Pipelines)</a>	2,106 thousand barrels	2.1%	Sep-21	<a href="#">find more</a>
<a href="#">Natural Gas in Underground Storage</a>	500,881 million cu ft	6.5%	Sep-21	<a href="#">find more</a>
<a href="#">Petroleum Stocks at Electric Power Producers</a>	383 thousand barrels	1.7%	Sep-21	<a href="#">find more</a>
<a href="#">Coal Stocks at Electric Power Producers</a>	6,390 thousand tons	7.9%	Sep-21	<a href="#">find more</a>
<b>Fueling Stations</b>	<b>Ohio</b>	<b>Share of U.S.</b>	<b>Period</b>	
Motor Gasoline	3,907 stations	3.5%	2019	
Propane	66 stations	2.4%	2021	
Electricity	744 stations	1.8%	2021	
E85	188 stations	5.1%	2021	
Compressed Natural Gas and Other Alternative Fuels	43 stations	3.4%	2021	

**Consumption & Expenditures**

<b>Summary</b>	<b>Ohio</b>	<b>U.S. Rank</b>	<b>Period</b>	
<a href="#">Total Consumption</a>	3,634 trillion Btu	8	2019	<a href="#">find more</a>
<a href="#">Total Consumption per Capita</a>	311 million Btu	25	2019	<a href="#">find more</a>
<a href="#">Total Expenditures</a>	\$ 41,988 million	7	2019	<a href="#">find more</a>
<a href="#">Total Expenditures per Capita</a>	\$ 3,590	32	2019	<a href="#">find more</a>
<b>by End-Use Sector</b>	<b>Ohio</b>	<b>Share of U.S.</b>	<b>Period</b>	
Consumption				
» <a href="#">Residential</a>	876 trillion Btu	4.2%	2019	<a href="#">find more</a>
» <a href="#">Commercial</a>	678 trillion Btu	3.8%	2019	<a href="#">find more</a>
» <a href="#">Industrial</a>	1,187 trillion Btu	3.6%	2019	<a href="#">find more</a>
» <a href="#">Transportation</a>	894 trillion Btu	3.1%	2019	<a href="#">find more</a>
Expenditures				
» <a href="#">Residential</a>	\$ 9,996 million	3.8%	2019	<a href="#">find more</a>
» <a href="#">Commercial</a>	\$ 6,121 million	3.2%	2019	<a href="#">find more</a>

**Consumption & Expenditures**

» <a href="#">Industrial</a>	\$ 7,611 million	3.8%	2019	<a href="#">find more</a>
» <a href="#">Transportation</a>	\$ 18,260 million	3.2%	2019	<a href="#">find more</a>
by Source	Ohio	Share of U.S.	Period	
Consumption				
» <a href="#">Petroleum</a>	211 million barrels	2.8%	2019	<a href="#">find more</a>
» <a href="#">Natural Gas</a>	1,181 billion cu ft	3.8%	2019	<a href="#">find more</a>
» <a href="#">Coal</a>	24 million short tons	4.0%	2019	<a href="#">find more</a>
Expenditures				
» <a href="#">Petroleum</a>	\$ 21,703 million	3.1%	2019	<a href="#">find more</a>
» <a href="#">Natural Gas</a>	\$ 6,495 million	4.3%	2019	<a href="#">find more</a>
» <a href="#">Coal</a>	\$ 1,418 million	5.6%	2019	<a href="#">find more</a>
Consumption for Electricity Generation	Ohio	Share of U.S.	Period	<a href="#">find more</a>
<a href="#">Petroleum</a>	16 thousand barrels	1.0%	Sep-21	<a href="#">find more</a>
<a href="#">Natural Gas</a>	27,988 million cu ft	2.7%	Sep-21	<a href="#">find more</a>
<a href="#">Coal</a>	1,837 thousand short tons	4.1%	Sep-21	<a href="#">find more</a>
Energy Source Used for Home Heating (share of households)	Ohio	U.S. Average	Period	
Natural Gas	65.0 %	47.8 %	2019	
Fuel Oil	2.0 %	4.4 %	2019	
Electricity	24.7 %	39.5 %	2019	
Propane	5.4 %	4.8 %	2019	
Other/None	2.9 %	3.5 %	2019	

**Environment**

Renewable Energy Capacity	Ohio	Share of U.S.	Period	<a href="#">find more</a>
<a href="#">Total Renewable Energy Electricity Net Summer Capacity</a>	1,808 MW	0.7%	Sep-21	
<a href="#">Ethanol Plant Nameplate Capacity</a>	743 million gal/year	4.2%	2021	
Renewable Energy Production	Ohio	Share of U.S.	Period	<a href="#">find more</a>
<a href="#">Utility-Scale Hydroelectric Net Electricity Generation</a>	29 thousand MWh	0.2%	Sep-21	

**Environment**

Utility-Scale Solar, Wind, and Geothermal Net Electricity Generation	326 thousand MWh	0.8%	Sep-21	
Utility-Scale Biomass Net Electricity Generation	47 thousand MWh	1.0%	Sep-21	
Small-Scale Solar Photovoltaic Generation	26 thousand MWh	0.6%	Sep-21	
Fuel Ethanol Production	14,934 thousand barrels	4.0%	2019	
<b>Renewable Energy Consumption</b>	<b>Ohio</b>	<b>U.S. Rank</b>	<b>Period</b>	<a href="#">find more</a>
Renewable Energy Consumption as a Share of State Total	4.4 %	46	2019	
Fuel Ethanol Consumption	11,563 thousand barrels	7	2019	
<b>Total Emissions</b>	<b>Ohio</b>	<b>Share of U.S.</b>	<b>Period</b>	<a href="#">find more</a>
Carbon Dioxide	208.8 million metric tons	4.0%	2018	
<b>Electric Power Industry Emissions</b>	<b>Ohio</b>	<b>Share of U.S.</b>	<b>Period</b>	<a href="#">find more</a>
Carbon Dioxide	67,225 thousand metric tons	4.3%	2020	
Sulfur Dioxide	84 thousand metric tons	8.2%	2020	
Nitrogen Oxide	50 thousand metric tons	4.1%	2020	

## Analysis

Last Updated: July 15, 2021

## Overview

Ohio is a highly industrialized state that has abundant natural resources.<sup>1</sup> Named after the river that forms its southern boundary, Ohio is a Great Lakes state bordered on the north by Lake Erie, the eleventh-largest lake in the world by surface area.<sup>2</sup> Ports along the state's more than 300 miles of Lake Erie shoreline and on the Ohio River give the Midwestern state access to domestic and international markets.<sup>3</sup> Coal and petroleum are shipped by way of the Ohio River to the Mississippi River and from the state's Lake Erie ports into the St. Lawrence Seaway system.<sup>4</sup> The eastern half of Ohio is occupied by the hills and valleys of the Appalachian Plateau, part of the larger Appalachian Basin. Ohio's coal resources and most of the state's many natural gas and crude oil fields are located there.<sup>5</sup> Western Ohio's rolling plains have some of the most fertile farmland in the nation and mark the beginning of the nation's Corn Belt, which extends westward across the Midwest.<sup>6</sup> Corn and soybeans are the state's leading crops, and corn is the feedstock for Ohio's fuel ethanol production.<sup>7,8</sup> Prevailing winds that blow across the state provide western Ohio with moderate onshore wind resources, and winds that blow across Lake Erie provide stronger offshore wind energy resources.<sup>9</sup>

With its large population, heavily industrialized economy, and wide seasonal temperature variations, Ohio is among the top 10 states in total energy consumption.<sup>10,11,12</sup> However, per capita total energy consumption in the state is near the national average.<sup>13</sup> Ohio's industrial sector accounts for about one-third of the state's total end-use energy

consumption.<sup>14</sup> Ohio's primary economic activities are in the financial and manufacturing sectors. A significant amount of Ohio's manufacturing is related to the production of chemicals; motor vehicles and transportation equipment; fabricated metal products; food, beverage, and tobacco products; and machinery. Mining, which includes the extraction of natural gas, coal, and crude oil, is also an important contributor to the state's economy.<sup>15</sup> With the fourth-largest interstate highway system in the nation, Ohio's transportation sector consumes the second-largest share of the energy delivered to end-users in the state—about one-fourth of the state's total.<sup>16</sup> The residential sector follows closely and accounts for almost one-fourth of Ohio's energy use, while the commercial sector consumes less than one-fifth.<sup>17</sup>

## Natural gas

Ohio has about 7% of the nation's natural gas reserves and accounts for about 7% of U.S. natural gas marketed production.<sup>18</sup> The state's natural gas gross withdrawals rose sharply after 2012 in large part because of increased production from shale formations, where horizontal drilling and hydraulic fracturing techniques release trapped natural gas.<sup>19,20</sup> In 2019, natural gas production in Ohio peaked at almost 34 times its 2010 volumes. Although production declined in 2020, it was still almost 31 times higher than a decade earlier.<sup>21</sup> Ohio's marketed natural gas production surpassed state demand for the first time in 2015.<sup>22,23</sup>

Because Ohio produces more natural gas than it consumes, a larger amount of natural gas leaves the state by interstate pipelines than enters.<sup>24</sup> Some of the natural gas that remains in Ohio is consumed in the state, and some is injected into underground natural gas storage reservoirs for later use. Ohio has the seventh-largest natural gas storage capacity among the states. Its 24 underground natural gas storage fields have a combined total storage capacity of about 575 billion cubic feet, which is about 6% of the U.S. total.<sup>25,26</sup> Natural gas is withdrawn from Ohio storage fields primarily between October and April to meet increased demand for heating.<sup>27</sup>

*In 2020,  
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Ohio is one of the nation's top 10 natural gas-consuming states. However, the state's per capita total natural gas consumption is less than in almost one-third of the states.<sup>28,29</sup> Natural gas use at Ohio's power plants increased markedly during the past decade and was more than six times greater in 2020 than in 2010.<sup>30</sup> In 2018, the electric power sector became the state's largest natural gas consumer for the first time, and, in 2020, it accounted for more than one-third of the total natural gas delivered to consumers. Ohio's industrial sector and the state's residential sector, where about two-thirds of households use natural gas for home heating, each account for about one-fourth of the state's total natural gas deliveries to consumers. Almost all the rest is used in the commercial sector.<sup>31,32</sup>

## Coal

Ohio has almost 5% of U.S. estimated recoverable coal reserves.<sup>33</sup> The state is the nation's tenth-largest producer of bituminous coal, the only type of coal mined in Ohio, and is the fourteenth-largest coal-producing state overall.<sup>34</sup> In 2019, two-thirds of the operating mines in Ohio were surface mines, but more than four-fifths of the state's coal production came from underground mines.<sup>35</sup> Slightly more than two-thirds of the coal mined in Ohio was used in the state in 2019. The rest was shipped to West Virginia, Kentucky, and Pennsylvania. Almost all of Ohio's coal fuels electricity generation.<sup>36</sup>

Coal from Ohio and other states is shipped from the state's ports along Lake Erie and on the Ohio River.<sup>37</sup> The Cleveland Customs District on Lake Erie is a leading port for U.S. coal exports.<sup>38</sup> Coal is transferred from railcars to ships at several points along the Lake, including ports at Toledo and Lorain. It is then sent to ports throughout the Great Lakes region and overseas.<sup>39</sup> Coal is also shipped on the Ohio River from Cincinnati, one of the nation's largest inland coal ports.<sup>40</sup>

Ohio is one of the top 10 coal-consuming states in the nation.<sup>41</sup> About three times as much coal is consumed in Ohio as is produced there.<sup>42,43</sup> To meet Ohio's needs, coal is brought in from several surrounding states by barge, rail, and truck. Coal arrives primarily from West Virginia, Pennsylvania, Illinois, Indiana, and Kentucky. Lesser amounts of coal come from several other states, including from as far away as Colorado and Wyoming.<sup>44</sup> In 2019, 85% of the coal consumed in Ohio was used for electric power generation. Most of the remaining coal was consumed at coking plants, and a small amount was delivered to other industrial users.<sup>45</sup>

*Ohio is among the top 10 coal-consuming states in the nation.*

## Petroleum

Ohio's crude oil reserves are modest and the state contributes less than 1% to the nation's total crude oil production.<sup>46</sup> Nonetheless, Ohio is the largest oil-producing state that is situated entirely east of the Mississippi River. Oil production in Ohio reached a record high of about 28 million barrels in 2019.<sup>47,48</sup> Production increased in recent years because of the use of advanced drilling technologies, including hydraulic fracturing and horizontal drilling, to access oil trapped within the Utica shale formation.<sup>49</sup>

*Ohio is the largest oil-producing state east of the Mississippi River.*

Ohio's four crude oil refineries have a combined processing capacity of more than 600,000 barrels of crude oil per calendar day, about 3% of the nation's total.<sup>50,51</sup> Collectively, the refineries can process a wide variety of crude oils from light, sweet crudes to heavy, sour ones. The crude oils come from many different areas, including Canada, the Midcontinent region, North Dakota, the Appalachian Basin, and the U.S. Gulf Coast. Ohio's refinery products, including motor gasoline, distillates, aviation fuels, petrochemical feedstocks, asphalt, and other byproducts, are transported by pipeline, truck, and rail to markets throughout the Midwest.<sup>52,53,54</sup> Petroleum products also move in and out of Ohio's port facilities on Lake Erie.<sup>55</sup>

Ohio is among the nation's top 10 petroleum-consuming states. Almost four-fifths of the petroleum used in Ohio is consumed in the transportation sector, mainly as motor gasoline and diesel fuel.<sup>56,57</sup> Conventional motor gasoline without ethanol can be sold throughout the state. Although almost all U.S. gasoline is blended with at least 10% ethanol, some Ohio fueling stations also sell gasoline blended with 15% ethanol.<sup>58,59</sup> Additionally, more than 200 public access fueling stations in Ohio sell E85, a blend of motor gasoline that contains 85% ethanol.<sup>60</sup> The industrial sector is Ohio's second-largest consumer of petroleum, accounting for about 15% of the state's total petroleum use. The residential sector—where about 7 in 100 Ohio households use heating oil, kerosene, or propane for heating—and the state's commercial sector each account for about 3%. Ohio's electric power sector accounts for less than 1% of the state's petroleum consumption.<sup>61,62</sup>

## Electricity

For decades, coal was the primary fuel for electricity generation in Ohio. However, in 2019, natural gas fueled more in-state electricity net generation than coal in Ohio for the first time. In recent years, coal's share of generation and the number of coal-fired power plants in the state have decreased. Although 6 of Ohio's 10 largest power plants by capacity were coal-fired in 2019, only 4 were among the 10 largest power plants based on the amount of electricity actually generated.<sup>63</sup> In 2020, an additional 1,500 megawatts of the state's coal-fired generating capacity retired, but coal still fueled 37% of the state's net generation that year.<sup>64</sup> Increased natural gas-fired generation has offset much of the power decrease caused by coal-fired power plant retirements. The share of Ohio's net generation provided by natural gas increased from less than 2% of the state's generation in 2008 to 43% in 2020. Ohio's two nuclear power plants, located near Toledo and Cleveland, supplied about 15% of the state's net generation in 2020.<sup>65,66</sup> Renewable energy resources, primarily wind, accounted for most of the rest.<sup>67</sup>



Ohio is one of the nation's top 10 electricity producers, and the state ranks among the top 5 electricity consumers.<sup>68,69</sup> However, per capita electricity retail sales in Ohio are less than in about half of the states.<sup>70</sup> The residential sector, where almost one in four households heat with electricity, accounts for the largest share of electricity retail sales in Ohio—about 38% of the state total. The industrial and commercial sectors each account for about 31% of Ohio's electricity use.<sup>71,72</sup> Because in-state generation does not meet consumer demand, Ohio imports about one-fourth of the electricity it needs from other states and Canada.<sup>73</sup>

Ohio is part of the PJM Interconnection, which coordinates the movement of electricity through all or part of 13 states and the District of Columbia between the Mississippi River and the Atlantic Ocean.<sup>74</sup> In August 2003, the failure of a transmitter in northeastern Ohio led to what was the largest blackout in North America.<sup>75</sup> It took only nine seconds for the grid to collapse, and it affected more than 50 million people in the northeastern United States and Canada.<sup>76</sup> A U.S.-Canadian joint task force investigated the causes of the blackout and a number of their recommendations were incorporated into the federal law that created the North American Electric Reliability Corporation, which assesses the reliability of the grid, develops reliability standards, and enforces compliance.<sup>77</sup>

*Ohio is among the nation's top 10 electricity producers and one of the top 5 electricity consumers.*

## Renewable energy

Renewable energy resources supplied about 3% of Ohio's total in-state electricity generation in 2020. Wind power provided three-fifths of the state's renewable generation.<sup>78</sup> Completed in 2012, the 304-megawatt Blue Creek Wind Farm, with 152 two-megawatt turbines, is the state's largest wind farm.<sup>79,80</sup> By April 2021, Ohio had more than 850 megawatts of installed wind generating capacity.<sup>81</sup> Most of the state's wind farms are located in northwestern Ohio, the area with the state's greatest wind potential.<sup>82,83</sup> A 21-megawatt offshore wind project called Icebreaker, which would be located in Lake Erie eight miles from the Cleveland shoreline, has faced opposition from environmental groups.<sup>84,85</sup>

Biomass, from wood and wood waste, landfill gas, and other feedstocks, accounts for the second-largest share of renewable electricity generation in Ohio at nearly one-fifth. There are 17 utility-scale power plants fueled with biomass in Ohio.<sup>86,87</sup> Biomass resources also provide feedstock for three wood pellet manufacturing plants in the state that together can produce about 83,000 tons of pellets per year. Wood pellets are used for electricity generation and space heating.<sup>88,89</sup>

Solar energy and hydroelectric power each accounted for a little more than one-tenth of Ohio's total renewable generation in 2020. More than half of the solar power came from small-scale (less than 1 megawatt), customer-sited solar photovoltaic (PV) generating systems like rooftop solar panels. The rest came from 30 utility-scale (1 megawatt or larger) solar PV facilities.<sup>90</sup> The state's two largest solar installations were the 20-megawatt Bowling Green solar project and the 13-megawatt Piqua-Manier solar project until early 2021, when the 150-megawatt Hardin Solar Energy project came online. Several additional large solar projects are planned.<sup>91,92</sup>

Ohio also produces biofuels and the state is the nation's eighth-largest fuel ethanol producer.<sup>93</sup> Ohio's seven fuel ethanol plants use corn as a feedstock and can produce more than 700 million gallons of ethanol per year, which is almost 1.5 times the state's annual consumption.<sup>94,95,96</sup> Ohio also has one biodiesel plant that has a production capacity of about 71 million gallons per year.<sup>97</sup> Ohio is among the top 10 biodiesel-consuming states in the nation and consumed almost 46 million gallons of biodiesel in 2019.<sup>98</sup>

*Ohio is the nation's eighth-largest fuel ethanol producer.*

In 2008, Ohio implemented an alternative energy portfolio standard (AEPS) and an energy efficiency portfolio standard (EEPS) for investor-owned utilities and retail suppliers, but not for municipal utilities and electric cooperatives. In 2019, the state legislature lowered the previously mandated AEPS target. Now 8.5%

of electricity retail sales are to come from renewable energy-sourced electricity by 2026. Waste heat recovery and fuel cells that use non-renewable fuels are among the eligible technologies. The 2019 legislation eliminated an earlier solar power requirement after 2020.<sup>99,100</sup> Ohio's EEPs requires that utilities put in place energy efficiency and peak demand reduction programs to achieve cumulative electric savings of 22% through 2027.<sup>101</sup> Ohio requires electric utilities to offer net metering to customers who generate electricity from wind energy, solar energy, biomass, landfill gas, hydropower, fuel cells, or microturbines, and the state has interconnection standards for systems up to 20 megawatts.<sup>102,103</sup>

## Endnotes

<sup>1</sup> NETSTATE, Ohio, The State of Ohio, updated July 28, 2017.

<sup>2</sup> Lake Erie Waterkeeper, Lake Erie Facts, accessed June 15, 2021.

<sup>3</sup> NETSTATE, Ohio, The Geography of Ohio, The Land, updated February 25, 2016.

<sup>4</sup> World Port Source, Port of Toledo Port Commerce, Port Lorain Port Commerce, and Port of Cincinnati Port Commerce, accessed June 15, 2021.

<sup>5</sup> U.S. Energy Information Administration (EIA), Ohio Profile Overview, All Coal Mines Map Layer and Oil and Gas Wells Map Layer, accessed June 15, 2021.

<sup>6</sup> NETSTATE, Ohio, The Geography of Ohio, The Land, updated February 25, 2016.

<sup>7</sup> U.S. Department of Agriculture, National Agricultural Statistics Service, 2020 State Agriculture Overview, Ohio.

<sup>8</sup> "U.S. Ethanol Plants," Ethanol Producer Magazine, updated May 26, 2021.

<sup>9</sup> U.S. Department of Energy, Energy Efficiency and Renewable Energy, WINDEXchange, Wind Energy in Ohio, accessed June 15, 2021.

<sup>10</sup> U.S. Census Bureau, Data, State Population Totals: 2010-2020, Annual Estimates of the Resident Population for the United States, Regions, States, and Puerto Rico: April 1, 2010 to July 1, 2020.

<sup>11</sup> Rogers, Jeffery, "Ohio's New Era of Climate Extremes," CoCoRaHS 'State Climates' Series, accessed June 15, 2021.

<sup>12</sup> Encyclopaedia Britannica, Ohio, Manufacturing, accessed May 24, 2021.

<sup>13</sup> U.S. EIA, State Energy Data System, Rankings: Total Energy Consumed per Capita, 2018.

<sup>14</sup> U.S. EIA, State Energy Data System, Table F33, Total Energy Consumption, Price, and Expenditure Estimates, 2019.

<sup>15</sup> U.S. Bureau of Economic Analysis, Regional Data, GDP and Personal Income, Annual Gross Domestic Product (GDP) by State, GDP in Current Dollars, Ohio, All Statistics in Table, Ohio, 2019.

<sup>16</sup> Deye, Andrew, "Ohio's Outstanding Transportation Infrastructure Is a Key Selling Point," Ohio Economic Development Association Newsletter (February 23, 2018).

<sup>17</sup> U.S. EIA, State Energy Data System, Table F33, Total Energy Consumption, Price, and Expenditure Estimates, 2019.

<sup>18</sup> U.S. EIA, Ohio Profile Data, Reserves and Supply & Distribution, accessed June 15, 2021.

<sup>19</sup> U.S. EIA, Ohio Natural Gas Gross Withdrawals from Shale Gas, 2007-19.

<sup>20</sup> Hoover, Shane, "Ohio's Utica shale drilling numbers staying consistent," CantonRep.com (April 8, 2019).

<sup>21</sup> U.S. EIA, Ohio Natural Gas Gross Withdrawals, 1967-2020.

<sup>22</sup> U.S. EIA, Ohio Natural Gas Total Consumption, 1997-2019.

<sup>23</sup> U.S. EIA, Ohio Natural Gas Marketed Production, 1967-2020.

<sup>24</sup> U.S. EIA, International and Interstate Movements of Natural Gas by State, Ohio, 2014-19.

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## Other Resources

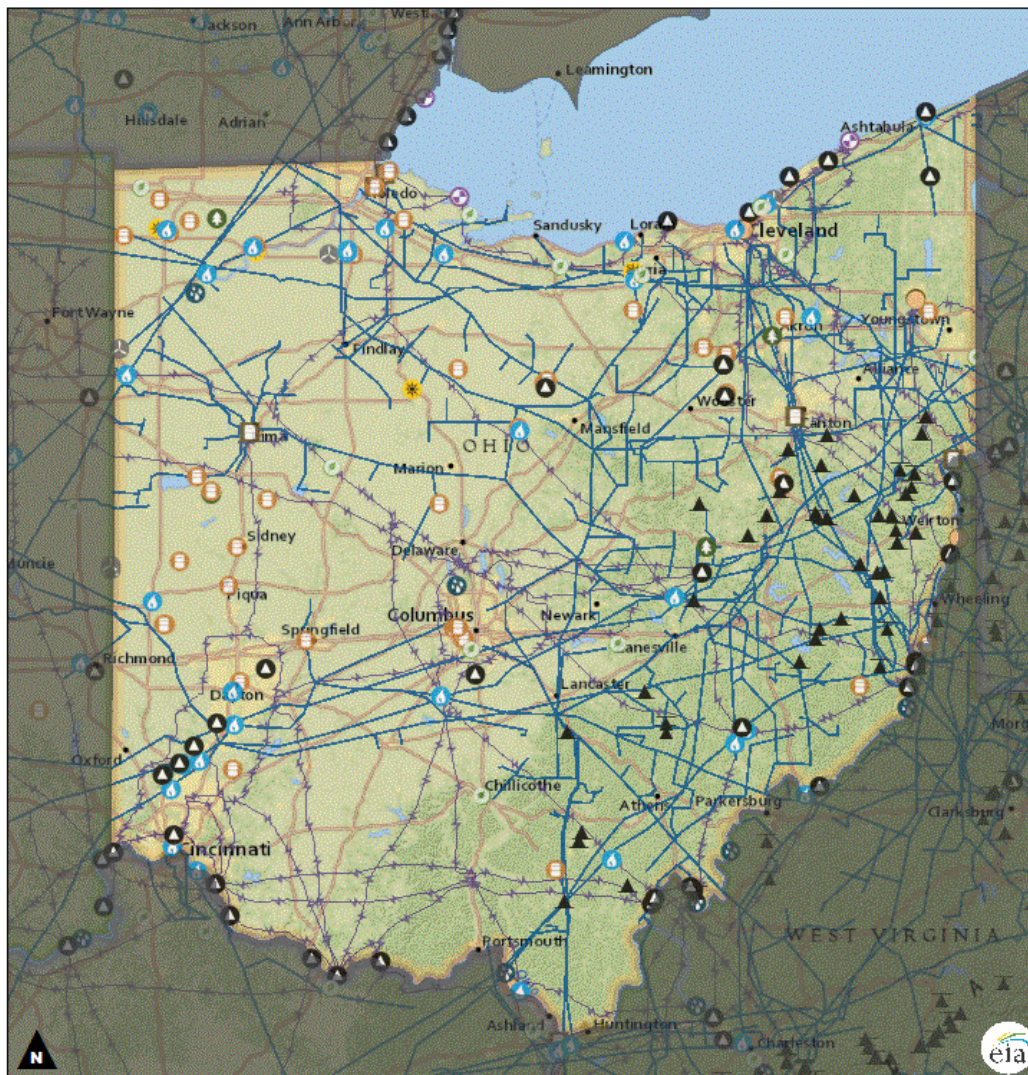
### Energy-Related Regions and Organizations

- [Coal Region: Appalachian](#)
- [Petroleum Administration for Defense District \(PADD\): 2](#)
- [North American Electric Reliability Corporation \(NERC\) Regional Entity: Reliability First Corporation \(RFC\)](#)
- [Regional Transmission Organization \(RTO\)/Independent System Operator \(ISO\): PJM Interconnection \(PJM\)](#)

### Other Websites

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- [Ohio Department of Natural Resources Division of Oil and Gas Resources](#)
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States:Electricity Transmission Lines - Ventyx, Velocity Suite;Grey Base:National

0 15 30 60 Miles

- |                          |                                  |                                |
|--------------------------|----------------------------------|--------------------------------|
| ■ Mask                   | ⚡ Hydroelectric Power Plant      | ⚙️ Pumped Storage Power Plant  |
| ▲ Surface Coal Mine      | 🔥 Natural Gas Power Plant        | ☀️ Solar Power Plant           |
| ▴ Underground Coal Mine  | ☢️ Nuclear Power Plant           | 🌪️ Wind Power Plant            |
| 🌱 Biomass Power Plant    | ⬤ Other Power Plant              | 🌲 Wood Power Plant             |
| ⚙️ Coal Power Plant      | 🔥 Other Fossil Gases Power Plant | 🏭 Petroleum Refinery           |
| 🌋 Geothermal Power Plant | 🛢️ Petroleum Power Plant         | 🛡️ Strategic Petroleum Reserve |

<http://www.eia.gov/state/>

**Table 5. Electric Power Industry Generation of Electricity by Primary Energy Source, 1992, 1996, and 2001**  
(Megawatthours)

Energy Source	1992	1996	2001	Annual Growth Rate 1992-2001 (Percent)	Percentage Share 1992	Percentage Share 1996	Percentage Share 2001
<b>Ohio</b>							
Coal .....	120,529,191	128,125,332	118,766,821	-0.2	87.6	88.7	83.5
Petroleum .....	195,228	267,240	406,434	8.5	.1	.2	.3
Natural Gas .....	212,669	195,917	336,372	5.2	.2	.1	.2
Nuclear .....	14,805,499	13,919,390	15,463,762	.5	10.8	9.6	10.9
Hydroelectric .....	244,352	392,474	510,785	8.5	.2	.3	.4
Other Renewable .....	309,613	0	0	-100.0	.2	.0	.0
<b>Total Utility .....</b>	<b>136,296,552</b>	<b>142,900,353</b>	<b>135,484,174</b>	<b>-1</b>	<b>99.0</b>	<b>98.9</b>	<b>95.2</b>
Coal .....	720,755	515,610	5,446,416	25.2	.5	.4	3.8
Petroleum .....	62,894	36,633	10,268	-18.2	.0	.0	.0
Natural Gas .....	127,567	214,353	588,045	18.5	.1	.1	.4
Other Gases .....	73,545	176,515	301,947	17.0	.1	.1	.2
Hydroelectric .....	8,813	4,880	0	-100.0	.0	.0	.0
Other Renewable .....	371,600	588,871	430,961	1.7	.3	.4	.3
<b>Total Nonutility .....</b>	<b>1,365,174</b>	<b>1,536,862</b>	<b>6,777,636</b>	<b>19.5</b>	<b>1.0</b>	<b>1.1</b>	<b>4.8</b>
Coal .....	121,249,946	128,640,942	124,213,237	.3	88.1	89.1	87.3
Petroleum .....	258,122	303,873	416,702	5.5	.2	.2	.3
Natural Gas .....	340,236	410,270	924,417	11.7	.2	.3	.6
Other Gases .....	73,545	176,515	301,947	17.0	.1	.1	.2
Nuclear .....	14,805,499	13,919,390	15,463,762	.5	10.8	9.6	10.9
Hydroelectric .....	253,165	397,354	510,785	8.1	.2	.3	.4
Other Renewable .....	681,213	588,871	430,961	-5.0	.5	.4	.3
<b>Total Industry .....</b>	<b>137,661,726</b>	<b>144,437,215</b>	<b>142,261,810</b>	<b>.4</b>	<b>100.0</b>	<b>100.0</b>	<b>100.0</b>

**Table 6. Utility Delivered Fuel Prices for Coal, Petroleum, and Natural Gas, 1992, 1996, and 2001**

Fuel	1992	1996	2001	Annual Growth Rate 1992-2001 (Percent)
<b>Ohio</b>				
Coal (2001 cents per million Btu) .....	163.9	140.5	131.0	-2.4
Average heat value (Btu per pound) .....	11,983	12,056	11,823	-.1
Average sulfur Content(percent) .....	2.6	2.1	2.1	-2.4
Petroleum (2001 cents per million Btu) .....	266.0	364.0	600.9	9.5
Average heat value (Btu per gallon) .....	426,444	355,668	139,451	-11.7
Average sulfur Content(percent) .....	3.6	2.1	.0	-100.0
Gas (2001 cents per million Btu) .....	255.5	351.1	797.2	13.5
Average heat value (Btu per cubic foot) .....	1032.9	1027.7	1024.8	-.1

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Summary: Exhibit OMAEG Ex 6 electronically filed by Mr. Ken Spencer on behalf of  
Armstrong & Okey, Inc.